2020 Groundwater Monitoring Report

Halls Glen Landfill Site
(PC of A A341004)
Township of Douro-Dummer
County of Peterborough

GHD | 347 Pido Road Unit 29, Peterborough, Ontario, K9J 6X7 Canada

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Enclosures

1. Introduction

The following report presents the results of the 2020 groundwater monitoring program that was completed for the Halls Glen Landfill Site in the Township of Douro-Dummer (formerly Township of Dummer) of the County of Peterborough. The monitoring program was conducted in accordance with the scope of work as presented by our proposal dated October 24, 2013 as well as additional requirements outlined in various Ministry of the Environment, Conservation and Parks (MECP) Memorandums.

2. Background

The Halls Glen Landfill Site is situated along the south side of County Road No. 6, 10km north of the community of Warsaw. The Geologic Plan, Plate 1, illustrates the location of the landfill with respect to nearby roads and watercourses. The location of the property is described as part of Lot 25, Concession 4 in the Township of Douro-Dummer.

Details regarding the operation of the landfill are outlined in the Provisional Certificate of Approval (PC of A) No. A 341004 dated October 8, 1980. The site also operates as a transfer station according to PC of A No. A 341007 dated October 25, 1991, and the amended Certificate of Approval (C of A) dated February 1, 2006 (see Appendix A). Two Memorandums were issued by MECP personnel in 2014 in response to reviewing the 2013 Groundwater Monitoring Report (see Appendix A).

A Memorandum dated June 23, 2014 provides commentary on the groundwater aspects of the 2013 monitoring program. A Memorandum dated August 7, 2014 presented comments relating to surface water. The MOE recommendations were implemented in the monitoring program in 2016. In general, the background data consisted of the following documents:

1. Current PC's of A issued by the MECP (Appendix A);
2. Excerpts from a report prepared by Hydroterra Limited regarding details of the monitoring well construction and borehole records (Appendix B);
3. MECP well record for monitor MW-7 that was installed in March, 1997 (Appendix B), MECP well records for monitors MW-8, 9, 10, 11 and 12 that were installed in the Fall of 2001 (Appendix B), MECP well record for monitor MW-13 (TW1-02) that was installed in October, 2002 (Appendix B)
4. Monitoring program and sampling protocol established for the landfill site by the former Township of Dummer (Appendix C); and
5. Reports prepared by Geo-Logic Inc./ GHD dated 1994, 1996 to 2006, 2009 to 2019 and AECOM Canada Ltd. dated 2007-2008 presenting the results of previous monitoring programs.

3. Site Conditions

3.1 General Geology

The site is situated in an area within the physiographic region known as the Dummer Moraine (Chapman and Putnam, 1984). This region is characterized by relatively flat, stoney ground covered with shallow deposits of glacial drift (till). Based on previous investigations, this material is covered locally by a layer of glaciolacustrine sand. Bedrock underlying the site consists of limestone belonging to the Lindsay Formation. The bedrock is part of the Trenton-Black River Group and is of Middle Ordovician age. Based on previous subsurface data, bedrock underlies the site at an average depth of 3.25m below the ground surface.

3.2 Existing Groundwater Monitors

In total, thirteen (13) groundwater monitoring stations were included during both monitoring circuits (spring and fall). The location of the monitors with respect to the property limits is illustrated on the Site Plan, Plate 2. Monitors MW 1, 2, 3, 4, 5, 6 and 7 consist of a 38mm diameter standpipe and a 50mm diameter piezometer, which have been constructed within a common borehole. Monitors MW 8, 9, 10, 11 and 13 consist of two (2) 50mm diameter piezometers with MW 12 having three (3) 50mm diameter piezometers that have been constructed within a common borehole. The monitoring stations are protected by a 150mm diameter steel locked well casing. In general, each monitor consists of a bedrock monitor and an overburden monitor with the exception of MW12 which has one (1) overburden monitor and two (2) bedrock monitors at different depths. Details pertaining to the construction of the monitoring wells are presented in Appendix B. A description of the monitoring station locations is summarized in Table 3.1.

During the summer of 2003, the landfill refuse area was prepared for closure. The landfill area was mounded and capped. It is our understanding that further work was conducted in 2004 and the work continued in 2005. Monitors MW-2 and MW-6 casing were extended to allow for the mounding of the landfill. Elevation data for these two (2) monitors have been calculated using past measurements of well depth compared to the 2004 recorded values.

Table 3.1 Monitoring Well Locations and Installation Dates

Monitor	Descriptive Location
MW 1-91 MW 13-02	up-gradient to existing landfill area
MW 2-91	within the central area of the refuse landfill
MW 3-91 MW 4-91 MW 5-91 MW 6-91 MW 7-97 MW 8-01 MW 9-01 MW 10-01 MW 11-01 MW 12-01	down-gradient of existing landfill

Note: See Site Plan for precise location of monitoring stations.

3.3 Pattern of Groundwater Movement

Groundwater monitoring was conducted during two sampling circuits in 2020. The water level data was acquired in May and November. The measurements are presented on Plate 5 and summarized in Table 3.2. Elevation data was not available for the monitor installed in October 2002 (MW-13). The ground water elevations for MW-2 and MW-6 for the monitoring circuits were adjusted to compensate for the extended casings using field measurements.

As is past monitoring events, monitors MW1-II, MW 2-I and MW2-II were dry during both sampling circuits while MW 5-II was dry for the fall circuit. The overburden groundwater monitoring data for May 2020 is presented on the Site Plan, Plate 2. Based on the data, the pattern of overburden and the deeper groundwater movement appears to be in a southeasterly direction.

Table 3.2 2020 Water Level Summary

Monitor Number	Elevation Top of Casing	Water Level Elevation	
		May 26, 2020	Nov. 18 2020
Overburden Monitors			
MW 1-II	271.24	dry	dry
MW 2-II	282.49	dry	dry
MW 3-II	269.23	268.09	267.49
MW 4-II	268.28	266.47	266.18
MW 5-II	271.35	268.1	dry
MW 6-II	271.01	268.07	267.11
MW 7-II	269.03	266.78	266.34
MW 8-II	270.74	265.93	264.25
MW 9-II	267.25	266.05	265.31
MW 10-II	267.97	265.75	265.53
MW 11-II	268.50	265.75	265.51
MW 12-I	268.00	266.02	266.06
MW 13-II	na	na	na
Bedrock Monitors			
MW 1-I	271.24	268.41	267.91
MW 2-I	282.53	dry	dry
MW 3-I	269.23	267.02	267.15
MW 4-I	268.28	266.29	266.03
MW 5-I	271.35	266.74	266.40
MW 6-I	271.01	266.37	266.10
MW 7-I	269.03	266.08	265.68
MW 8-I	270.74	266.12	265.36
MW 9-I	267.25	266.45	266.17
MW 10-I	267.97	265.85	265.49
MW 11-I	268.50	265.96	265.50
MW 12-II	268.00	266.35	266.16
MW 12-III	268.00	266.46	266.13
MW 13-I	na	na	na

Notes: All measurements are presented in metres. Monitor top of casing elevations provided by TSH.
(na) indicates information not available.

3.4 Horizontal Hydraulic Gradient

Horizontal hydraulic gradient is simply the slope of the water table or potentiometric surface. It is the change in hydraulic head over the change in distance between the two monitoring wells or dh/dl. In mathematical terms, horizontal gradient is rise over run. The hydraulic gradient has been calculated based on 2019 data.

dh/dl= difference in head / horizontal distance between wells. $(h_2 - h_1) / L$

All well locations were recorded using the Ministry of Natural Resources (MNR) Topographical mapping and plotted on the Site Plan, Plate 2. The distances between the wells were measured after plotting well locations on the MNR mapping for the site. Water level elevation was obtained from Table 3.2.

Overburden wells for the site are divided into shallow and deeper wells. Two gradients per monitoring period were calculated for each level of overburden wells for the spring monitoring period as most were dry during the fall. The average horizontal gradient for the shallow overburden wells was 11.8 m/km. The average horizontal gradient for the deeper overburden wells was 2.1 m/km. The results are summarized on Table 3.3.

Three gradients of bedrock wells were calculated for each monitoring period. The average horizontal gradient within the bedrock is calculated at 3.4 m/km. The results of the bedrock gradient analysis are summarized on Table 3.4.

Table 3.3 Hydraulic Gradient – Overburden Wells

Monitoring Wells	Shallow / Deep Spring / Fall 2019	Groundwater Elevation (m)	Distance Between Wells (km)	Hydraulic Gradient (m/km)
MW 3-II MW 4-II	Shallow / Spring	268.09 266.47	0.095	17.05
MW 3-II MW 7-II	Shallow / Spring	268.09 266.78	0.087	15.06
MW 6-II MW 11-II	Deep / Spring	268.07 267.05	0.28	1.14
MW 9.II MW 12-I	Deep / Spring	266.05 266.02	0.23	0.13
MW 3-II MW 4-II	Shallow / Fall	267.49 266.18	0.095	13.79
MW 3-II MW 7-II	Shallow / Fall	267.49 266.34	0.87	1.32
MW 6-II MW 11-II	Deep / Fall	267.11 265.51	0.28	5.71
MW 12-I MW 9-II	Deep / Fall	266.06 265.72	0.23	1.48
Average	Shallow		0.48	11.80
Average	Deep		0.26	2.12

Table 3.4 Hydraulic Gradient – Bedrock Wells

Monitoring Wells	Spring/Fall 2019	Groundwater Elevation (m)	Distance Between Wells (km)	Hydraulic Gradient (m/km)
MW 1-I MW 5-I	Spring	268.41 266.74	0.22	7.59
MW 8-I MW 7-I	Spring	266.12 266.08	0.38	0.11
MW 12-II MW 10-I	Spring	266.46 265.85	0.25	2.44
MW 1-I MW 5-I	Fall	267.91 266.40	0.22	6.86
MW 7-I MW 8-I	Fall	265.68 265.36	0.38	1.28
MW 12-II MW 10-I	Fall	266.13 265.49	0.25	2.56
Average	Spring		0.28	3.2
Average	Fall		0.28	3.6
Yearly Average				3.4

3.5 Hydraulic Conductivity

The hydraulic conductivity of a soil is described as a measure of the soil's ability to transmit water. Slug tests were performed in 2009 on two overburden and two bedrock wells in order to assess the permeability of the two layers present at the site. The results of the testing indicate that the overburden soils to be silty sand with a relatively high hydraulic conductivity. The bedrock results indicate this layer to be fractured limestone. Table 3.5 summarizes the results of slug tests performed at the site. The graphs of the hydraulic conductivity testing are presented in Appendix E.

Table 3.5 Hydraulic Gradient – Bedrock Wells

Location	Test Type	Hydraulic Conductivity (cm/s)	Geometric Mean K (cm/s)	Representative Aquifer
MW-3-1 MW-3-1	Falling Head Rising Head	6E-03 3E-03	10E-03	Fractured limestone Fractured limestone
MW-7-2 MW-7-2	Falling Head Rising Head	3E -02 2E-02	10E-02	Silty sand, clean sand Silty sand, clean sand
MW-8-2 MW-8-2	Falling Head Rising Head	2E-02 4E-02	10E-02	Silty sand Silty sand, clean sand
MW-8-1 MW-8-1	Falling Head Rising Head	4E-03 2E-03	10E-03	Fractured limestone Fractured limestone

4. Monitoring Program

GHD followed the established sampling and monitoring protocol for the Halls Glen landfill site during the 2020 season. Details of this protocol are summarized in Appendix C. An overview of the protocol is outlined below.

1. Field work to be carried out at all thirteen (13) monitoring stations during the spring and fall seasons.
2. Field work and sampling to be completed at four (4) residential wells during the spring and fall sampling period. Two (2) surface water stations to be sampled during both monitoring circuit.
3. Methane gas hydrogen sulphide generation was measured at each well using a portable multi-gas indicator.
4. Water levels were then recorded for each monitor prior to well purging.
5. Three to five measured casing volumes were then removed from each monitor in order to ensure that representative groundwater samples were obtained.
6. In-situ chemical testing was conducted during the purging operation in order to determine a stabilized water quality condition. The in-situ testing included parameters such as temperature, conductivity, pH, ORP and DO.
7. After the purging operation, representative samples of groundwater were collected in proper containers with appropriate preservatives where needed.
8. The water samples were delivered to SGS Laboratories in Lakefield. Sampling was carried out as per previous sampling circuits.
9. Reviewed slug testing on wells to determine hydraulic conductivity values as requested by MECP review (dated September 2, 2009) of the Halls Glen 2008 Monitoring Report prepared by AECOM Canada Ltd. Hydraulic Gradients were calculated using well locations and groundwater elevations.

5. Water Quality Data

5.1 General

Representative groundwater samples from each of the monitors were subjected to chemical testing for specified parameters. The parameters tested included those listed in Column 1 of Schedule 5 (Comprehensive List) in the spring and Column 2 (Indicator List) in the fall, of the Landfill Standards: A Guideline on Regulatory and Approval Requirements for New or Expanding Sites for the deeper wells. All metals were analyzed for the parameters listed in Schedule 5 Column 1 for all wells. In addition, selected samples were analyzed for volatile organic compounds (VOCs) to evaluate any trends that may develop.

The surface water stations and shallow monitors that discharge to surface water were analyzed for the parameters listed in Column 3 of Schedule 5 of the Landfill Standards Guideline (Comprehensive List for Surface Water). The certificates of analysis are included in Appendix D.

5.2 Overburden Monitors

As in the past, monitor MW 1-II and MW 2-II were measured dry during the spring and fall sampling period. MW 5-II which usually has had insufficient water for sampling did generate enough water for sampling in the spring but not in the fall sampling circuit. In general, the groundwater levels in the monitors were found to be at normal elevation in the spring but lower in the fall. The chemical results from the shallow wells (where samples were obtained) have been summarized in Tables 5.1 and 5.2.

The data is presented with the Ontario Drinking Water Standards (ODWS) and Provincial Water Quality (PWQO) for comparison purposes. As in past reports, the monitors located closest to the former landfill area (MW-3, MW-5-II and MW- 6-II) had the highest number of the parameters exceeding the PWQO and ODWS during both sampling circuits. MW 7-II that generally has multiple exceedances had very few in 2020. Iron and manganese were elevated in down-gradient monitor MW 10-II during both sampling circuits. Although Iron has been historically elevated for the area and is interpreted to be naturally elevated this should be closely monitored for any upwards trends. Elevated levels of total dissolved solids (TDS) and Alkalinity were reported in some wells during both sampling periods. MW-4-II that has in the past had exceedances for some parameters, met all analyzed parameters in 2020.

Although there were still exceedances of the ODWS and PWQO for some parameters there are no upward trends in the remaining monitors or in the parameters indicating exceedances. Future monitoring programs should continue to monitor these parameters to evaluate potential environmental concerns.

As in past reports, the monitoring data indicates that the monitoring stations located near the landfill area are being impacted by the landfill. The following overburden wells had parameters that exceeded the ODWS in 2020.

Spring 2020 Circuit Exceedances of ODWS

Alkalinity	MW 3-II, 5-II, 6-II
Iron	MW 5-II, 6-II 10-II, 11-II
TDS	MW-3-II, 5-II, 6-II
Manganese	MW 3-II, 5-II, 6-II, 7-II, 10-II

Fall 2020 Circuit Exceedances of ODWS

Alkalinity	MW 3-II, 6-II
Iron	MW 3-II, MW 6-II, 10-II, MW 11-II
TDS	MW 3-II, 6-II, MW 7-II
Manganese	MW 3-II, MW 6-II, MW 10-II

The MECP in their 2014 memorandum indicated that all shallow wells that possibly discharge to the wetland located southeast of the landfill, be analyzed for the same parameters as surface water and must be compared to the PWQO standards. It was once again noted that the majority of exceedances were from monitoring wells MW 3-II, 5-II and 6-II that are located next to the landfill. These wells had the most exceedances while monitors further down gradient showed very few exceedances. The following overburden wells had parameters that exceeded the PWQO in 2020.

Spring 2020 Circuit Exceedances of PWQO

Iron	MW-5-II, 6-II, 10-II, 11-II
Boron	MW-3-II, 5-II, 6-II
Ammonia	MW-5-II, 6-II

Fall 2020 Circuit Exceedances of PWQO

Iron	MW 3-II, MW 6-II, 10-II, MW 11-II
Ammonia	MW 6-II
Boron	MW 3-II, 6-II
Copper	MW 6-II

In addition to the aforementioned parameters, monitors MW-3-II, MW-4-II, MW-5-II, MW-6-II, MW-7-II and MW-11-II were sampled for VOCs during the spring and fall sampling circuits. The monitors did not yield detectable levels of VOCs in either the spring or fall sampling circuits with the exception on a minor exceedance for monochlorobenzene in MW 6-II. All levels are within the ODWS and PWQO. The results of the chemical testing are presented in Appendix D.

Table 5.1 May 2020 Overburden Monitors

Parameters	Overburden Monitors											ODWS	PWQO
	MW 3-II	MW 4-II	MW 5-II	MW 6-II	MW 7-II	MW 8-II	MW 9-II	MW 10-II	MW 11-II	MW 12-1	MW 13-II		
May 26, 2020													
BOD	14	4	66	6	< 4	< 4	< 4	4	7	5	< 4	**---**	**---**
TSS	379	3020	800	115	264	20	6	42	8	8	56	**---**	**---**
Alkalinity	674	382	780	1090	212	235	233	243	227	278	318	**30-500**	**---**
pH	7.36	7.79	7.18	7.25	7.95	7.85	7.90	7.83	7.76	7.71	7.41	**6.5-8.5**	**6.5-8.5**
Conductivity	1360	415	1560	2190	383	452	591	618	520	684	862	**---**	**---**
TDS	814	251	900	1370	223	240	311	389	274	397	526	**500**	**---**
COD	26	10	62	102	10	16	< 8	8	13	< 8	15	**---**	**---**
Phosphorus	0.27	0.55	0.32	0.08	0.09	< 0.03	< 0.03	0.04	< 0.03	< 0.03	0.03	**---**	**---**
TKN	1.3	< 0.5	13.5	32.8	< 0.5	< 0.5	< 0.5	0.8	0.6	< 0.5	< 0.5	**---**	**---**
Ammonia	0.6	< 0.1	13.6	31.8	< 0.1	< 0.1	< 0.1	0.9	0.7	< 0.1	0.2	**---**	****3.3**
Phenolics	< 0.001	0.001	0.005	0.005	0.002	< 0.001	< 0.001	< 0.001	0.002	0.002	0.003	**---**	**0.005**
Sulphate	89	4	9	150	5	6	10	10	17	23	22	**500**	**--**
Chloride	54	5	110	92	10	9	50	54	21	55	85	**250**	**---**
Nitrite	0.05	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	**1.0**	**---**
Nitrate	1.76	< 0.06	0.07	< 0.06	< 0.06	0.15	< 0.06	< 0.06	0.13	< 0.06	1.27	**10**	**---**
Mercury	0.02	0.02	0.02	0.04	0.02	0.01	< 0.01	0.01	0.03	0.03	0.02		
Arsenic	0.0003	<0.0002	0.0014	0.0006	< 0.0002	<0.0002	0.0004	<0.0002	<0.0002	< 0.0002	<0.0002	**0.002**	**0.05**
Barium	0.157	0.0900	0.700	0.544	0.0838	0.0811	0.285	0.491	0.504	0.621	0.158	**200**	**---**
Boron	0.466	0.022	0.427	0.739	0.046	0.026	0.143	0.106	0.150	0.106	0.049	**1.0**	**0.2**
Calcium	222	90.8	264	342	74.6	80.1	80.8	98.5	102	115	149	**---**	**---**
Cadmium	0.000039	<0.000003	0.000017	0.000014	<0.000003	0.000025	0.000007	<0.000003	0.000005	<0.000003	0.000024	**0.005**	**0.0002**
Chromium	0.00032	0.00020	0.00079	0.00113	0.00019	0.00026	0.00023	0.00016	0.00018	0.00013	0.00026	**0.05**	**---**
Cooper	0.0020	0.0007	0.0010	0.0051	0.0006	0.0014	<0.0002	0.0004	0.0005	0.0003	0.0016	**1.0**	**0.005**
Iron	0.028	< 0.007	26.1	7.21	< 0.007	0.024	0.30	0.886	2.13	0.020	0.016	**0.3**	**0.3**
Potassium	22.9	0.911	27.2	38.4	0.631	0.738	2.74	2.46	2.86	3.34	4.01	**---**	**---**
Magnesium	27.2	2.64	29.0	42.4	3.18	2.68	8.76	12.7	12.7	12.9	5.68	**---**	**---**
Manganese	0.822	0.00073	8.52	8.49	0.00030	0.00434	0.0332	0.0951	0.0314	0.00518	0.00127	**0.05**	**---**
Sodium	107	7.43	77.1	90.8	12.6	23.5	44.4	9.83	8.39	16.9	46.8	**200**	**---**
Lead	0.00001	0.00001	0.00001	0.00002	0.00001	0.00001	0.00009	0.00001	0.00003	0.00001	0.00008	**0.01**	**0.005**
Zinc	< 0.002	< 0.002	0.006	0.003	< 0.002	0.009	0.002	0.002	0.008	0.002	0.012	**5.0**	**0.03**

Notes: All results in mg/L with the exception of Conductivity (uS/cm) and pH, (---) indicates no data, (np) indicates not performed. Highlighted values exceed ODWS or PWQO.

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Table 5.2 October 2020 Overburden Monitors

Parameters	Overburden Monitors										ODWS	PWQO
	MW 3-II	MW 4-II	MW 6-II	MW 7-II	MW 8-II	MW 9-II	MW 10-II	MW 11-II	MW 12-I	MW 13-II		
Nov. 18, 2020												
BOD	5	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	**---**	**---**
TSS	1200	1420	92	323	22	2	56	17	8	45	**---**	**---**
Alkalinity	841	490	973	397	283	295	258	242	253	314	**30-500**	**---**
pH	7.63	7.76	7.67	7.78	7.81	7.91	7.79	7.77	7.91	7.77	**6.5-8.5**	**6.5-8.5**
Conductivity	1360	680	1940	840	838	791	623	547	595	666	**---**	**---**
TDS	900	406	1200	611	480	437	351	343	351	391	**500**	**---**
COD	< 8	< 8	98	< 8	< 8	< 8	< 8	< 8	< 8	10	**---**	**---**
Phosphorus	0.56	0.52	0.04	0.06	< 0.03	< 0.03	0.08	0.03	< 0.03	0.04	**---**	**---**
TKN	2.2	< 0.5	28.7	< 0.5	< 0.5	< 0.5	1.0	0.8	< 0.5	< 0.5	**---**	**---**
Ammonia	1.5	< 0.1	27.0	< 0.1	< 0.1	< 0.1	1.0	0.9	0.1	< 0.1	**---**	****3.3**
Phenolics	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001	<0.001	**---**	**0.005**
Sulphate	62	13	64	19	10	10	6	9	25	12	**500**	**--**
Chloride	59	53	140	53	120	77	53	43	44	38	**250**	**---**
Nitrite	0.49	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	**1.0**	**---**
Nitrate	5.18	1.49	0.14	1.62	0.67	1.17	< 0.06	< 0.06	< 0.06	1.12	**10**	**---**
Mercury	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Arsenic	0.0003	<0.0002	0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	**0.002**	**0.05**
Barium	0.240	0.128	0.401	0.183	0.162	0.176	0.416	0.358	0.311	0.113	**200**	**---**
Boron	0.408	0.034	0.557	0.062	0.023	0.039	0.096	0.164	0.110	0.050	**1.0**	**0.2**
Calcium	296	115	305	134	145	126	99.9	93.4	113	126	**---**	**---**
Cadmium	0.000078	0.000004	0.000014	<0.000003	<0.000003	0.000010	<0.000003	<0.000003	<0.000003	0.000006	**0.005**	**0.0002**
Chromium	0.00058	0.00025	0.00104	0.00034	0.00031	0.00028	0.00022	0.00021	0.00028	0.00031	**0.05**	**---**
Cooper	0.0061	0.0008	0.0145	0.0015	0.0011	0.0042	0.0008	0.0004	0.0004	0.0010	**1.0**	**0.005**
Iron	1.39	0.011	4.59	0.016	0.015	0.015	3.29	1.06	0.024	0.046	**0.3**	**0.3**
Potassium	26.6	1.28	33.4	2.60	1.21	2.65	2.60	3.72	2.78	2.97	**---**	**---**
Magnesium	24.1	3.24	33.1	7.13	5.28	4.27	10.4	12.3	9.82	3.55	**---**	**---**
Manganese	1.01	0.00254	6.34	0.00294	0.00097	0.00331	0.0580	0.0198	0.0164	0.00328	**0.05**	**---**
Sodium	45.7	16.1	91.0	17.0	29.4	44.6	6.93	6.20	11.2	25.6	**200**	**---**
Lead	0.00127	0.00004	0.00009	0.00007	0.00004	0.00004	0.00004	0.00004	0.00003	0.00005	**0.01**	**0.005**
Zinc	0.005	< 0.002	0.003	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	**5.0**	**0.03**

Notes: All results in mg/L with the exception of Conductivity (uS/cm) and pH, (---) indicates no data, (np) indicates not performed. Highlighted values exceed ODWS or PWQO

5.3 Bedrock Monitors

All of the bedrock monitors were sampled during the 2020 sampling circuits with the exception of MW 2-I, which was dry during both circuits. MW 2-I has been historically dry. The results of the testing are compared in Tables 5.3 and 5.4 against the ODWS. In general, the results are similar to past years with MW 5-I and MW 6-I yielding the most exceedances. MW 3-I and 4-I that yielded exceedances in the past had only an exceedance at MW 4-I for manganese in the spring in 2020. All of these wells are directly adjacent to the landfill. As in past years, iron and manganese are elevated in other monitors.

TDS that is generally elevated in down-gradient monitors was not this year. It is interpreted that these parameters are naturally elevated since the background monitors MW 1-I and MW 13-I exceeded the criteria for TDS. Future monitoring programs should continue to monitor these parameters to evaluate potential environmental concerns. The results of the chemical testing are presented in Appendix D.

The following deeper bedrock wells had parameters that exceeded the ODWS in 2020.

Spring 2020 Circuit Exceedances of ODWS

Alkalinity	MW 5-I
TDS	MW 1-I (background) 5-I, 6-I, 13-I (background)
Iron	MW 5-I, 6-I
Manganese	MW 4-I, 5-I, 6-I, 9-I, 10-I, 11-I, 12-II

Fall 2020 Circuit Exceedances of ODWS

Alkalinity	MW 5-I
TDS	MW 1-I (background) 4-I, 5-I, 6-I
Iron	MW 5-I, 6-I
DOC	MW 5-I
Manganese	MW 5-I, 6-I, 8-I, 9-I, 10-I 11-I, 12-II

In addition to the aforementioned parameters, monitors MW-3-I, MW-4-I, MW-5-I, MW-6-I, MW-7-I and MW-11-I were sampled for VOCs during the spring and fall sampling circuits. All other wells were sampled for the VOC parameters listed in Schedule 5 Column 1 during the spring circuit. The monitors yielded results below the detectable levels of VOCs in both the spring and fall sampling circuits with the exception Monochlorobenzene in Monitor MW 5-I in the fall sampling period which reported levels just above the detection limit. Generally only monitors close to the landfill have yielded detectable VOC levels for a some parameters but only MW 5-I reported detectable levels this year. The results of the chemical testing are presented in Appendix D.

Table 5.3 May 2020 Bedrock Monitors

Parameters	Bedrock Monitors													ODWS
	MW 1-I	MW 3-I	MW 4-I	MW 5-I	MW 6-I	MW 7-I	MW 8-I	MW 9-I	MW 10-I	MW 11-I	MW 12-II	MW 12-III	MW 13-I	
May 26, 2020														
Alkalinity	297	364	329	609	470	359	290	258	233	241	303	296	251	**30-500**
pH	7.79	7.50	7.52	7.48	7.60	8.08	7.84	7.73	7.80	7.83	7.73	7.68	7.77	**6.5-8.5**
Conductivity	1210	876	725	1200	1130	790	794	592	623	607	732	681	884	**---**
TDS	746	480	389	711	617	489	451	337	377	391	394	403	503	**500**
COD	< 8	14	8	39	16	< 8	< 8	37	< 8	11	23	< 8	8	**---**
Phosphorus	0.13	0.10	0.17	0.06	0.08	0.09	0.06	< 0.03	< 0.03	< 0.03	0.08	0.05	< 0.03	**---**
TKN	< 0.5	3.3	1.2	6.4	6.8	< 0.5	< 0.5	0.6	< 0.5	0.9	< 0.5	< 0.5	< 0.5	**---**
Ammonia	< 0.1	3.1	1.0	6.9	7.3	< 0.1	< 0.1	0.6	0.2	0.8	0.4	< 0.1	< 0.1	**---**
Phenolics	< 0.002	< 0.002	< 0.002	0.005	< 0.002	0.003	< 0.002	0.003	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	**---**
Sulphate	90	24	15	13	37	32	19	63	25	43	75	23	10	**500**
Chloride	190	57	47	83	92	51	86	16	53	34	34	52	140	**250**
Nitrite	< 0.03	0.07	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	**1.0**
Nitrate	2.92	1.22	1.10	0.24	< 0.06	0.17	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	**10**
DOC	2	6	2	14	7	1	2	1	1	2	1	1	2	**5**
Mercury	0.01	0.02	0.01	0.02	0.02	0.01	0.01	< 0.01	0.02	0.01	0.01	0.01	0.01	
Arsenic	<0.0002	<0.0002	<0.0002	0.0004	0.0003	0.0006	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	**0.002**
Barium	0.243	0.120	0.125	0.504	0.330	0.133	0.0948	0.689	0.848	0.683	0.195	0.0340	0.110	**200**
Boron	0.098	0.107	0.081	0.276	0.207	0.482	0.101	0.531	0.221	0.331	0.621	0.077	0.017	**1.0**
Calcium	178	120	124	230	172	32.3	105	53.0	90.9	90.3	82.3	127	108	**---**
Cadmium	0.000009	0.000016	0.000017	0.000007	0.000006	0.000004	<0.000003	<0.000003	<0.000003	0.000005	<0.000003	0.000003	0.000009	**0.005**
Chromium	0.00019	0.00024	0.00018	0.00054	0.00026	0.00012	0.00017	0.00017	0.00018	0.00041	0.00020	0.00009	0.00020	**0.05**
Cooper	0.0019	0.0005	0.0008	0.0018	0.0003	0.0005	0.0008	0.0004	0.0002	0.0004	0.0003	0.0004	0.0011	**1.0**
Iron	< 0.007	0.008	0.050	3.74	0.410	< 0.007	0.017	0.015	0.048	0.014	0.038	< 0.007	< 0.007	**0.3**
Potassium	5.00	5.12	4.74	21.8	16.8	2.16	3.15	5.33	3.87	3.88	3.56	1.65	2.51	**---**
Magnesium	17.5	5.10	6.27	22.7	13.9	8.37	12.0	24.4	21.5	22.8	31.2	5.49	3.02	**---**
Manganese	0.00002	0.0219	0.212	2.59	1.72	0.00021	0.00405	0.0699	0.119	0.0680	0.110	0.0627	0.00007	**0.05**
Sodium	87.8	30.4	35.1	55.1	75.1	163	52.1	56.2	14.1	14.7	47.9	16.1	70.3	**200**
Lead	0.00002	0.00001	0.00003	0.00001	0.00013	0.00002	<0.00001	<0.00001	<0.00001	0.00002	0.00001	0.00002	0.00006	**0.01**
Zinc	0.002	0.002	< 0.002	< 0.002	< 0.002	0.003	0.004	< 0.002	0.006	0.007	0.003	< 0.002	0.004	**5.0**

Notes: All results in mg/L with the exception of Conductivity (uS/cm) and pH, (---) indicates no data, (np) indicates not performed. Highlighted values exceed ODWS.

Table 5.4 October 2020 Bedrock Monitors

Parameters	Bedrock Monitors													ODWS
	MW 1-I	MW 3-I	MW 4-I	MW 5-I	MW 6-I	MW 7-I	MW 8-I	MW 9-I	MW 10-I	MW 11-I	MW 12-II	MW 12-III	MW 13-I	
Nov. 18, 2020														
Alkalinity	304	343	390	661	454	367	287	335	241	290	291	334	245	**30-500**
pH	7.81	7.39	7.26	7.31	7.49	8.08	7.73	8.24	7.91	8.09	7.79	7.70	7.76	**6.5-8.5**
Conductivity	1250	772	862	1470	1300	808	791	598	631	657	708	663	517	**---**
TDS	737	451	469	823	749	466	440	320	351	346	431	394	294	**500**
COD	< 8	< 8	< 8	49	19	< 8	< 8	35	< 8	10	< 8	< 8	< 8	**---**
Ammonia	< 0.1	< 0.1	0.4	11.3	6.7	< 0.1	< 0.1	0.7	0.3	0.8	0.4	< 0.1	< 0.1	**---**
Sulphate	87	14	12	10	33	29	18	66	25	64	80	21	7	**500**
Chloride	180	43	57	110	120	48	85	15	51	28	32	47	21	**250**
Nitrate	2.84	1.26	2.65	0.53	0.12	0.23	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	0.35	**10**
DOC	2	2	2	12	5	1	1	1	1	< 1	1	1	1	**5**
Barium	0.227	0.105	0.143	0.512	0.278	0.130	0.0976	0.612	0.662	1.74	0.180	0.0292	0.0716	**200**
Boron	0.102	0.040	0.049	0.304	0.176	0.432	0.099	0.468	0.201	0.438	0.566	0.069	0.023	**1.0**
Calcium	177	118	157	225	172	35.4	111	57.5	96.3	101	86.0	134	79.1	**---**
Iron	<0.007	<0.007	0.021	25.0	1.63	<0.007	0.019	<0.007	0.023	<0.007	0.015	0.056	<0.007	**0.3**
Magnesium	15.2	4.13	5.31	20.0	11.5	7.82	11.4	20.8	20.1	27.3	27.0	5.37	2.22	**---**
Sodium	75.5	30.2	36.0	64.3	63.5	143	48.5	47.0	12.9	15.9	39.0	13.2	34.0	**200**
Arsenic	<0.0002	<0.0002	<0.0002	0.0021	0.0004	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	**0.002**
Cadmium	0.000003	0.000007	0.000006	0.000009	<0.000003	0.000011	0.000003	<0.000003	<0.000003	<0.000003	<0.000003	0.000003	<0.000003	**0.005**
Chromium	0.00087	0.00075	0.00096	0.00111	0.00080	0.00081	0.00077	0.00067	0.00071	0.00067	0.00058	0.00072	0.00073	**0.05**
Cooper	0.0016	0.0012	0.0010	0.0006	0.0018	0.0009	0.0012	<0.0002	0.0003	<0.0002	<0.0002	0.0003	0.0007	**1.0**
Lead	0.00001	0.00001	0.00002	0.00003	0.00015	0.00006	<0.00001	<0.00001	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	**0.01**
Manganese	0.00109	0.00396	0.0509	2.00	1.38	0.00271	0.0564	0.0583	0.124	0.0643	0.09681	0.0193	0.00012	**0.05**
Potassium	5.17	4.75	4.75	25.1	14.6	2.29	3.58	5.42	4.46	5.00	3.70	1.66	2.16	**---**
Lead	0.003	<0.002	<0.002	0.002	0.003	0.007	<0.002	<0.002	0.003	<0.002	0.004	<0.002	<0.002	**0.01**
Zinc	0.002	0.002	<0.002	<0.002	<0.002	0.003	0.004	<0.002	0.006	0.007	0.003	<0.002	0.004	**5.0**

Notes: All results in mg/L with the exception of Conductivity (uS/cm) and pH, (---) indicates no data, (np) indicates not performed. Highlighted values exceed ODWS.

5.4 Reasonable Use Concept

Reference is made to previous monitoring reports that presented estimated criteria for significant contaminant indicators. The Reasonable Use Concept evaluation was developed from MECP Guideline B-7 and Guideline B-7-1 Determination of Contaminant Limits and Attenuation Zones. The criterion is based on the following equation.

$$X = B + F(W - B)$$

Where:

X = maximum acceptable concentration at property boundary

B = background concentration of parameter

F = factor of 0.5 for aesthetic parameter and 0.25 for health related parameter

W = ODWS value for each particular parameter

The MECP (in their June 23, 2014 Memorandum) indicated that RUC should be applied to the parameters of Schedule 5 Column 2 indicator list for groundwater leachate for parameters that had ODWS. The RUC was applied to samples from both the overburden and bedrock monitors. Background water quality for the overburden monitors utilized the chemical results from monitor MW 13 while background water quality for the bedrock monitors utilized the chemical results from the bedrock monitor at stations MW 1 and MW 13. The results for the shallow monitors RUC are illustrated on Plates 6A and 6C. The results for the bedrock monitors RUC are illustrated on plates 6B and 6D with the RUC exceedances for the shallow wells summarized below.

Spring 2020 Overburden Monitors Exceedances of RUC

Alkalinity	MW 3-II, 5-II, 6-II
TDS	MW 3-II, 5-II, 6-II
Iron	MW 5-II, 6-II, 8-II, 9-II, 10-II
Manganese	MW-3-II, 5-II, 6-II, 10-II
Barium	MW-5-II **

Fall 2020 Overburden Monitors Exceedances of RUC

Alkalinity	MW 3-II, MW 4-II**, 6-II
TDS	MW 3-II, 6-II, MW 7-II
Iron	MW 3-II, MW 6-II, 10-II, 11-II
Manganese	MW 3-II, 6-II, MW 9-II, MW 10-II

** indicates value within ODWS.

Exceedances for the bedrock monitors are listed below.

<u>Spring 2020 Bedrock Monitors Exceedances of RUC</u>

Alkalinity	MW-5-I, MW-6-I**
TDS	MW 5-1, MW-6-I
DOC	MW 3-1, 5-1, 6-1,
Barium	MW 9-I, MW 10-I, MW 11-1
Iron	MW-5-I, MW-6-I
Manganese	MW MW-4-I, 5-I, MW-6-I, MW-9-I, MW-10-I, MW-11-I, MW 12-II
Sodium	MW-7-I

<u>Fall 2020 Bedrock Monitors Exceedances of RUC</u>

Alkalinity	MW5-I, MW 6-I
TDS	MW-5-I, MW-6-I
DOC	MW 5-1 MW 6-I
Barium	MW 9-1, 10-1, 11-1
Iron	MW-5-I, MW-6-I
Manganese	MW-4-I, 5-I, MW-6-I, MW-8-I, MW-9-I, MW-10-I, MW-11-I, MW 12-II, MW-12-III

**indicates value within ODWS.

A historical review of past monitoring programs indicates elevated levels of parameters within the monitors immediately down-gradient of the refuse area. The 2020 monitoring indicated similar monitors exceeded RUC MAC as in the past. Based on the data off site significant impact has not been observed and it is anticipated that the potential for impact will decrease over time due to closure of the landfill site.

5.5 Historical Chemical Comparison

A MECP Memorandum, dated June 23, 2014, indicated that a historical comparison be conducted for the chemical results for all parameters in the MECP Schedule 5 Column 2 Indicator List for Groundwater and Leachate for all monitors. For monitors MW-1 to MW-7 the data dates back to 1993 while in the newer monitors MW-8 to MW-12 well the data is from 2001 to present. Background Monitor MW-13 data ranges from installation in 2006 to 2020. No data is available for this well for 2007-2008 as TSH could not locate it for sampling.

The review of the historical chemical data indicates that monitors within the landfill or near the mound experience more elevated parameters compared to those down gradient. For the most part the values for each parameter in each well either remain constant or show seasonal fluctuations with the occasionally spike that generally returns to normal.

The exception to this appears to be at Monitoring Location 6, which is located within the south-eastern portion of the landfill. The shallow groundwater monitor MW-6-II and the deeper monitor 6-I are both showing an increasing trend for Ammonia.

Although there appears to be an upwards trend at monitoring location MW-6, the down-gradient monitors at locations MW-4 and MW-7, are not showing increasing trends for the Schedule 5 Column 2 parameters. Although there does appear to be a plume around MW-6 at this time it does not appear to be spreading to the south or east. The chemical comparison graphs are presented in Appendix F.

5.6 Residential Wells

Four (4) residential wells were sampled during the spring and fall of 2020. Residential Well R-1 well was abandoned in the summer of 2019 and a new monitoring well was established adjacent to the former well at a depth similar to the former dug well. The remaining three wells are deeper drilled wells (R2, R3 and R4). R1 and R2 are situated down-gradient of the landfill site and R3 and R4 are situated up-gradient. The wells were sampled and analyzed for the same parameters as the monitoring wells. The results of the 2020 residential well monitoring circuits are presented on Table 5.5 with the locations of the residential wells and the surface water stations presented on Plate 2.

As in past monitoring programs, the majority of the parameters tested are within the ODWS with respect to the residential wells. TDS (total dissolved solids) in R4 exceeded the criteria during the spring and fall sampling circuit. TDS is considered an aesthetic objective under the ODWS and has been historically elevated in some of the residential wells. R3 exceeded for iron and lead in the fall sample obtained. Iron levels in R-2 that have in the past exceeded the ODWS were within the criteria during both sampling circuits. The results of the sampling are presented in Appendix D. The 2020 sampling program did not yield any detectable concentrations of VOCs in the residential wells.

The results of the analyses indicate that the landfill appears to have had no impact on the surrounding residential wells. It should be noted that R-1 is located down-gradient of the landfill. This property is now part of the landfill property. Because of its location, it is our opinion that R-1 intercepts the shallow groundwater regime that represents the on-site conditions. In addition, the former well has been used for several years as a groundwater monitoring station that has resulted in a long history of chemical data. For these reasons, it is our opinion that R-1 should be used as a trigger point (RUC exceedance would trigger action) when evaluating the potential for off-site impacts from the former landfill operation. The only exceedance for R1 was alkalinity in the spring but not in the fall. No other parameters showed any exceedances of the RUC. The results for the R-1 monitor are summarized on Table 5.5 while the RUC summary for this well is illustrated on Plate 5E.

Table 5.5 2020 Residential Well Water Quality Summary

Parameters	Residential Monitors								ODWS
	R-1 May / 20	R-1 Nov. / 20	R-2 May / 20	R-2 Nov. / 20	R-3 May / 20	R-3 Nov. / 20	R-4 May / 20	R4 Nov. / 20	
Alkalinity	1710	298	254	270	237	277	304	347	30-500
pH	8.03	8.13	7.96	7.60	7.96	7.67	7.72	7.85	6.5-8.5
Conductivity	611	864	702	941	530	776	1130	1340	---
TDS	337	460	397	529	331	434	629	797	500
COD	< 8	< 8	9	< 8	< 8	< 8	< 8	18	---
Phosphorus	< 0.03		< 0.03		< 0.03		< 0.03		---
TKN	< 0.5		< 0.5		< 0.5		< 0.5		---
Ammonia	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	---
Phenolics	< 0.002		< 0.002		< 0.002		0.002		---
Sulphate	4	15	9	21	8	8	10	14	500
Chloride	58	92	59	140	41	81	210	220	250
Nitrite	< 0.03		< 0.03		< 0.03		< 0.03		1
Nitrate (as N)	0.09	1.78	1.77	0.54	2.16	0.81	0.56	220	10
DOC	3	1	1	2	3	2	2	4	5.0
Mercury	< 0.01		0.01		< 0.01		< 0.01		
Arsenic	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.025
Barium	0.0768	0.175	0.0877	0.103	0.0279	0.0915	0.114	0.125	1.0
Boron	0.013	0.033	0.011	0.029	0.026	0.021	0.016	0.031	5.0
Calcium	83.3	131	114	139	27.2	117	116	126	---
Cadmium	0.000015	0.000005	<0.000003	0.000005	0.000015	0.000009	0.000007	0.000007	0.005
Chromium	0.00017	0.00089	0.00011	0.00071	0.00010	0.00093	0.00029	0.00123	0.05
Copper	0.0009	0.0011	0.110	0.120	1.79	0.301	0.0705	0.169	5.0
Iron	< 0.007	0.022	< 0.007	0.013	0.009	0.017	0.011	0.008	0.3
Potassium	0.870	1.92	0.869	1.00	0.700	1.57	2.95	3.16	---
Magnesium	2.98		2.91		1.16		3.75		---
Manganese	0.00033	0.00343	0.00007	0.00038	0.0734	0.00318	0.00042	0.00022	0.05
Sodium	36.0	45.9	26.3	61.0	124	49.1	138	165	200
Lead	0.00002	0.00003	< 0.003	0.00048	0.297	0.00013	0.00156	0.00269	0.01
Zinc	0.004	0.003	0.00040	0.007	0.024	0.054	0.031	0.030	5.0

Notes: All results in mg/L with the exception of Conductivity (uS/cm) and pH, (---) indicates no data, (np) indicates not performed. Highlighted values exceed ODWS.

5.7 Surface Water Monitoring

Two surface water sampling station were also utilized during the May and October 2020 sampling period. The surface water station (S-1) is located down-gradient from the landfill site and is adjacent to R1. Surface Water location S-2 is a background surface water monitor that was added in the fall of 2014. The samples obtained were analyzed for the parameters listed in Column 3 of Schedule 5 of the Landfill Standards Guideline (Comprehensive List for Surface Water). In-field measurements were taken at the surface water stations as presented in Table 5.6. The results of the analyses are summarized in Table 5.7. The results of the analysis are included in Appendix D. All of the parameters tested are within their respective current Provincial Water Quality Objective (PWQO), Canadian Water Quality Objective (CWQO) and Aquatic Protection Value (APV) with the exception of phenolics for PWQO in both fall and spring samples for the background sample and Iron and Manganese in the background sample in the fall. It should be noted that the water samples obtained from S-2 in the fall were stagnant. It is our opinion that this is not representative of the flowing conditions.

Table 5.6 2020 Surface Water Field Measurements

Parameter	Field Measurement			
	S-1	S-2	S-1	S-2
	May, 2020	May, 2020	Nov. 2020	Nov. 2020
Temperature (°C)	18.0	18.1	2.7	0.4
pH	7.55	7.50	8.81	9.36
Conductivity (us/cm)	517	498	375	305
Dissolved Oxygen (mg/L)	8.29	6.04	10.2	10.5
ORP	145	151	120	100
Flow	Pond – Continuous Flow	Pond – Continuous Flow	Pond – Continuous Flow	Pond - Stagnant

Table 5.7 2020 Surface Water Data

Parameters	Sample Locations				APV	CWQG	PWQO
	S-1 May 2020	S-2 May 2020	S-1 Nov. 2020	S-2 Nov. 2020			
BOD	7	< 4	< 4	10			
TSS	15	27	4	34			
Alkalinity (mg/L)	232	225	267	220			
pH	8.10	7.76	7.61	7.72		6.0-9.0	6.5-8.5
Conductivity	570	558	717	604			
TDS	340	334	406	423			
COD	< 8	19	< 8	58			
TKN	< 0.5	< 0.5	< 0.5	0.7			
Ammonia	< 0.1	< 0.1	< 0.1	< 0.1			
Phenolics	< 0.001	**0.004**	< 0.001	**0.002**	0.04**	0.004	0.001
Sulphate	5	5	17	54			
Chloride (mg/L)	46	37	63	33	180	128	
Nitrite	< 0.03	< 0.03	< 0.03	0.05		0.06	
Nitrate	0.07	< 0.06	2.24	0.49		2.9	
Mercury	< 0.01	< 0.01	< 0.01	< 0.01			
Arsenic	0.0003	0.0003	< 0.0002	0.0008	0.150		
Barium	0.0956	0.109	0.132	0.106	2.30		
Boron	0.011	0.014	0.052	0.052	3.55	1.50	0.2
Calcium	101	104	117	111			
Cadmium	0.000011	0.000036	0.000008	0.000111	0.00021	0.000017	0.0005
Chromium	0.00028	0.00053	0.00046	0.00065	0.064		
Copper	0.0008	0.0036	0.0009	0.0050	0.0069		0.005
Iron (mg/L)	0.275	0.284	0.068	**0.316**	1.00*		0.3
Potassium	1.29	2.26	1.73	7.13			
Magnesium	3.07	3.32	4.59	4.80			
Manganese	0.0347	0.0271	0.0130	**0.0635**			0.05
Sodium	30.2	23.0	33.7	15.5			
Phosphorus	0.118	0.091	0.009	0.136			3.3***
Lead	0.00023	0.00078	0.00007	0.00048	0.02		0.005
Zinc	< 0.002	0.004	0.003	0.015	0.089	0.03	0.02

Notes: Highlighted values exceed standard, ** USA EPA Criterion, ** Lowest observed effect criterion*
**** Based on 10º Celcius at 8pH, All results in mg/L with the exception of Conductivity (uS/cm) and pH,*
PWQO=Provincial Water Quality Objective, CWQO=Canadian Water Quality Objective, APV=Aquatic Protection Value

5.8 Groundwater Trigger Mechanism

Groundwater trigger mechanisms and contingency planning have been developed with respect to VOCs parameters due to detected levels in down gradient wells in past monitoring events. For the down-gradient wells (MW-8, MW-9, MW-10 and MW-11), parameters that have maximum acceptable concentrations (MACs) should consider a trigger of 0.5 of the MAC. The VOC parameters that have interim MACs (IMACs) should consider a trigger of 0.75 of the IMAC. If concentrations of parameters exceed the trigger values, then the contingency plan(s) should be implemented.

For example, consider benzene with an MAC in the ODWS of 5 μg/L If a groundwater sample is greater than 2.5 μg/L, the contingency plan is triggered. The groundwater trigger mechanism was not exceeded for VOCs for any monitoring well during the 2020 monitoring period.

In addition, to address the MECP concern for a trigger mechanism for the RUC parameters prior to reaching the property boundary, R-1 was selected to be representative of the shallow groundwater on-site. The original stone dug well was abandoned in 2019 and replaced shallow groundwater monitor. At this location, the potential for off-site impact of the RUC parameters in the shallow groundwater was evaluated as an early warning sign (see Plate 6-E for 2020 results). The only exceedances of the RUC was for alkalinity in the spring. Alkalinity levels met the RUC were reported in the fall. The contingency plan indicates that if a second exceedance is recorded, then the down-gradient wells should be sampled. No trigger mechanism values were exceeded in 2020 at M-1.

Contingency planning may be broken into the following steps when a trigger value is exceeded:

1. Immediately re-sample the well where an exceedance of the trigger value was observed;
2. If a second exceedance is reported, sample down-gradient wells to confirm that off-site migration has not occurred (re-sample if exceedance of trigger value at down-gradient wells);
3. If down-gradient wells at the Site boundary are impacted above trigger value, notify private well owners down-gradient of the Site and sample private wells on a monthly basis for parameter(s) of concern;
4. If private wells are impacted above the triggers values as outlined above, the Township of Douro-Dummer will need to provide an alternative water supply to the home owner (i.e. bottled water, temporary water supply, new well, etc.) until the exceedance of the trigger value subsides; and
5. If impacted, groundwater is migrating off-site (greater than Guideline B-7 values, MECP Table 2 Standards or exceeds ODWS), remediation will need to be implemented or greater attenuation areas established.

6. Conclusions and Recommendations

This report presents the results of the 2020 groundwater-monitoring program carried out at the Halls Glen Landfill Site in the Township of Douro-Dummer. It is our professional opinion that the groundwater level and chemical data do not indicate a significant anomaly from the results of the previous years.

The majority of the parameters are within their applicable limits with a few exceedances in the shallow monitors located adjacent to the refuse area as determined by MECP Guideline B-7. The well trends should be monitored during future monitoring programs to evaluate if the exceedances are increasing.

Initiated during the 2002-monitoring program, monitors MW 3, MW 4, MW 5, MW 6 and MW 7, the bedrock monitor at MW 11 and the residential monitors have been sampled for VOCs annually during both sampling periods. Monitors MW5 and MW6, located within the former landfill, have historically detected low concentrations of some VOC parameters during all of the sampling periods. In 2020 only MW 5-I had recordable values for monochlorobenzene in the fall sampling period. The remainder of the monitors have indicated sporadic trace levels of VOCs with no trends or duplication of results. MW 11-I (bedrock), had been yielding relatively low levels of toluene, ethylbenzene and xylenes that were trending downwards towards non-detectable or trace levels of in past years. The 2016-2020 results have indicated non-detectable levels for all VOCs in MW-11-I and MW-11-II in both sampling events. Toluene levels (that meet ODWS) have been measured in MW 3-I and MW 4-I in the past but not for the last 10 monitoring periods. No VOC levels were recorded in any of the other monitoring wells or residential wells during either sampling period in 2020. Future monitoring programs should continue to evaluate the data collected to evaluate the VOC monitoring program. No VOC trigger mechanism values were exceeded during the 2020 monitoring program.

Landfill gas was not detected during the 2020 sampling circuits. The water quality at the residential wells is not interpreted to be affected by the landfill.

Historical trends for BOD, TSS, Alkalinity, pH, Conductivity, COD, Ammonia, Sulphate, Chloride, Nitrate, Barium, Boron, Calcium, Iron, Magnesium, Sodium and Manganese have been tracked annually. All monitors have either been staying stable or decreasing for all parameters with very few exceptions. Monitor M 6-I and MW 6-II have been showing increases in Ammonia for the last few years although Monitors MW 4 and MW 12 that are immediately down gradient of MW 6, do not show increases for ammonia. Iron levels in monitor MW 5-1 has remained higher than other wells. Iron levels at 6-II (landfill shallow monitor) which appeared to be increasing in the past few years showed fluctuations this year but no longer appears to be increasing.

Alkalinity, TDS, Iron and Manganese levels generally exceed the ODWS and the RUC for shallow monitors MW 3-II, MW-5-II and MW 6-II. These wells are located within the landfill area. Shallow monitors immediately down gradient of these monitors (MW-4-II and MW-12-I) generally don’t show exceedances of the ODWS or RUC indicating that the impacted shallow groundwater is not impacting the down-gradient shallow ground-water. In the deeper aquifer, landfill monitors MW-5 and OW-6 also have many exceedances of the ODWS and RUC.

Although there are occasional exceedances at down-gradient monitors MW-12-II and MW-12-III, there are rarely exceedances at the monitors further down gradient with the exception of manganese in MW-11-I. Manganese levels in MW-11-I should be monitored in future sampling events to see if the levels increase.

It is our professional opinion that even though the ground water within the landfill area may be impacted, it does not appear to impacting the down-gradient, shallow or deep groundwater. Surface water samples taken at the site do not show any impact related to the landfill. Down-gradient residential wells show no impact from the landfill.

Exceedance of the RUC for R-1 were noted for alkalinity in the spring but not the fall. Down-gradient well R-2 did not show any elevated levels for alkalinity. R-1 was formerly a dug well that became unusable and has been replaced by a monitoring station. This monitored was sampled for the first time in the fall.

Future monitoring programs should consider the following recommendations.

1. At the recommendation of the MECP, the chemical parameter list for monitoring and residential wells should include the parameters in Column 1 (Groundwater) in the spring and Column 2 in the fall. Shallow wells that may discharge to surface water along with surface water samples should be analyzed for Column 3 of Schedule 5 in the Landfill Standards, A Guideline on Regulatory and Approval Requirements for New or Expanding Sites. The surface water monitoring should include the new background station (S-2) that was established in 2014.

2. Sampling should continue VOCs for wells that surround the landfill (MW 3-7) as well as the residential wells. Monitors MW-11-I and MW-11-II had shown detectable levels of VOC's in the past but have not for 10 straight monitoring events. It is recommended that VOC monitoring be discontinued at these monitoring wells.

3. The monitoring program should continue to utilize the monitor installed in the fall of 2002 (MW-13) to evaluate the background water quality in the shallow overburden and bedrock.

4. The use of S-1(surface Water) as a future predictor of potential RUC impacts offsite should continue for future monitoring periods.

5. The monitors should continue to be monitored for any trend increases.

6.1 Signatures

We trust that this report meets with your immediate requirements. Should you have any questions, please contact our office.

Sincerely,

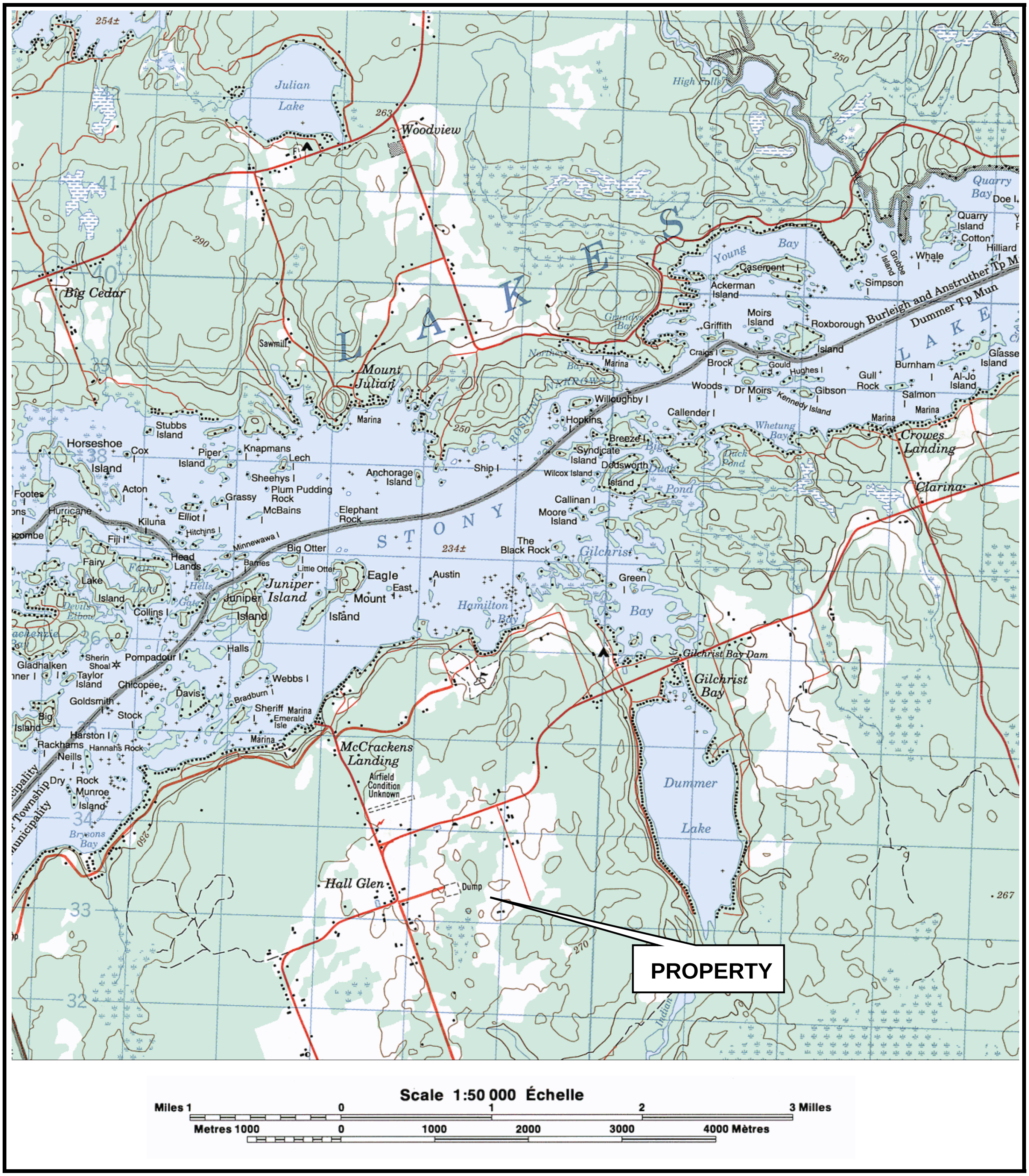
GHD

Steven Gagne, H.B.Sc.

Nyle McIlveen, P.Eng.

LICENSED PROFESSIONAL ENGINEER
May 23/21
N. C. McILVEEN
PROVINCE OF ONTARIO

Enclosures



Base map complied from Energy, Mines and Resources Canada Map 31 D/9 dated 1996. Air photography 1999.

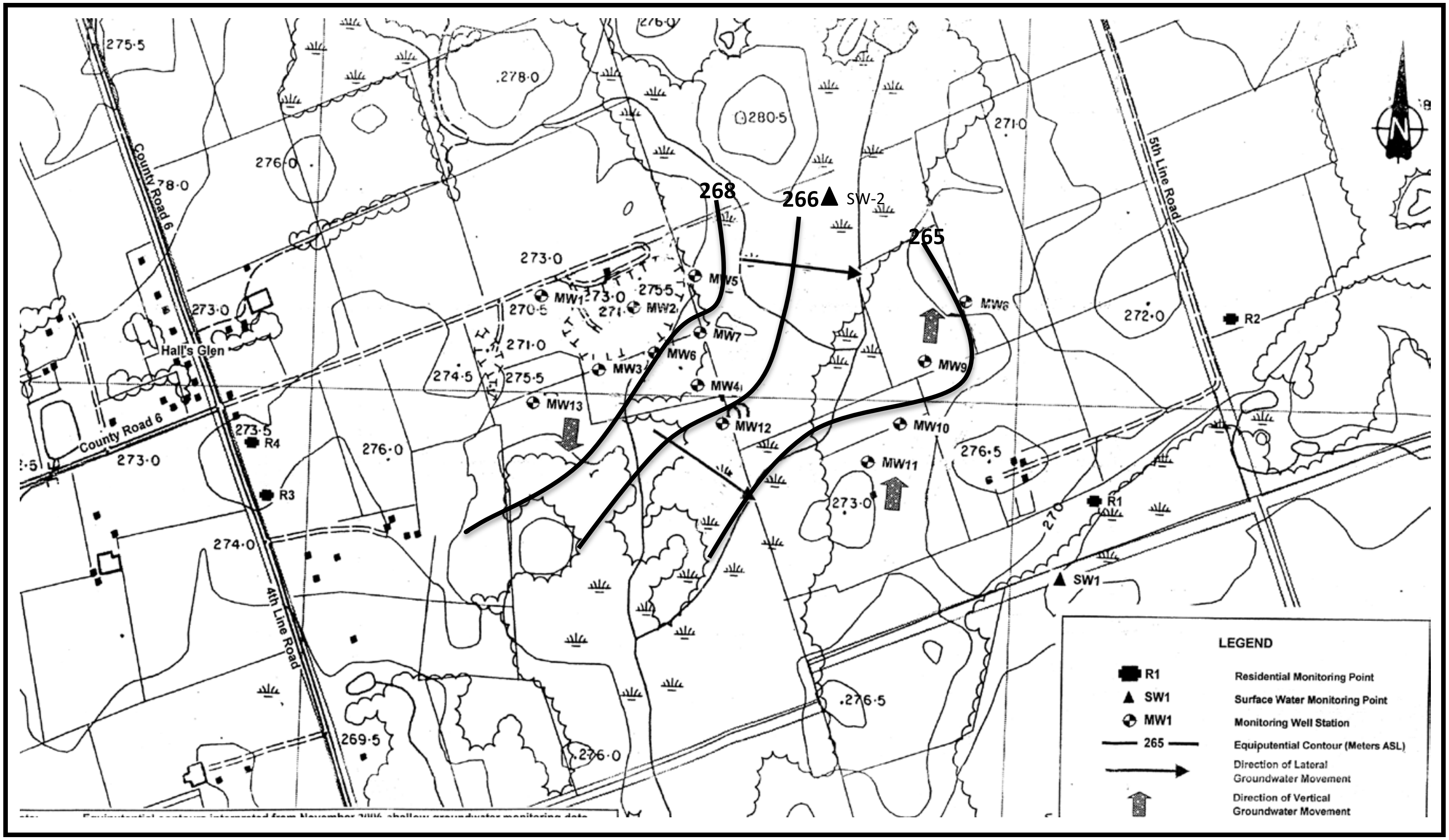
Scale:
1:50000
Coordinate System
NAD 1983 UTM

Halls Glenn Landfill
Douro-Dummer Township
Peterborough County

11212878-01
January, 2021

Vicinity Plan

Plate 1



Source: Ministry of Natural Resources Base Map Series10 17 7250 49300 dated 1990, Air Photo 1984

Scale:
1: 18000
Coordinate System:
NAD 1983 UTM Zone 17

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GHD

Halls Glenn Landfill
Douro Dummer Township
Peterborough County

Property Plan

11212878-01
January, 2021

Plate 2

2020 FIELD DATA SUMMARY

Hall's Glen Landfill Site
Township of Douro-Dummer, County of Peterborough
Project No. 11212878-01

	May 26,2020					*Nov. 20, 2020*					
Monitoring Well	**TEMP (°C)**	**DO (ppm)**	**ORP mV**	**METHANE (% CH_4) / H^2S (ppm)**	**pH**	**TEMP (°C)**	**EC (uS/cm)**	**DO (ppm)**	**ORP mV**	**METHANE (% CH_4) / H^2S (ppm)**	**pH**
MW 1-I	16.3	na	na	0/0	7.5	10.7	885	96.0	2	0/0	7.5
MW 1-II				0/0						0/0	
MW 2-I				0/0						0/0	
MW 2-II				18/0						25/0	
MW 3-I	13.1			0/0	7.0	10.5	514	4.8	28	0/0	7.6
MW 3-II	13.6			0/0	6.9	10.0	973	7.2	29	0/0	7.1
MW 4-I	12.9			0/0	7.2	9.2	547	5.2	-7	0/0	7.5
MW 4-II	13.0			0/0	7.6	10.6	458	8.5	32	0/0	7.6
MW 5-I	12.8			0/0	6.9	9.1	973	5.2	-66	0/0	7.4
MW 5-II	13.1			0/0	6.7					0/0	
MW 6-I	13.8			0/0	7.0	9.8	1407	5.3	-20	0/0	7.5
MW 6-II	12.9			0/0	6.6	10.6	973	7.4	-72	0/0	7.0
MW 7-I	12.8			0/0	7.4	9.4	524	5.4	22	0/0	8.1
MW 7-II	14.4			0/0	7.1	9.4	579	10.2	31	0/0	8.0
MW8-I	15.2			0/0	7.7	5.8	460	7.7	119	0/0	8.4
MW8-II	16.4			0/0	8.1	6.2	486	11.3	135	0/0	8.6
MW9-I	14.8			0/0	7.5	7.3	361	3.7	-288	0/0	7.7
MW9-II	1.7			0/0	7.6	7.4	471	5.0	60	0/0	8.0
MW10-I	14.1			0/0	7.7	6.6	373	3.4	-238	0/0	8.1
MW10-II	15.1			0/0	7.5	6.7	364	4.2	-148	0/0	7.9
MW11-I	14.5			0/0	7.7	6.2	386	3.6	-235	0/0	8.0
MW11-II	15.1			0/0	7.6	4.9	350	6.4	-60	0/0	8.3
MW12-I	14.4			0/0	7.3	8.6	388	6.5	-128	0/0	8.1
MW12-II	12.9			0/0	7.3	10.3	486	5.4	-151	0/0	7.6
MW12-III	14.1			0/0	7.4	9.6	446	4.5	-59	0/0	7.5
MW 13-I	12.8			0/0	7.3	12.8	370	8.2	28	0/0	7.6
MW 13-II	16.6			0/0	7.5	12.6	485	4.8	38	0/0	7.6

Notes:
(---) indicates no data
na = not available

2020 WATER LEVEL MONITORING SUMMARY

Hall's Glen Landfill Site
Township of Douro-Dummer, County of Peterborough
Project No. 11212878-01

MONITORING WELL	TOP OF CASING ELEVATION (M)	May 26, 2020 WATER LEVEL FROM TOP OF CASING (M)	May 26, 2020 WATER LEVEL ELEVATION (M)	November 20, 2020 WATER LEVEL FROM TOP OF CASING (M)	November 20, 2020 WATER LEVEL ELEVATION (M)
MW1-I	271.24	2.83	268.41	3.33	267.91
MW1-II	271.24	dry		dry	dry
MW2-I	282.49	dry		dry	dry
MW2-II	282.53	dry		dry	dry
MW3-I	269.23	2.21	267.02	2.08	267.15
MW3-II	269.23	1.14	268.09	1.74	267.49
MW4-I	268.28	1.99	266.29	2.25	266.03
MW4-II	268.28	1.81	266.47	2.10	266.18
MW5-I	271.35	4.61	266.74	4.95	266.40
MW5-II	271.35	3.25	268.10	dry	dry
MW6-I	271.01	4.64	266.37	4.91	266.10
MW6-II	271.01	2.94	268.07	3.90	267.11
MW7-I	269.03	2.95	266.08	3.35	265.68
MW7-II	269.03	2.25	266.78	2.69	266.34
MW8-I	270.74	4.62	266.12	5.38	265.36
MW8-II	270.74	4.81	265.93	6.49	264.25
MW9-I	267.25	0.80	266.45	1.08	266.17
MW9-II	267.25	1.20	266.05	1.94	265.31
MW10-I	267.97	2.12	265.85	2.48	265.49
MW10-II	267.97	2.22	265.75	2.44	265.53
MW11-I	268.50	2.54	265.96	3.00	265.50
MW11-II	268.50	2.75	265.75	2.99	265.51
MW12-I	268.00	1.68	266.32	1.94	266.06
MW12-II	268.00	1.65	266.35	1.84	266.16
MW12-III	268.00	1.54	266.46	1.87	266.13
MW13-I	na		---	na	
MW13-II	na		---	na	

Notes:

All measurments presented in metres.

MP refers to measuring point (top of protective casing) above surrounding ground surface.

(na) - indicates not available

EVALUATION OF REASONABLE USE CRITERIA - OVERBURDEN WELLS, May 2020
Hall's Glen Landfill Site

PARAMETER	ODWS MAC	BACKGROUND AVERAGE	RUP MAC'S	OVERBURDEN MONITORS						BACKGROUND WELL
				MW 2-II	MW 3-II	MW 4-II	MW 5-II	MW 6-II	MW 7-II	MW 13-II
Alkalinity	500	318	409.00		**674**	382	**780**	**1090**	212	318
pH	8.5	7.41	7.96		7.36	7.79	7.18	7.25	7.95	7.41
Conductivity		862			1360	415	1560	2190	383	862
TDS	500	526	513.00		**814**	251	**900**	**1370**	223	526
COD		15			26	10	62	102	10	15
Ammonia		0.2			0.6	< 0.1	13.6	31.8	5	0.2
Sulphate	500	22	261.00		89	4	9	150	10	22
Chloride	250	85	167.50		54	5	110	92	< 0.06	85
Nitrate	10	1.3	5.64		1.76	< 0.06	0.07	< 0.06	0.0838	1.27
Barium	1	0.158	0.58		0.157	0.09	**0.7**	0.544	0.046	0.158
Boron	5	0.049	2.52		0.466	0.022	0.427	0.739	74.6	0.049
Calcium		149			222	90.8	264	342	< 0.007	149
Iron	0.3	0.02	0.16		0.028	< 0.007	**26.1**	**7.21**	3.18	0.016
Manganese	0.05	0.00127	0.03		**0.822**	0.00073	**8.52**	**8.49**	0.0003	0.00127
Sodium	200	46.8	123.40		107	7.43	77.1	90.8	12.6	46.8

All results are represented in mg/L unless otherwise stated

ODWS - Ontario Drinking Water Standards, 2000

RUP - Reasonable Use Policy (Policy B-7)   Bolded values exceed RUP.

Background Well MW1-I was reported at less than detection limit for Nitrate (<0.05).

PARAMETER	ODWS MAC	BACKGROUND AVERAGE	RUP MAC'S	OVERBURDEN MONITORS						BACKGROUND WELL
				MW 8-II	MW 9-II	MW 10-II	MW 11-II	MW 12-I		MW 13-II
Alkalinity	500	318	409.00	233	243	227	278	318		318
pH	8.5	7.41	7.96	7.9	7.83	7.76	7.71	7.41		7.41
Conductivity		862		591	618	520	684	862		862
TDS	500	526	513.00	240	311	389	274	397		526
COD		15		16	< 8	8	13	< 8		15
Ammonia		0.2		< 0.1	0.9	0.7	< 0.1	0.2		0.2
Sulphate	500	22	261.00	10	10	17	23	22		22
Chloride	250	85	167.50	50	54	21	55	85		85
Nitrate	10	1.3	5.64	< 0.06	< 0.06	0.13	< 0.06	1.27		1.27
Barium	1	0.158	0.58	0.285	0.491	0.504	0.621	0.158		0.158
Boron	5	0.049	2.52	0.143	0.106	0.15	0.106	0.049		0.049
Calcium		149		80.8	98.5	102	115	149		149
Iron	0.3	0.02	0.16	**0.302**	**0.886**	**2.13**	0.02	0.016		0.016
Manganese	0.05	0.00127	0.03	0.00434	0.0332	**0.0951**	8.39	0.00518		0.00127
Sodium	200	46.8	123.40	23.5	44.4	9.83	0.0314	16.9		46.8

PLATE 6A

EVALUATION OF REASONABLE USE CRITERIA - BEDROCK WELLS, MAY 2020
Hall's Glen Landfill Site

PARAMETER	ODWS MAC	BACKGROUND AVERAGE	RUP MAC'S	BEDROCK MONITORS						BACKGROUND WELL	
				MW2-I	MW3-I	MW4-I	MW5-I	MW6-I	MW7-I	MW1-I	MW13-I
Alkalinity	500	274	387.00		364	329	**609**	**470**	359	297	251
pH	8.5	7.78	8.14		7.5	7.52	7.48	7.6	8.08	7.79	7.77
Conductivity		1047			876	725	1200	1130	790	1210	884
TDS	500	624.5	562.25		480	389	**711**	**617**	489	**746**	503
COD		8			14	8	39	16	< 8	8	8
Ammonia		0.1			3.1	1	6.9	7.3	< 0.1	0.1	0.1
Sulphate	500	50	275.00		24	15	13	37	32	90	10
Chloride	250	165	207.50		57	47	83	92	51	190	140
Nitrate	10	1.5			1.22	1.1	0.24	< 0.06	0.17	2.92	0.06
DOC	5	2	3.50		**6**	2	**14**	**7**	1	2	2
Barium	1	0.1715	0.59		0.12	0.125	0.504	0.33	0.133	0.243	0.1
Boron	5	0.0575	2.53		0.107	0.081	0.276	0.207	0.482	0.098	0.017
Calcium		54.89			120	124	230	172	32.3	1.78	108
Iron	0.3	0.01	0.15		0.008	0.05	**3.74**	**0.41**	< 0.007	0.007	0.007
Manganese	0.05	0.000045	0.03		0.0219	**0.212**	**2.59**	**1.72**	0.00021	0.00002	0.00007
Sodium	200	79.05	139.53		30.4	35.1	55.1	75.1	**163**	87.8	70.3

All results are represented in mg/L unless otherwise stated

ODWS - Ontario Drinking Water Standards, 2000

RUP - Reasonable Use Policy (Policy B-7)

Bolded values exceed RUP.

Background Well MW1-I was reported at less than detection limit for Nitrate (<0.05).

PARAMETER	ODWS MAC	BACKGROUND AVERAGE	RUP MAC'S	BEDROCK MONITORS						BACKGROUND WELL	
				MW8-I	MW9-I	MW10-I	MW11-I	MW12-II	MW12-III	MW1-I	MW13-I
Alkalinity	500	274	387.00	290	258	233	241	303	296	297	251
pH	8.5	7.78	8.14	7.84	7.73	7.8	7.83	7.73	7.68	7.79	7.77
Conductivity		1047		794	592	623	607	732	681	1210	884
TDS	500	624.5	562.25	451	337	377	391	394	403	**746**	503
COD		8		< 8	37	< 8	11	23	< 8	8	8
Ammonia		0.1		< 0.1	0.6	0.2	0.8	0.4	< 0.1	0.1	0.1
Sulphate	500	50	275.00	19	63	25	43	75	23	90	10
Chloride	250	165	207.50	86	16	53	34	34	52	190	140
Nitrate	10	1.5	5.75	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	2.92	0.06
DOC	5	2	3.50	2	1	1	2	1	1	2	2
Barium	1	0.1715	0.59	0.0948	**0.689**	**0.848**	**0.683**	0.195	0.034	0.243	0.1
Boron	5	0.0575	2.53	0.101	0.531	0.221	0.331	0.621	0.077	0.098	0.017
Calcium		54.89		105	53	90.9	90.3	82.3	127	1.78	108
Iron	0.3	0.01	0.15	0.017	0.015	0.048	0.014	0.038	< 0.007	0.007	0.007
Manganese	0.05	0.000045	0.03	0.00405	**0.0699**	**0.119**	**0.068**	**0.11**	**0.0627**	0.00002	0.00007
Sodium	200	79.05	139.53	52.1	56.2	14.1	14.7	47.9	16.1	87.8	70.3

PLATE 6B

EVALUATION OF REASONABLE USE CRITERIA - OVERBURDEN WELLS, NOVEMBER 2020
Hall's Glen Landfill Site

PARAMETER	ODWS MAC	BACKGROUND AVERAGE	RUP MAC'S						BACKGROUND WELL
				MW 3-II	MW 4-II	MW 5-II	MW 6-II	MW 7-II	MW 13-II
Alkalinity	500	314	407.00	**841**	**490**		**973**	397	314
pH	8.5	7.77	8.14	7.63	7.76		7.67	7.78	7.77
Conductivity		666		1360	680		1940	840	666
TDS	500	391	445.50	**900**	406		**1200**	**611**	391
COD		10		8	8		98	8	10
Ammonia		0.1		1.5	0.1		27	0.1	0.1
Sulphate	500	12	256.00	62	13		64	19	12
Chloride	250	38	144.00	59	53		140	53	38
Nitrate	10	1.1	5.56	5.18	1.49		0.14	1.62	1.12
Barium	1	0.113	0.56	0.24	0.128		0.401	0.183	0.113
Boron	5	0.05	2.53	0.408	0.034		0.557	0.062	0.05
Calcium		126		296	115		305	134	126
Iron	0.3	0.05	0.17	**1.39**	0.011		4.59	0.016	0.046
Manganese	0.05	25.6	12.83	45.7	16.1		91	17	25.6
Sodium	200	0.00328	100.00	1.01	0.00254		6.34	0.00294	0.00328

All results are represented in mg/L unless otherwise stated

ODWS - Ontario Drinking Water Standards, 2000

RUP - Reasonable Use Policy (Policy B-7) *Bolded values exceed RUP.*

Background Well MW1-I was reported at less than detection limit for Nitrate (<0.05).

PARAMETER	ODWS MAC	BACKGROUND AVERAGE	RUP MAC'S						BACKGROUND WELL
				MW 8-II	MW 9-II	MW 10-II	MW 11-II	MW 12-I	MW 13-II
Alkalinity	500	314	407.00	283	295	258	242	253	314
pH	8.5	7.77	8.14	7.81	7.91	7.79	7.77	7.91	7.77
Conductivity		666		838	791	623	547	595	666
TDS	500	391	445.50	**480**	437	351	343	351	391
COD		10		8	8	8	8	8	10
Ammonia		0.1		0.1	0.1	1	0.9	0.1	0.1
Sulphate	500	12	256.00	10	10	6	9	25	12
Chloride	250	38	144.00	120	77	53	43	44	38
Nitrate	10	1.1	5.56	0.67	1.17	0.06	0.06	0.06	1.12
Barium	1	0.113	0.56	0.162	0.176	0.416	0.358	0.311	0.113
Boron	5	0.05	2.53	0.023	0.039	0.096	0.164	0.11	0.05
Calcium		126		145	126	99.9	93.4	113	126
Iron	0.3	0.05	0.15	0.015	0.015	**3.29**	**1.06**	0.024	0.046
Manganese	0.05	25.6	12.83	0.00433	**29.4**	**44.6**	6.93	6.2	25.6
Sodium	200	0.00328	100.00	36.8	0.00097	0.00331	0.058	0.0198	0.00328

PLATE 6C

EVALUATION OF REASONABLE USE CRITERIA - BEDROCK WELLS, NOVEMBER 2020
Hall's Glen Landfill Site

PARAMETER	ODWS MAC	BACKGROUND AVERAGE	RUP MAC'S	BEDROCK MONITORS						BACKGROUND WELL	
				MW2-I	MW3-I	MW4-I	MW5-I	MW6-I	MW7-I	MW1-I	MW13-I
Alkalinity	500	274.5	387		343	390	**661**	**454**	367	304	245
pH	8.5	7.785	8.1		7.39	7.26	7.31	7.49	8.08	7.81	7.76
Conductivity		883.5			772	862	1470	1300	808	1250	517
TDS	500	515.5	507.75		451	469	**823**	**749**	466	737	294
COD		8			< 8	< 8	49	19	< 8	8	8
Ammonia		0.1			< 0.1	0.4	11.3	6.7	< 0.1	0.1	0.1
Sulphate	500	47	273.50		14	12	10	33	29	87	7
Chloride	250	100.5	175.25		43	57	110	120	48	180	21
Nitrate	10	1.6	5.80		1.26	2.65	0.53	0.12	0.23	2.84	0.35
DOC	5	1.5	3.25		2	2	**12**	**5**	1	2	1
Barium	1	0.1493	0.57		0.105	0.143	0.512	0.278	0.13	0.227	0.0716
Boron	5	0.0625	2.53		0.04	0.049	0.304	0.176	0.432	0.102	0.023
Calcium		128.05			118	157	225	172	35.4	177	79.1
Iron	0.3	0.01	0.15		<0.007	0.021	**25**	**1.63**	<0.007	0.007	0.007
Manganese	0.05	0.000605	0.03		0.00396	**0.0509**	**2**	**1.38**	0.00271	0.00109	0.00012
Sodium	200	54.75	127.38		30.2	36	64.3	63.5	**143**	75.5	34

All results are represented in mg/L unless otherwise stated

ODWS - Ontario Drinking Water Standards, 2000

RUP - Reasonable Use Policy (Policy B-7), *Bolded values exceed RUP.*

Background Well MW1-I was reported at less than detection limit for Nitrate (<0.05).

PARAMETER	ODWS MAC	BACKGROUND AVERAGE	RUP MAC'S	BEDROCK MONITORS						BACKGROUND WELL	
				MW8-I	MW9-I	MW10-I	MW11-I	MW12-II	MW12-III	MW1-I	MW13-I
Alkalinity	500	274.5	387	287	335	241	290	291	334	304	245
pH	8.5	7.785	8.14	7.73	8.24	7.91	8.09	7.79	7.7	7.81	7.76
Conductivity		883.5		791	598	631	657	708	663	1250	517
TDS	500	515.5	507.75	440	320	351	346	431	394	737	294
COD		8		< 8	35	< 8	10	< 8	< 8	8	8
Ammonia		0.1		< 0.1	0.7	0.3	0.8	0.4	< 0.1	0.1	0.1
Sulphate	500	47	273.50	18	66	25	64	80	21	87	7
Chloride	250	100.5	175.25	85	15	51	28	32	47	180	21
Nitrate	10	1.6	5.80	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	2.84	0.35
DOC	5	1.5	3.25	1	1	1	< 1	1	1	2	1
Barium	1	0.1493	0.57	0.0976	**0.612**	**0.662**	**1.74**	0.18	0.0292	0.227	0.0716
Boron	5	0.0625	2.53	0.099	0.468	0.201	0.438	0.566	0.069	0.102	0.023
Calcium		128.05		111	57.5	96.3	101	86	134	177	79.1
Iron	0.3	0.01	0.15	0.019	<0.007	0.023	<0.007	0.015	0.056	0.007	0.007
Manganese	0.05	0.000605	0.03	**11.4**	**20.8**	**20.1**	**27.3**	**27**	**5.37**	0.00109	0.00012
Sodium	200	54.75	127.38	48.5	47	12.9	15.9	39	13.2	75.5	34

PLATE 6D

EVALUATION OF REASONABLE USE CRITERIA - OVERBURDEN WELLS, 2020
Hall's Glen Landfill Site

PARAMETER	ODWS MAC	BACKGROUND AVERAGE	RUP MAC'S	OVERBURDEN MONITORS		BACKGROUND WELL	
				R-1 Spring	R-1 Fall	MW 13-II Spring	MW 13-II Fall
Alkalinity	500	270.5	385.25	**1710**	298	227	314
pH	8.5	7.765	8.13	8.03	8.13	7.76	7.77
Conductivity		593		611	864	520	666
TDS	500	458.5	479.25	337	460	526	391
COD		12.5		< 8	<8	15	10
Ammonia		0.15		<0.1	<0.1	0.2	0.1
Sulphate	500	17	258.50	4	15	22	12
Chloride	250	61.5	155.75	58	92	85	38
Nitrate	10	1.2	5.60	0.09	1.78	1.27	1.12
Barium	1	0.1355	0.57	0.0768	0.175	0.158	0.113
Boron	5	0.0495	2.52	0.013	0.033	0.049	0.05
Calcium		137.5		83.3	131	149	126
Iron	0.3	0.03	0.17	<0.007	0.022	0.016	0.046
Manganese	0.05	17.00	8.52	0.00033	0.00343	8.39	25.6
Sodium	200	0.01734	100.01	36	45.9	0.0314	0.00328

All results are represented in mg/L unless otherwise stated

ODWS - Ontario Drinking Water Standards, 2000

RUP - Reasonable Use Policy (Policy B-7)

Bolded values exceed RUP.

Background Well MW1-I was reported at less than detection limit for Nitrate (<0.05).

PLATE 6E

Appendix A
MOECC C of A and Correspondence

Ministry of the Environment and Climate Change

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M E M O R A N D U M

September 8, 2016

TO: C. Johnston
Senior Environmental Officer
Peterborough District Office
Eastern Region

FROM: B. W. Metcalfe
Senior Environmental Officer
Water Resources Unit – Surface Water Group
Technical Support Section
Eastern Region

RE: 2015 Groundwater Monitoring Report – Hall's Glen Landfill Site
Lot 25, Concession 4, Geographic Township of Dummer
Township of Douro-Dummer, County of Peterborough
Environmental Compliance Approval (ECA) No. 341007

I have reviewed the noted report dated March 2016, prepared by GHD, for the Township of Douro-Dummer, the landfill site Owner. The following comments are offered relative to surface water impact concerns:

Background Information

The Hall's Glen landfill Site is situated along the south side of County Road no. 6 approximately 10 km north of the community of Warsaw. The site operates per the provisional Certificate of Approval No. 341004 dated October 8, 1980. The site also operates as a transfer site according to ECA No. A341007. It was reported that during the summer of 2003 the landfill site was prepared for closure. The landfill area has been mounded and capped and it was understood that that further work was conducted in 2004 and 2005. The landfill operates as a natural attenuating site.

Surface Water Regime

The landfill site is situated within the Trent River Basin. The major surface water features in the landfill site area include Stony Lake located north of the Site and Dummer Lake located to the east of the Site.

Based on overburden groundwater monitoring data GEO-LOGIC determined that the pattern of overburden groundwater movement within the Site area appears to be in a southeasterly direction. There is possible groundwater discharge from the Site area to the wetland located southeast of the landfill.

2015 Surface Water Sampling Program

Surface water samples were collected on two occasions during May and November of 2015. Surface water sample station S-1 is located downgradient from the landfill site and sample station S-2 is the background surface water monitor that was added in 2014. The collected samples were analyzed for the parameters listed in Column 3 of Schedule 5 of the Landfill Standards Guidelines (Comprehensive List for Surface Water). In-field measurements of water temperature, pH, conductivity and dissolved oxygen were taken for each sampling event.

2015 Surface Water Sampling Results

Upstream Background (S-2):

Surface water sample station, newly established in 2014, is located north, upgradient of the landfill site. Sampling was conducted on two occasions in 2015 during May (spring) and November (fall).

The water quality general chemistry was characterized having BOD (<4 mg/L), COD (9 – 18 mg/L), field Dissolved Oxygen (8.18 mg/L, Nov. 19/15), field Conductivity (109 μS/cm, Nov. 19/15), field pH (7.82, Nov. 19/15), Alkalinity (251 - 269 mg/L), Chlorides (34 - 84 mg/L), Total Ammonia (<0.1 mg/L), Un-ionized Ammonia (n.a.), Nitrate (<0.06 – 0.13 mg/L), Total Phosphorus (0.021 - <0.03 mg/L), Total Suspended Solids (< 2 – 3 mg/L) and Phenols (0.001 – 0.002 mg/L).

- Provincial Water Quality Objectives (PWQO) exceedance was observed only for Phenols (0.002 mg/L slightly exceeded 0.001 mg/l, Nov. 91/15).

Downstream Impact (S-1):

Surface water sample station is located approximately 0.75 km southeast downgradient of the landfill site waste mound. Sampling was conducted on two occasions during May and November 2015.

The water quality general chemistry was characterized having BOD (< 4 mg/L), COD (9 - 10 mg/L), field Dissolved Oxygen (6.05 mg/L, Nov. 4/15), field Conductivity (546 μS/cm, Nov. 4/15), field pH (7.2, Nov. 4/15), Alkalinity (253 - 273 mg/L), Chlorides (59 – 84 mg/L), Total Ammonia (<0.1 mg/L), Un-ionized Ammonia (n.a.), Nitrate (<0.03 mg/L), Total Phosphorus (0.012 – <0.03 mg/L), Total Suspended Solids (< 2 – 4 mg/L) and Phenols (<0.001 – 0.001 mg/L).

- There were no PWQO exceedances observed for the relevant parameters analyzed for.

Surface Water Quality Impact Assessment

- The reviewer is in agreement with the landfill site Owner's assessment that all of the water quality parameters tested for are within their respective current PWQO, the Canadian Council of Ministers of the Environment Canadian Water Quality Guidelines, and APV concentrations with the exception of a minor exceedance for Phenols of the PWQO in the background 2015 November (fall) sample.

- The monitoring results for the 2015 sampling events indicated the landfill site was not having an adverse impact to the water quality of the down-gradient surface water monitored at sample location S-2.

- Relative to surface water impact concerns the reviewer is in agreement with the conclusions and recommendations presented in the 2015 Annual Monitoring Report for the Hall's Glen Landfill Site.

"Original Signed By"

Bruce Metcalfe
BWM/dv

ec: G. Faaren
P. Taylor
C. Redmond

c: S. Trimper
B. Metcalfe (Aba2016\aba4161.mem) 6151-AAFLMZ \ X-ref. 6700-AAFLBU
File SW PB DD C4 03 06, Hall's Glen Landfill Site, Township of Douro-Dummer
File SW 11 02 07 02, Unnamed Tributary, Stony Lake, Trent River Basin

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Ontario

M E M O R A N D U M

07 August 2014

TO: C. Johnston
Senior Environmental Officer
Peterborough District Office
Eastern Region

FROM: B. W. Metcalfe
Senior Environmental Officer
Water Resources Unit, Surface Water Group
Technical Support Section
Eastern Region

RE: 2013 Annual Monitoring Report - Hall's Glen Landfill Site
Lot 25, Concession 4, Dummer Ward, Geographic Township of Dummer
Township of Duoro-Dummer, County of Peterborough
Environmental Compliance Approval (ECA) No. A341004

I have reviewed the document entitled, "2013 Groundwater Monitoring Report, Hall's Glen Landfill Site (C of A A341004)", dated March 2014, prepared by Geo-Logic Inc. (Geo-Logic) for the Township of Duoro- Dummer. The following comments are offered relative to surface water impact concerns.

Background Information

The Hall's Glen landfill Site is situated along the south side of County Road No. 6 approximately 10 km north of the community of Warsaw. The site operates per the provisional Certificate of Approval No. 341004 dated October 8, 1980. The site also operates as transfer site according to Provisional Certificate of Approval No. A341007. It was reported that during the summer of 2003 the landfill site was prepared for closure. The landfill area has been mounded and capped and it was understood that further work was conducted in 2004 and 2005. The landfill operates as a natural attenuating site.

Surface Water Regime

The landfill site is situated within the Trent River Basin. The major surface water features in the landfill site area include Stony Lake located north of the site and Dummer Lake located to the east of the site.

Based on overburden groundwater monitoring data Geo-Logic determined that the pattern of overburden groundwater movement appears to be in an easterly direction.

Surface Water Monitoring Program

The groundwater monitoring report includes a limited surface water sampling component for the site. The surface water monitoring program is limited to one surface water sampling station (identified as SW1 on the Site Plan) which is located southeast downgradient of the site. The surface water feature monitored was not identified, but appears to be a drainage ditch or ponded wetland. The landfill site Owner did not include a reference background upstream surface water quality sampling station.

Sample station SW1 was sampled on two occasions, June 10 and November 5, 2013. The collected surface water samples were analyzed for the limited parameter suite specified in Column 4 of Schedule 5 of the Landfill Standards Guideline (Indicator List for Surface Waters).

The analyses of the June 10 and November 5, 2013 collected surface water samples (referenced as sample station S-1) were presented in the SGS Certificate of Analysis Reports dated June 17 and November 13, 2013 respectively.

Surface Water Impact Assessment

SGS summarized the surface water quality data with the assessment that all of the parameters tested are within their respective current PWQO (the PWQO parameters analyzed for were limited only to pH, total phosphorus, phenols, and iron).

A review of the 2013 analytical results showed a total phosphorus concentration of 0.08 mg/L for the June 10/13 sample which exceeded the PWQO of 0.03 mg/L.

- The reviewer would note that there is no upstream background surface water sampling station incorporated in the surface water monitoring program for the landfill site.

Summary and Recommendations

Relative to surface water quality impact assessment purposes the reviewer considers the 2013 Annual Monitoring Report for the Hall's Glen Landfill Site provided by the landfill site Owner to be deficient.

The reviewer provided previous surface water technical comment on the 2012 Annual Monitoring Report for the Hall's Glen Landfill Site (Geo-Logic, 2012) which was presented in the memorandum dated January 20, 2014, from B. Metcalfe, Senior Environmental Officer, Water Resources Unit, Technical Support Section, Eastern Region to D. Johnston, Senior Environmental Officer, Peterborough District Office. The reviewer's recommendations presented in the noted January 20, 2014 memorandum and those provided in this memorandum remain essentially the same. Additional detail regarding the nature and degree of the surface water quality impact associated with the landfill site is required from the landfill site Owner. The reviewer recommends the following:

- In addition to the existing downstream surface water sampling station SW1 a reference upstream background surface water sampling station is required for the surface water monitoring program for the landfill site.

- The chemical parameter suite per Column 4 of Schedule 5 of the Landfill Standards Guideline (Indicator List for Surface Waters) is considered to be inadequate for the purposes of surface water quality impact assessment for this landfill site. The collected surface water samples should be analyzed for the Schedule 5 – Column 3 Comprehensive List for Surface Water (which includes the metals analyses suite) per the MOE Landfill Standards Guideline.

- A surface water quality impact assessment section is required to be provided by the landfill site Owner and this should be included in all future Annual Monitoring Reports for the Hall's Glen Landfill Site.

B.W. Metcalfe

Bruce Metcalfe
BWM/gl

c: G. Faaren
B. Metcalfe (Aba2014\aba414.mem) 2441-9KKLGX \ X-ref. 2387-9KHRP6
File SW PB DD C4 03 06, Hall's Glen Landfill Site, Township of Duoro-Dummer
File SW 11 02 07 02, Unnamed Tributary, Stony Lake, Trent River Basin

ec: G. Dagg-Foster
P. Taylor
J. Matherus

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M E M O R A N D U M

23 June 2014

TO: Chris Johnston
Senior Environmental Officer
Peterborough District Office
Eastern Region

FROM: Greg Faaren
Hydrogeologist
Technical Support Section
Eastern Region

RE: Hall's Glen Waste Disposal Site, 2013 Annual Monitoring Report
Lot 25, Concession IV, Geographic Region of Dummer
Township of Duoro-Dummer, County of Peterborough, A341004

Purpose

I have reviewed the hydrogeologically pertinent sections of the document entitled "2013 Groundwater Monitoring Report, Hall's Glen Landfill Site (A341004), Township of Douro-Dummer, County of Peterborough" dated March 2014 and prepared by GEO-LOGIC Inc. (GLI). This report was provided on behalf of Township of Douro-Dummer to fulfill the requirements of the Provisional Environmental Compliance Approval (ECA) for the site. I offer the following comments for your consideration.

Summary

- The primary pathway for leachate migration at the site is within the overburden and shallow bedrock to the southeast of the waste mound. Leachate impacted groundwater is present to the south and southeast of the waste mound.

- GLI completed a Guideline B-7 Reasonable Use (RU) assessment as part of the 2013 annual monitoring report. However, the RU assessment only included four (4) parameters (iron, chloride, sulphate and nitrate). The data provided by GLI shows RU exceedances for iron in several downgradient wells. GLI states that the iron concentrations observed in the downgradient wells at locations MW8, MW10 and MW11 may be naturally occurring. Continued monitoring is recommended. Future RU assessments must also include all leachate indicator parameters for the site.

- Leachate impacted groundwater flows to the south and southeast from the waste mound, and may discharge to the wetland in this portion of the site. It is recommended that any monitoring wells that are thought to intercept groundwater that discharges to surface water be analyzed for the same suite of parameters as the surface water samples. The samples should also be analyzed with detection limits commensurate with the Provincial Water Quality Objectives (PWQO). The samples from these monitoring wells must be compared to the PWQO and the Ontario Drinking Water Quality Standards, Objectives and Guidelines (ODWSOG).

- The fall sample from residential well R2 exceeded the ODWSOG for iron. The spring and fall samples from well R4 also exceeded the ODWSOG for TDS. These impacts do not appear to be landfill related as well R4 is located upgradient of the waste disposal site and well R2 is located downgradient of the site across a wetland. Continued monitoring is recommended.

- Trend analysis information was provided for select monitoring wells at the site, but the supporting data (i.e. numerical data tables) was not provided. It is recommended that the historical sampling data as well as background water quality ranges be included as part of each annual report. The supporting data should be provided in both hard copy and electronic format (i.e. MS Excel) as well. Evaluation of trends in groundwater concentrations should continue to be completed for all leachate indicator parameters at all monitoring wells at the site.

- GLI has provided groundwater trigger mechanisms based on only health related volatile organic compound (VOC) parameters. These parameters alone do not comprise an appropriate trigger mechanism for the site. It is recommended that trigger mechanisms and contingency plans based Guideline B-7, Reasonable Use and surface water issues be developed for the site and provided in the next annual monitoring report. The trigger parameters should include all leachate indicator parameters.

- It is noted that the waste disposal site boundaries are not shown clearly on the figures attached in the report. This issue should be addressed.

- GLI recommends that groundwater samples be analyzed for the list of parameters in Column 2 of Schedule 5 of the Landfill Standards Guideline. The reporting frequency is to be every year. I recommend that the semi-annual groundwater monitoring sampling program continue at this site. The list of parameters should include those listed in Column 1 (spring) and Column 2 (fall) of Schedule 5 of the Landfill Standards Guideline (including manganese).

- As per the MOE's November 2010 Monitoring and Reporting for Waste Disposal Sites Technical Guidance Document, a Monitoring and Screening checklist is to be submitted with all annual monitoring reports, commencing in 2011. In reviewing the Hall's Glen waste disposal site report, it is noted that the checklist was not included. It is recommended that the 2014 report, and all subsequent future reports include a completed and signed checklist.

<u>Environmental Compliance Approval (ECA)</u>

The Hall's Glen waste disposal site previously operated under Provisional ECA A341004. The site stopped accepting waste in 2003 and began closure activities at that time. Final capping of the landfill was completed in 2005. The site is located in Lot 25, Concession IV, Geographic Region of Dummer, Township of Douro-Dummer. Originally, the licensed waste footprint was 1.0 hectare within a total property of 2.0 ha. However in 2005, additional buffer lands were purchased by the Township to bring the site's total area to 48.5 ha. These additional lands were added in an amendment to the site's ECA issued on February 1, 2006. A groundwater monitoring program was implemented for the site as part of the post closure plan. It is noted that the waste disposal site boundaries are not shown clearly on the figures attached in the report.

According to MOE's November 2010 Monitoring and Reporting for Waste Disposal Sites Technical Guidance Document, and as communicated by the ministry (through webinars and information distributed in coordination with the Ontario Waste Management Association both last year and earlier this year), a Monitoring and Screening checklist is to be submitted with all annual monitoring reports, commencing in 2011. In reviewing the 2013 Hall's Glen waste disposal site report, it is noted that the checklist was not included.

Geology

The consultants previously described the geology of the site as:

- A glacial drift/till unit;
- A glaciolacustrine sand unit; and,
- A limestone bedrock unit (Lindsay Formation).

GLI reports that the typical overburden thickness at the site is approximately 3.25 m.

Hydrogeology

The consultants previously determined the physical hydrogeological characteristics of the site as:

- Groundwater flow within the overburden on-site is to the southeast towards an unnamed wetland. Groundwater flow within the bedrock is towards the south.
- The hydraulic conductivities at the site range from 10^{-2} to 10^{-3} cm/second.
- GLI reported that the average horizontal gradient for the shallow overburden wells was 1.6×10^{-2} m/m, deep overburden wells was 4.6×10^{-03} m/m and 3.8×10^{-03} m/m in bedrock. Vertical hydraulic gradients are variable with downward gradients observed in wells near the waste mound and upward gradients in wells near the wetland.

GLI reports that monitoring wells MW1-II, MW2-I, MW2-II and MW5-II were not able to be sampled in 2013.

Background Water Quality

GLI has used monitoring wells MW1-I, MW1-II, MW13-I and MW13-II to represent background water quality conditions for the site. These monitoring wells are located hydraulically upgradient to the existing landfill area. Water samples were unable to be collected from well MW1-II during the 2013 sampling program. The groundwater sampling results show that only dissolved organic carbon (DOC) and total dissolved solids (TDS) from well MW1-I exceeded the ODWSOG in analyzed background groundwater samples in 2013.

Leachate

Groundwater monitoring wells MW2-I and MW2-II are located within the waste area and are expected to be representative of leachate quality. However, monitoring wells MW2-I and MW2-II were not able to be sampled in 2013. It is noted that both the shallow and deep monitoring wells at locations MW3, MW5 and MW6 were sampled in 2013 and (as in previous years) the groundwater quality in these wells was notably impacted. Elevated concentrations of iron, alkalinity, DOC, sulphate and TDS were noted in these wells. These wells would appear to most represent leachate quality at the landfill.

Downgradient Water Quality

The primary pathway for leachate migration is inferred to be within the overburden and shallow bedrock in a south to southeasterly direction. Leachate impacts to groundwater as measured in the downgradient locations at this site are summarized as follows:

- The highest levels of leachate indicator parameters were seen in the overburden monitoring wells at locations MW3, MW5 and MW6. Levels of one (1) or more of iron, alkalinity, DOC and TDS exceeded the ODWSOG in each of these wells.

- It is noted that concentrations of most leachate indicator parameters were lower in the spring sampling event (June) than in the fall sampling event (November). GLI also notes that groundwater quality showed less impact in 2013 as compared to previous years. Further monitoring is required to study this trend.

- Exceedances of the ODWSOG for iron were noted in the furthest downgradient monitoring wells (i.e. MW10 and MW11).

GLI reports that the elevated concentrations of iron observed in wells MW8-I, MW10-II and MW11-II may be naturally occurring. The concentrations of iron observed in these monitoring wells are significantly higher than those observed in wells closer to the waste mound, particularly in the shallow zone wells. There may be other factors contributing to the elevated iron concentrations in these wells. However it is noted that elevated concentrations of landfill related iron are evident in some monitoring wells closer to the waste mound.

The results of the VOC analyses conducted showed no exceedances of the ODWSOG for VOC parameters.

It is noted that the groundwater samples from the Hall's Glen waste disposal site were not submitted for analysis of manganese. Manganese is a common leachate indicator parameter at waste disposal sites. The reason for not including manganese in the sampling suite was not provided.

Groundwater/Surface Water Interaction

The site plans provided by GLI indicate that there are wetlands located off-site to the southeast of the waste mound. GLI reports that vertical hydraulic gradients near the wetland are upward, indicating groundwater discharge conditions. Therefore there is the potential that shallow groundwater discharges to the surface water to the southeast of the site. GLI has not compared the results of the groundwater analyses conducted to the PWQO criteria.

Potable Groundwater Sampling

GLI reports that groundwater samples were collected from nearby potable water supply wells R1, R2, R3 and R4 in the spring and fall of 2013. Wells R1 and R2 are located downgradient of the landfill site and across a wetland. Wells R3 and R4 are located upgradient of the landfill near the intersection of 4th Line Road and County Road 6.

A review of the sampling results indicates that the spring and fall 2013 water samples from well R4 exceeded the ODWSOG for TDS. However, the samples from well R4 showed low levels of barium, calcium and magnesium, but elevated levels of chloride, sodium, TDS and conductivity. Well R4 is located hydraulically upgradient of the waste disposal site and therefore the impacts in this well are not likely related to the landfill. This well may be showing signs of road salt impacts.

The fall sample from well R2 exceeded the ODWSOG for iron. These impacts do not appear to be landfill related as well R2 is located significantly downgradient of the site across a wetland.

Guideline B-7 Reasonable Use

Guideline B-7 applies to operating waste disposal sites and to sites closed post 1986. GLI conducted a Guideline B-7 Reasonable Use for the site as part of the 2013 monitoring program report. However, GLI only used four (4) parameters as part of the Reasonable Use assessment, namely chloride, sulphate, nitrate and iron. Other leachate indicator parameters including TDS, alkalinity and DOC were not included.

GLI reports Reasonable Use (RU) exceedances for iron in several downgradient wells on at least one (1) occasion in 2013. GLI states that the iron concentrations observed in the downgradient wells may be naturally occurring. Iron is not elevated in any of the background groundwater monitoring wells and wells located closer to the waste mound show elevated concentrations of iron likely related to leachate impacts. However, iron concentrations observed in wells MW8-I, MW10-II and MW11-II are significantly higher than those observed in wells closer to the waste mound, particularly in the shallow zone wells. There may be other factors contributing to the elevated iron concentrations in these wells. It is noted that concentrations of leachate indicators in the downgradient wells has decreased from previous years.

The landfill site boundaries are not well illustrated on the site plan. Therefore it is difficult to ascertain where the Guideline B-7 conformance boundary is located.

Trigger Mechanisms/Contingency Plans

Information regarding trigger mechanisms or contingency plans was provided in the 2013 report. However, the trigger mechanisms specified were based only on health related parameters from the ODWSOG for VOCs. Trigger mechanisms based on non-health related groundwater parameters or surface water issues were not provided.

Groundwater Monitoring

GLI recommends that groundwater samples be analyzed for the list of parameters in Column 2 of Schedule 5 of the Landfill Standards Guideline. GLI also recommends that additional QA/QC samples be analyzed for VOCs during both sampling events in 2014. The reporting frequency is to be annual.

Greg Faaren

Greg Faaren, P.Geo.
GF/sh

ec: Peter Taylor
Gillian Dagg-Foster
David Bradley
Victor Castro

c: File GW PB DD C4 01 03 (A341004)
GF/IDS #2417-8VLL4E

FEB 0 9 2006

Ministry of the Environment
Ministère de l'Environnement
Ontario

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A341004

Issue Date: February 1, 2006

The Corporation of the Township of Douro-Dummer
PO Box 92
Warsaw, Ontario
K0L 3A0

Site Location: Hall's Glen Landfill Site
Lot 25, Concession 4, Dummer Ward
Douro-Dummer Township, County of Peterborough

You are hereby notified that I have amended Provisional Certificate of Approval No. A341004 issued on October 8, 1980 and amended on April 6, 2001, November 29, 2001, August 29, 2002, July 18, 2003, July 23, 2004 and June 23, 2005 for a Waste Disposal Site (Landfill/Transfer), as follows:

I. The total area of the closed Hall's Glen landfill site is hereby increased from 8 hectares to 48.5 hectares in accordance with the letter dated August 30, 2005 to James O' Mara, Director, Environmental Assessment and Approvals Branch, Ministry of the Environment. See Part IV for Registration on Title requirements.

II. The following definitions are hereby added:

(1) (g) "Competent" means knowledgeable, through instruction and practice, and able to carry out any necessary duties in the following:

(i) relevant waste management legislation, regulations and guidelines;
(ii) major environmental concerns pertaining to the waste to be handled;
(iii) emergency response procedures for the waste to be handled;
(iv) use and operation of the equipment to be used at the Site;
(v) emergency response procedure and alerting;
(vi) Site specific written procedures for the control of conditions that may cause an adverse effect; and
(vii) requirements of this Certificate.

III. <u>HOUSEHOLD HAZARDOUS WASTE ("HHW") DEPOT</u>

The Township is hereby approved to establish and operate a household hazardous waste depot at the site, in accordance with the following added conditions and with the items listed in Schedule "B" of this Certificate:

(34) (a) The HHW depot shall not receive more than 20 cubic metres of HHW per day; and

(b) The HHW depot shall not store in excess of 50 cubic metres of HHW on site.

(35) HHW shall not be stored at the Site for longer than one hundred eighty (180) days, unless the consent of the District Manager has been obtained, with the exception of waste oil which shall be stored on site in accordance with Condition 31(b).

(36) All household hazardous waste received and stored must be managed in accordance with Ontario Regulation 347, R.R.O. 1990, as amended, and with the Ministry of Environment document entitled "Household Hazardous Waste Collection and Facility Guidelines" dated May 1993.

(37) All storage of liquid wastes shall be in accordance with this Ministry's publication "Guidelines of Environmental Protection Measures at Chemical Storage Facilities", dated October 1978 as amended.

(38) All HHW shall be stored in secondary containment that is adequate to contain any spills or leaks. Segregated secondary containment shall be provided for incompatible types of waste.

(39) Incoming HHW shall be inspected by Competent personnel, prior to being accepted at the Site, to ensure that the Site is approved to accept that type of waste.

(40) All containers shall be clearly labeled indicating the type and nature of the hazardous waste stored as required by regulation. All points of access to the Site shall be posted to warn that the area contains hazardous materials.

(41) No radioactive wastes shall be accepted at this Site.

(42) Oil and oil-based paints which have been manufactured prior to 1972; or whose manufacturing date cannot be determined, may contain PCBs and shall be handled as follows:

(a) The oil and oil-based paints shall not be mixed (bulked) with other paints prior to testing. Paints which are lab-packed are not considered to be mixed under this Certificate;

(b) The oil and oil-based paints shall be tested by a certified laboratory for PCB content and shall be handled in the manner outlined in Condition 42(c) if found to contain PCBs;

(c) If the oil and oil-based paints are found to have PCBs at or above levels identified in Condition 42(d), it shall be forthwith reported to the District Manager and shall be managed in accordance with Regulation 362 and stored or removed from the Site to an approved PCB storage site, in accordance with written instructions from the District Manager; and

(d) The oil and oil-based paints shall not be distributed for reuse if they have any measurable PCB content. The oil and oil-based paint is considered to be a PCB waste, if measured levels are equal to or greater than 50 parts per million.

(43) Except for oil based paints that become classified as PCB Waste, paints may be offered for reuse to the public. Records shall be kept of the type, volume and recipient of paint returned to the public.

(44) The Township shall maintain, at the Site, a log book which records daily, the following information:

(a) date of record;
(b) types, quantities and source of HHW received;
(c) quantities of HHW stored at the Site;
(d) quantities and destination of HHW shipped from the Site; and
(e) quantities of waste returned to the public as noted in Condition (42).

IV. The following Conditions are hereby added:

CERTIFICATE OF REQUIREMENT

(45) The Owner shall:

(a) within sixty (60) calendar days of the date of this Certificate, submit to the Director, for Director's signature, two copies of a completed Certificate of Requirement containing a registerable description of the newly acquired property, in accordance with the attached form; and

(b) within twenty (20) calendar days of receiving the Certificate of Requirement signed by the Director, register the Certificate of Requirement in the appropriate Land Registry Office on title to the Property and submit to the Director the duplicate registered copy immediately following registration.

(46) Pursuant to Section 197 of the *EPA*, neither the *Owner* nor any person having an interest in the Property shall deal with the Property in any way without first giving a copy of this Certificate to each person acquiring an interest in the Property as a result of the dealing.

V. The following items are hereby added to Schedule "B":

(8) Application for a Provisional Certificate of Approval for a Waste Disposal Site dated September 1, 2005 and signed by Mr. David Clifford, CAO, The Corporation of the Township of Douro-Dummer including all attached supporting information and documentation.

(9) Document entitled "*County of Peterborough: Household Hazardous Waste (HHW) Facility Operations Manual*" dated August 10, 2005.

(10) Letter dated August 30, 2005 to Mr. James O'Mara, Director, Environmental Assessment and Approvals Branch, Ministry of Environment from Mr. Michael Cant, Manager, Solid Waste, Totten Sims Hubicki Associates. Re: Amendment for Certificate of Approval No. A341004 including all attachments.

(11) Letter dated October 11, 2005 to Mr. Matthew Chisholm, Application Processor, Ministry of Environment, from Mr. Michael Cant, Manager, Solid Waste, Totten Sims Hubicki Associates. Re: Application for Approval of a Waste Disposal Site, MOE Reference No. 2960-6FTPZG.

(12) Letter dated January 24, 2006 to Mr. David Lee, Waste Evaluator, Ministry of Environment, from Mr. Michael Cant, TSH Associates, Re: Draft Notice of Amendment for Certificate of Approval No. A341004.

The reasons for this amendment to the Certificate of Approval are as follows:

The reason for section I is to recognize the new total site area of the waste disposal site.

The reason for section II is to define the specific meaning of the term "competent" as used in this Notice of Amendment.

The reason for the conditions imposed in section III is to approve the establishment and operation of a household hazardous waste transfer station and to ensure that the wastes are managed in a manner that protects the environment and the health and safety of the public.

The reason for the conditions imposed in section IV is to ensure that any persons having an interest in the lands are aware that the land has been used for waste disposal operations.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A341004 dated October 8, 1980

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 39, *Environmental Protection Act*
Ministry of Environment and Energy
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the
Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted waste disposal site is approved under Section 39 of the Environmental Protection Act.

DATED AT TORONTO this 1st day of February, 2006

Greg Washuta, P.Eng.
Director
Section 39, *Environmental Protection Act*

DL/

c: District Manager, MOE Peterborough
Michael Cant, Totten Sims Hubicki Associates (1997) Limited

Appendix B
Monitoring Well Details and Borehole Data

TOWNSHIP OF DUMMER

HALL'S GLEN LANDFILL STUDY

BOREHOLE LOGS

June 27 - July 9, 1991

BOREHOLE	DEPTH INTERVAL (metres below ground)	DRILLER'S DESCRIPTION
1-91	0 - 0.61	Brown CLAY, GRAVEL, hard
	0.61 - 1.98	Grey GRAVEL, dry
	1.98 - 6.10	Grey LIMESTONE
	6.10 - 6.71	Brown SHALE
	Water-bearing zone reported at 6.10 metres	
2-91	0 - 1.22	Brown FILL
	1.22 - 3.05	REFUSE
	3.05 - 4.88	Brown SAND, COBBLES
	4.88 - 5.49	Grey GRAVEL
	5.49 - 6.71	Brown SHALE, wet
	6.71 - 8.53	Grey LIMESTONE
	8.53 - 9.14	Brown SHALE
	Water-bearing zone reported at 8.53 metres	
3-91	0 - 0.91	Brown SAND, CLAY
	0.91 - 1.52	Brown GRAVEL, COBBLES, CLAY, hard
	1.52 - 4.27	Grey LIMESTONE
	Water-bearing zone reported at 3.66 metres	
4-91	0 - 2.74	Grey GRAVEL, BOULDERS
	2.74 - 3.66	Grey LIMESTONE
	3.66 - 4.88	Brown SHALE
	Water-bearing zone reported at 3.66 metres	
5-91	0 - 1.83	Brown SAND, CLAY
	1.83 - 3.20	Brown SAND, GRAVEL
	3.20 - 3.66	Brown SAND, CLAY
	3.66 - 7.01	Grey LIMESTONE
	Water-bearing zone reported at 6.40 metres	

TOWNSHIP OF DUMMER

HALL'S GLEN LANDFILL STUDY

BOREHOLE LOGS

June 27 - July 9, 1991

BOREHOLE	DEPTH INTERVAL (metres below ground)	DRILLER'S DESCRIPTION
6-91	0 - 0.61	Brown SAND
	0.61 - 2.74	Brown SAND, GRAVEL
	2.74 - 5.18	Grey LIMESTONE
	5.18 - 5.79	Brown SHALE

Water-bearing zone reported at 5.18 metres

MONITOR DETAILS

BOREHOLE		MONITOR					SCREENED INTERVAL (mbgl)	SAND FILTER PACK (mbgl)	BENTONITE SEAL (mbgl)	STEEL CASING (mbgl)
NO	Diameter (mm)	NO	Type	Diameter (mm)	Stick-up (m)	Elevation (t.o.p.m.)				
1-91 1-91	150	I II	P S	50 38	0.98	271.27	6.71 - 5.18 1.98 - 0.46	6.71 - 5.33 1.98 - 0.46	5.33 - 4.72 0.46 - 0.00	0.91 - 10.88
2-91 2-91	150	I II	P S	50 38	1.07	275.79	9.14 - 7.62 5.49 - 3.96	9.14 -6.70 5.49 - 0.61	6.70 - 5.79 0.61 - 0.00	0.91 - 11.07
3-91 3-91	150	I II	P S	50 38	1.11	269.23	4.27 - 2.74 1.52 - 0.00	4.27 - 2.13 1.52 - 0.31	2.13 - 1.52 0.31 - 0.00	0.91 - 11.11
4-91 4-91	150	I II	P S	50 38	1.04	268.28	4.88 - 3.35 3.05 - 1.52	4.88 - 3.66 3.05 - 0.61	3.66 - 3.05 0.61 - 0.00	0.91 - 11.04
5-91 5-91	150	I II	P S	50 38	1.00	271.32	7.01 - 5.49 3.66 - 2.13	7.01 - 4.27 3.66 - 0.16	4.27 - 3.66 0.61 - 0.00	0.91 - 11.00
6-91 6-91	150	I II	P S	50 38	1.02	269.83	5.79 - 4.26 2.74 - 1.22	5.79 - 3.35 2.74 - 0.61	3.35 - 2.74 0.61 - 0.00	0.91 - 11.02

P = Piezometer　　mbgl = metres below

Geo-
Logic Inc.
Plate B-3

Ministry of Environment and Energy Ontario

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable

County or District	Township/Borough/City/Town/Village	Con block tract survey etc.	Lot
Peterborough	Dummer Twp., Hall Glen Landfill	Con.4	26
Owner's surname / First name	Address	Date completed	
Township of Dummer	C/O Totten Sims Hubicki Assoc. 300 Water St., Whitby, Ont. L1N 9J2	15 03 97	

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	To
Black	Topsoil	stones	soft	0	1
Brown	Gravelly Clay	stones	soft-caving	1	9
Brown	Shale		soft	9	14
Gray	Limestone		hard	14	18
Brown	Limestone		very hard	18	22
		* Finished depth @ 21 ft.			

WATER RECORD

Water found at - feet	Kind of water
9	Fresh
18	Fresh

CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	To
6½	Steel	.188	+ 2	3
2	Plastic	Piezo	+ 2	16
2	Plastic	Piezo	+ 2	4

SCREEN

Slot No.	Diameter	Length
10	2 inches	29.5 feet

Material and type	Depth at top of screen
PVC	4 & 16

PLUGGING & SEALING RECORD — Annular space

Depth set at - feet From	To	Material and type (Cement grout, bentonite, etc.)
0	3	Mud Slurry
3	4	Bentonite
4	11½	Gravel
11½	16½	Bentonite
16½	22½	Gravel
		Bentonite

PUMPING TEST

Pumping test method	Pumping rate	Duration of pumping
Bailer	10 GPM	30 mins

Static level	Water level end of pumping	15 minutes	30 minutes	45 minutes	60 minutes
6 feet	11 feet	11 feet	11 feet	11 feet	11 feet

Water level at end of pumping: Pumping. Water at end of test: Cloudy.

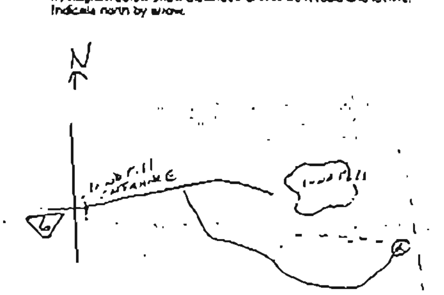
FINAL STATUS OF WELL
- X Observation well

WATER USE
- X Other: Piezometer

METHOD OF CONSTRUCTION
- X Cable tool

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



174284

Name of Well Contractor	Well Contractor's Licence No.
C.Hart & Sons Well Drilling Ltd.	2662
Address: Box 850, Fenelon Falls, Ontario	
Name of Well Technician	Well Technician's Licence No.
Greg Bullock	T-2108

MINISTRY USE ONLY

3 - OWNER'S COPY

M.O.E. WATER WELL RECORD

MW-7

Geo-Logic Inc.

Plate B-4

Ontario Ministry of the Environment

WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

County or District	Township/Borough/City/Town/Village	Con.	Lot
Peterborough	Dummer Twp., Halls Glen-Landfill (BH-8)	Con. 4	16

Owner's surname	Address	Date completed
Township of Dummer	c/o Totten Sims Hubicki Assoc. 300 Water St., Whitby, ON L1N 9J2	1 11 01

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	To
Black	Topsoil			0	1
Brown	Gravel	sand		1	9
Brown	Gravel	stones		9	15
Brown	Rock		broken	15	17
Gray	Limestone			17	35

WATER RECORD

Water found at - feet	Kind of water
19	Fresh
28	Fresh

CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	To
6¼	Galvanized	.188	+2½	17
2	Plastic	Piezo	+2½	30
2	Plastic	Piezo	+2½	17½

SCREEN

Slot no.	Length	Material and type	Depth at top of screen
10	2 x 5 feet	PVC	30, 17½ feet

PLUGGING & SEALING RECORD

Depth set at - feet From	To	Material and type
0	17	Bentonite & Mudslurry

PUMPING TEST

Pumping rate: 8-10 GPM; Duration of pumping: 30 mins

Static level: 15 feet

FINAL STATUS OF WELL

Observation well

WATER USE

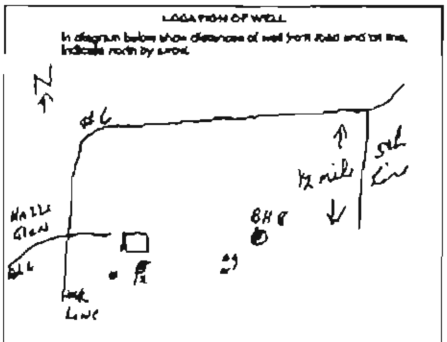
Other: Monitoring

METHOD OF CONSTRUCTION

Cable tool

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



236648

Name of Well Contractor	Well Contractor's Licence No.
C.Harr & Sons Well Drilling Ltd	2662
Address: Box 850, Fenelon Falls, Ontario	
Name of Well Technician: Jim Leap	Well Technician's Licence No.: T-0546

1 - CONTRACTOR'S COPY

M.O.E. WATER WELL RECORD

MW-8

Geo-Logic Inc.

PLATE B-5

Ontario Ministry of the Environment

The Ontario Water Resources Act
WATER WELL RECORD

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
Peterborough	Dummer Twp., Hall's Glen-Land(1) (BH-6)	Con. 4	26
Owner's surname: Township of Dummer	Address: c/o Totten Sims Hubicki Assoc. 300 Water St., Whitby, Ont. L1N 9J2	Date completed	30 10 01

LOG OF OVERBURDEN AND BEDROCK MATERIALS

General colour	Most common material	Other materials	General description	Depth - feet From	To
Black	Topsoil			0	1
Brown	Gravel			1	10
Brown	Rock		broken	10	12
Gray	Limestone			12	30

WATER RECORD

Water found at - feet	Kind of water
12	
26	

CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	To
6¼		.188	+2½	13
2		Piezo	+2½	25
2		Piezo	+2½	13

SCREEN

Slot No.	Diameter	Length
10	2 inches	2 x 5 feet
PVC		25.8'-13 feet

PLUGGING & SEALING RECORD

Depth set at - feet From	To	Material and type
0	12	Bentonite

PUMPING TEST

Pumping rate: 8-10 GPM

Duration of pumping: 30 min

Static level: 8 feet

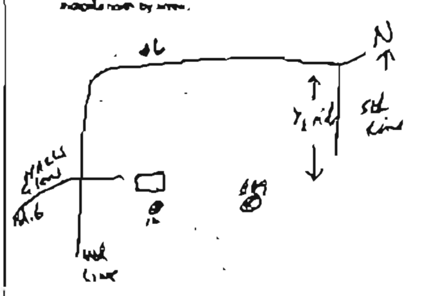
FINAL STATUS OF WELL

WATER USE

METHOD OF CONSTRUCTION

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



236649

Name of Well Contractor	Well Contractor's Licence No.
G. Hart & Sons Well Drilling Ltd	2667
Address: Box 850, Fenelon Falls, Ontario	
Name of Well Technician: Jim Loan	Well Technician's Licence No.: T-0546

1 - CONTRACTOR'S COPY

M.O.E. WATER WELL RECORD

MW-9

Geo-Logic Inc.

PLATE E-6

Ontario Ministry of the Environment

The Ontario Water Resources Act

WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
Peterborough	(MW-10) Dummer Twp., Halls Glen-Landfill	Con. 4	26

Owner's surname	Address	Date completed
Township of Dummer	c/o Totten Sims Hubicki Assoc. 300 Water St., Whitby, ON L1N 9J2	2 11 01 (day month year)

LOG OF OVERBURDEN AND BEDROCK MATERIALS

General colour	Most common material	Other materials	General description	Depth - feet From	To
Black	Topsoil			0	1
Brown	Gravel			1	9
Brown	Gravel	broken rock		9	15
Gray	Limestone			15	30

WATER RECORD

Water found at - feet	Kind of water
13	Fresh
26	Sulphur

CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	To
6¼	Steel	.188	+2½	13
2	Plastic	Piezo	+2½	25
2	Plastic	Piezo	+2½	14.3

SCREEN

Slot no.	Diameter	Length
10	2 inches	2x 5 feet

Material and type: PVC. Depth at top of screen: 25, 14.3 feet

PLUGGING & SEALING RECORD

Depth set at - feet From	To	Material and type
0	13	Holeplug (outside 6")
13	20½	Sand
20½	22	Holeplug
22	30	Sand

PUMPING TEST

Pumping test method: Pump. Pumping rate: 5-6 GPM. Duration of pumping: 30 mins. Static level: 8.5 feet

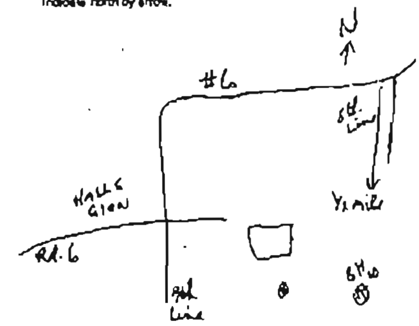
FINAL STATUS OF WELL: Observation well

WATER USE: Other: Monitor

METHOD OF CONSTRUCTION: Cable tool

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



236643

Name of Well Contractor	Well Contractor's Licence No.
G. Hart & Sons Well Drilling Ltd	2662
Address: Box 850, Fenelon Falls, Ontario	
Name of Well Technician: Jim Lean	Well Technician's Licence No.: T-0546

1 - CONTRACTOR'S COPY

M.O.E. WATER WELL RECORD

MW-10

Geo-Logic Inc.

PLATE B-7

Ontario Ministry of the Environment

WATER WELL RECORD

County or District	Township/Borough/City/Town/Village	Con.	Lot
Peterborough	(BH-11) Dummer Twp., Halle Glen-Landfill	Con. 4	26
Township of Dummer	c/o Totten Sims Hubicki Assoc. 300 Water St., Whitby, ON L1N 9J2	Date completed	5 11 01

LOG OF OVERBURDEN AND BEDROCK MATERIALS

General colour	Most common material	Other materials	General description	Depth - From	Depth - To
Black	Topsoil			0	1
Brown	Gravel			1	5
Brown	Gravel	boulder		5	10
Brown	Broken Rock			10	12
Gray	Limestone			12	30

WATER RECORD

Water found at - feet	Kind of water
19	
29	

CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - From	Depth - To
6¼		.188	+2½	12
2		Piezo	+2½	25
2		Piezo	+2½	15

SCREEN

Slot No.	Diameter	Length
10	2	2x 5
PVC	Depth at top of screen	25, 15

PLUGGING & SEALING RECORD

From	To	Material and type
0	12	Holeplug (outside steel)
11	20	Sand
20	22	Holeplug
22	30	Sand

PUMPING TEST: Pumping rate 2-3 gpm; Duration of pumping 10 hrs; Static level 9

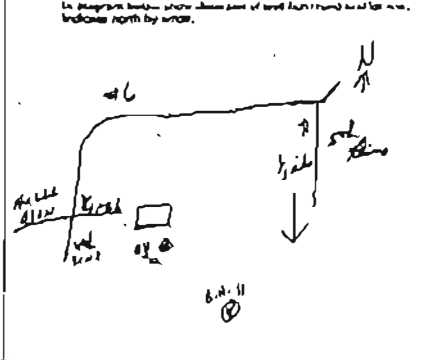
FINAL STATUS OF WELL

WATER USE: Monitor

METHOD OF CONSTRUCTION

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



236642

Name of Well Contractor	Well Contractor's Licence No.
G. HART & Sons Well Drilling Ltd	2662
Box 850, Fenelon Falls, Ontario	
Jim Lean	T-0546

1 - CONTRACTOR'S COPY

M.O.E. WATER WELL RECORD

MW-11

Geo-Logic Inc.

PLATE B-8

Ontario Ministry of the Environment

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

County or District	Township/Borough/City/Town/Village	Con. block tract survey, etc.	Lot
Peterborough	(MW-12) Dummer Twp., Hall's Glen - Landfill	Con. 4	26

Owner's surname / First Name	Address	Date completed
Township of Dummer	c/o Totten Sims Hubicki Assoc. 300 Water St., Whitby, ON L1N 9J2	7 11 01 (day month year)

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	To
Black	Topsoil			0	1
Brown	Gravel			1	8
Brown	Gravel	broken rock		8	13
Gray	Limestone			13	29
Gray	Limestone		soft	29	30
Gray	Limestone			30	40

WATER RECORD

Water found at - feet	Kind of water
13	Fresh
29	Sulphur

CASING & OPEN HOLE RECORD

Inside diam. inches	Material	Wall thickness inches	Depth - feet From	To
6¼	Steel	.188	+3	13
2	Plastic	Plaso	+3	35
2	Plastic	Plaso	+3	25½
2	Plastic	Plaso	+3	14½

SCREEN

Slot No.	Diameter	Length
10	2 inches	3x 5 feet

Material and type: PVC
Depth at top of screen: 35, 25, 5 / 14.5 feet

PLUGGING & SEALING RECORD

Annular space

Depth set at - feet From	To	Material and type
0	13	Bentonite (outside)
40	31	Sand (inside)
31	30	Holeplug, * Cont'd

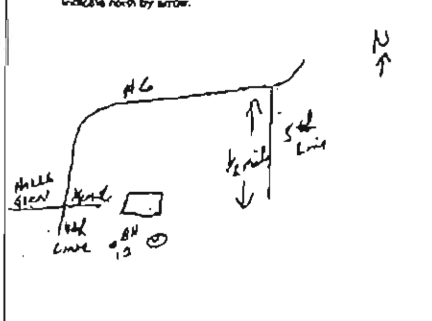
PUMPING TEST

Pumping test method: Pump / Bailer
Pumping rate: 10 - 15 GPM

Static level: 4 feet

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



* 30 - 21 Sand
21 - 19½ Holeplug
19½ - 9 Sand

236641

FINAL STATUS OF WELL

Observation well / Test hole

WATER USE

Other: Monitor

METHOD OF CONSTRUCTION

Cable tool / Rotary

Name of Well Contractor	Well Contractor's Licence No.
C.Hart & Sons Well Drilling Ltd.	2662

Address: Box 850, Fenelon Falls, Ontario

Name of Well Technician	Well Technician's Licence No.
Jim Loan	T-0346

Signature of Technician/Contractor

MINISTRY USE ONLY

1 - CONTRACTOR'S COPY

M.O.E. WATER WELL RECORD

MW-12

Geo-
Logic Inc.
PLATE B-9

Ontario Ministry of the Environment

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

705 749 3246 F.03-03

WATER WELL RECORD

County or District	Township/Borough/City/Town/Village	Con. block tract survey, etc.	Lot
Peterborough	Dummer Twp.Halls Glen-Land(11) TW1-02	4	26
Owner's surname: Township of Dummer	Address: c/o Totten Sims Hubicki Assoc. 300 Water St. Whitby ON. L1N 9J2	Date completed	29 10 02

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	To
Black	Topsoil			0	.5
Brown	Gravel	boulders		.5	9
Grey	Limestone			9	17

WATER RECORD

Water found at - feet	Kind of water
15.5	

CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	To
6?		.188	+3	6
2		.180	+3	6
2		.180	+3	12

SCREEN: Slot No. 10; Diameter 2; Length 3'&5'; Material and type PVC; Depth at top of screen 6, 12

PLUGGING & SEALING RECORD

Depth set at - feet From	To	Material and type
17	11	sand
11	9	holeplug
9	5	sand
5	0	holeplug

PUMPING TEST: 7

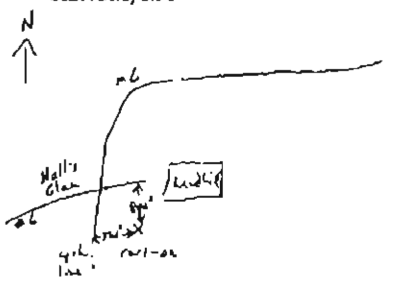
FINAL STATUS OF WELL

WATER USE: Other: Monitoring

METHOD OF CONSTRUCTION

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



252361

Name of Well Contractor	Well Contractor's Licence No.
C.Hart & Sons Well Drilling Ltd	2662
Address: Box 850, Fenelon Falls, ON K0M 1N0	
Name of Well Technician: Jim Leon	Well Technician's Licence No. T-0546

MINISTRY USE ONLY

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M.O.E. WELL RECORD

MW-13

Geo-Logic Inc.
PLATE B-10

Appendix C
Chemical Comparison Tables and Certificates of Analysis

FINAL REPORT

CA14957-MAY20 R1

11212878, Halls Glenn Landfill

Prepared for

GHD Limited - 735

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	GHD Limited - 735	Project Specialist	Brad Moore Hon. B.Sc
		Laboratory	SGS Canada Inc.
Address	347 Pido Rd., Unit #29 Peterborough, ON K9J 6Z8, Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Steve Gagne	Telephone	705-652-2143
Telephone	705-749-3317	Facsimile	705-652-6365
Facsimile		Email	brad.moore@sgs.com
Email	steve.gagne@ghd.com;gus.bolin@ghd.com;pascal.renella@gh	SGS Reference	CA14957-MAY20
Project	11212878, Halls Glenn Landfill	Received	05/26/2020
Order Number		Approved	06/04/2020
Samples	Ground Water (13)	Report Number	CA14957-MAY20 R1
		Date Reported	06/04/2020

COMMENTS

Temperature of Sample upon Receipt: 19 degrees C

Cooling Agent Present:Yes

Custody Seal Present:No

Chain of Custody Number:NA

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

FINAL REPORT

CA14957-MAY20 R1

Client: GHD Limited - 735

Project: 11212878, Halls Glenn Landfill

Project Manager: Steve Gagne

Samplers: Gus Bolin

PACKAGE: **BTEX** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7	8	9	10	11	12
				Sample Name	MW-1-1	MW-3-1	MW-4-1	MW-5-1	MW-6-1	MW-7-1	MW-8-1	MW-9-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
BTEX												
Benzene	ug/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	ug/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	ug/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Xylene (total)	ug/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
o-xylene	ug/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
m/p-xylene	ug/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
General Chemistry												
Alkalinity	mg/L as CaCO3	2	500		297	364	329	609	470	359	290	258
Conductivity	uS/cm	2			1210	876	725	1200	1130	790	794	592
Total Dissolved Solids	mg/L	30	500		746	480	389	711	617	489	451	337
Chemical Oxygen Demand	mg/L	8			< 8	14	8	39	16	< 8	< 8	37
Total Kjeldahl Nitrogen	as N mg/L	0.5			< 0.5	3.3	1.2	6.4	6.8	< 0.5	< 0.5	0.6
Ammonia+Ammonium (N)	as N mg/L	0.1			< 0.1	3.1	1.0	6.9	7.3	< 0.1	< 0.1	0.6
Dissolved Organic Carbon	mg/L	1	5		2	6	2	14	7	1	2	1

FINAL REPORT

CA14957-MAY20 R1

Client: GHD Limited - 735

Project: 11212878, Halls Glenn Landfill

Project Manager: Steve Gagne

Samplers: Gus Bolin

PACKAGE: **Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7	8	9	10	11	12
				Sample Name	MW-1-1	MW-3-1	MW-4-1	MW-5-1	MW-6-1	MW-7-1	MW-8-1	MW-9-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics												
Phosphorus (total)	mg/L	0.03			0.13	0.10	0.17	0.06	0.08	0.09	0.06	< 0.03
Sulphate	mg/L	2	500		90	24	15	13	37	32	19	63
Nitrite (as N)	as N mg/L	0.03		1	< 0.03	0.07	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		10	2.92	1.22	1.10	0.24	< 0.06	0.17	< 0.06	< 0.06
Arsenic (dissolved)	mg/L	0.0002		0.01	< 0.0002	< 0.0002	< 0.0002	0.0004	0.0003	0.0006	< 0.0002	< 0.0002
Barium (dissolved)	mg/L	0.00002		1	0.243	0.120	0.125	0.504	0.330	0.133	0.0948	0.689
Boron (dissolved)	mg/L	0.002		5	0.098	0.107	0.081	0.276	0.207	0.482	0.101	0.531
Calcium (dissolved)	mg/L	0.01			178	120	124	230	172	32.3	105	53.0
Cadmium (dissolved)	mg/L	0.000003		0.005	0.000009	0.000016	0.000017	0.000007	0.000006	0.000004	< 0.000003	< 0.000003
Chromium (dissolved)	mg/L	0.00008		0.05	0.00019	0.00024	0.00018	0.00054	0.00026	0.00012	0.00017	0.00017
Copper (dissolved)	mg/L	0.0002	1		0.0019	0.0005	0.0008	0.0018	0.0003	0.0005	0.0008	0.0004
Iron (dissolved)	mg/L	0.007	0.3		< 0.007	0.008	0.050	3.74	0.410	< 0.007	0.017	0.015
Potassium (dissolved)	mg/L	0.009			5.00	5.12	4.74	21.8	16.8	2.16	3.15	5.33
Magnesium (dissolved)	mg/L	0.001			17.5	5.10	6.27	22.7	13.9	8.37	12.0	24.4
Manganese (dissolved)	mg/L	0.00001	0.05		0.00002	0.0219	0.212	2.59	1.72	0.00021	0.00405	0.0699
Sodium (dissolved)	mg/L	0.01	200	20	87.8	30.4	35.1	55.1	75.1	163	52.1	56.2
Phosphorus (dissolved)	mg/L	0.003			0.013	0.003	0.004	0.003	0.005	< 0.003	< 0.003	< 0.003
Lead (dissolved)	mg/L	0.00001		0.01	0.00002	0.00001	0.00003	0.00001	0.00013	0.00002	< 0.00001	< 0.00001
Zinc (dissolved)	mg/L	0.002	5		0.002	0.002	< 0.002	< 0.002	< 0.002	0.003	0.004	< 0.002

![SGS]

FINAL REPORT

CA14957-MAY20 R1

Client: GHD Limited - 735

Project: 11212878, Halls Glenn Landfill

Project Manager: Steve Gagne

Samplers: Gus Bolin

PACKAGE: **Other (ORP)** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7	8	9	10	11	12
				Sample Name	MW-1-1	MW-3-1	MW-4-1	MW-5-1	MW-6-1	MW-7-1	MW-8-1	MW-9-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Other (ORP)												
pH	no unit	0.05	8.5		7.79	7.50	7.52	7.48	7.60	8.08	7.84	7.73
Chloride	mg/L	1	250		190	57	47	83	92	51	86	16
Mercury (total)	µg/L	0.01			0.01	0.02	0.01	0.02	0.02	0.01	0.01	< 0.01
Phenols												
4AAP-Phenolics	mg/L	0.002			< 0.002	< 0.002	< 0.002	0.005	< 0.002	0.003	< 0.002	0.003
THMs (VOC)												
Bromodichloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Bromoform	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Dibromochloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
VOCs												
1,4-Dichlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl Chloride	µg/L	0.2			< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bromomethane	µg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Carbon tetrachloride	µg/L	0.2				< 0.2	< 0.2	< 0.2	< 0.2	< 0.2		
Chloroethane	µg/L	5.0				< 5	< 5	< 5	< 5	< 5		
Chloroform	µg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Chloromethane	µg/L	5.0				< 5	< 5	< 5	< 5	< 5		
1,2-Dichlorobenzene	µg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,3-Dichlorobenzene	µg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,1-Dichloroethane	µg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,2-Dichloroethane	µg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,1-Dichloroethylene	µg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		

FINAL REPORT

CA14957-MAY20 R1

Client: GHD Limited - 735

Project: 11212878, Halls Glenn Landfill

Project Manager: Steve Gagne

Samplers: Gus Bolin

PACKAGE: **VOCs** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7	8	9	10	11	12
				Sample Name	MW-1-1	MW-3-1	MW-4-1	MW-5-1	MW-6-1	MW-7-1	MW-8-1	MW-9-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (continued)												
1,2-Dichloropropane	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
trans-1,2-Dichloroethene	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
cis-1,2-Dichloroethene	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
cis-1,3-Dichloropropene	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
trans-1,3-Dichloropropene	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Ethylenedibromide	μg/L	0.2				< 0.2	< 0.2	< 0.2	< 0.2	< 0.2		
Monochlorobenzene	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Styrene	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,1,2,2-Tetrachloroethane	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Tetrachloroethene	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Trichloroethylene	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Trichlorofluoromethane	μg/L	5.0				< 5	< 5	< 5	< 5	< 5		
1,1,1-Trichloroethane	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,1,2-Trichloroethane	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,1,1,2-Tetrachloroethane	μg/L	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		

FINAL REPORT

CA14957-MAY20 R1

Client: GHD Limited - 735

Project: 11212878, Halls Glenn Landfill

Project Manager: Steve Gagne

Samplers: Gus Bolin

PACKAGE: **BTEX** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	13	14	15	16	17
				Sample Name	MW-10-1	MW-11-1	MW-12-2	MW-12-3	MW-13-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**
BTEX									
Benzene	ug/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	ug/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	ug/L	0.5				< 0.5			
Xylene (total)	ug/L	0.5				< 0.5			
o-xylene	ug/L	0.5				< 0.5			
m/p-xylene	ug/L	0.5				< 0.5			
General Chemistry									
Alkalinity	mg/L as CaCO3	2	500		233	241	303	296	251
Conductivity	uS/cm	2			623	607	732	681	884
Total Dissolved Solids	mg/L	30	500		377	391	394	403	503
Chemical Oxygen Demand	mg/L	8			< 8	11	23	< 8	8
Total Kjeldahl Nitrogen	as N mg/L	0.5			< 0.5	0.9	< 0.5	< 0.5	< 0.5
Ammonia+Ammonium (N)	as N mg/L	0.1			0.2	0.8	0.4	< 0.1	< 0.1
Dissolved Organic Carbon	mg/L	1	5		1	2	1	1	2

FINAL REPORT

Client: GHD Limited - 735

Project: 11212878, Halls Glenn Landfill

Project Manager: Steve Gagne

Samplers: Gus Bolin

PACKAGE: **Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	13	14	15	16	17
				Sample Name	MW-10-1	MW-11-1	MW-12-2	MW-12-3	MW-13-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics									
Phosphorus (total)	mg/L	0.03			< 0.03	< 0.03	0.08	0.05	< 0.03
Sulphate	mg/L	2	500		25	43	75	23	10
Nitrite (as N)	as N mg/L	0.03		1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Arsenic (dissolved)	mg/L	0.0002		0.01	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Barium (dissolved)	mg/L	0.00002		1	0.848	0.683	0.195	0.0340	0.110
Boron (dissolved)	mg/L	0.002		5	0.221	0.331	0.621	0.077	0.017
Calcium (dissolved)	mg/L	0.01			90.9	90.3	82.3	127	108
Cadmium (dissolved)	mg/L	0.000003		0.005	< 0.000003	0.000005	< 0.000003	0.000003	0.000009
Chromium (dissolved)	mg/L	0.00008		0.05	0.00018	0.00041	0.00020	0.00009	0.00020
Copper (dissolved)	mg/L	0.0002	1		0.0002	0.0004	0.0003	0.0004	0.0011
Iron (dissolved)	mg/L	0.007	0.3		0.048	0.014	0.038	< 0.007	< 0.007
Potassium (dissolved)	mg/L	0.009			3.87	3.88	3.56	1.65	2.51
Magnesium (dissolved)	mg/L	0.001			21.5	22.8	31.2	5.49	3.02
Manganese (dissolved)	mg/L	0.00001	0.05		0.119	0.0680	0.110	0.0627	0.00007
Sodium (dissolved)	mg/L	0.01	200	20	14.1	14.7	47.9	16.1	70.3
Phosphorus (dissolved)	mg/L	0.003			0.003	0.006	0.003	< 0.003	0.010
Lead (dissolved)	mg/L	0.00001		0.01	< 0.00001	0.00002	0.00001	0.00002	0.00006
Zinc (dissolved)	mg/L	0.002	5		0.006	0.007	0.003	< 0.002	0.004

FINAL REPORT

Client: GHD Limited - 735
Project: 11212878, Halls Glenn Landfill
Project Manager: Steve Gagne
Samplers: Gus Bolin

PACKAGE: **Other (ORP)** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	13	14	15	16	17
				Sample Name	MW-10-1	MW-11-1	MW-12-2	MW-12-3	MW-13-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**
Other (ORP)									
pH	no unit	0.05	8.5		7.80	7.83	7.73	7.68	7.77
Chloride	mg/L	1	250		53	34	34	52	140
Mercury (total)	µg/L	0.01			0.02	0.01	0.01	0.01	0.01
Phenols									
4AAP-Phenolics	mg/L	0.002			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
VOCs									
1,4-Dichlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl Chloride	µg/L	0.2			< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bromomethane	µg/L	0.5				< 0.5			
Carbon tetrachloride	µg/L	0.2				< 0.2			
Chloroethane	µg/L	5.0				< 5			
Chloroform	µg/L	0.5				< 0.5			
Chloromethane	µg/L	5.0				< 5			
1,2-Dichlorobenzene	µg/L	0.5				< 0.5			
1,3-Dichlorobenzene	µg/L	0.5				< 0.5			
1,1-Dichloroethane	µg/L	0.5				< 0.5			
1,2-Dichloroethane	µg/L	0.5				< 0.5			
1,1-Dichloroethylene	µg/L	0.5				< 0.5			
1,2-Dichloropropane	µg/L	0.5				< 0.5			
trans-1,2-Dichloroethene	µg/L	0.5				< 0.5			
cis-1,2-Dichloroethene	µg/L	0.5				< 0.5			
cis-1,3-Dichloropropene	µg/L	0.5				< 0.5			

PACKAGE: **VOCs** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	13	14	15	16	17
				Sample Name	MW-10-1	MW-11-1	MW-12-2	MW-12-3	MW-13-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	26/05/2020	26/05/2020	26/05/2020	26/05/2020	26/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (continued)									
trans-1,3-Dichloropropene	µg/L	0.5				< 0.5			
Ethylenedibromide	µg/L	0.2				< 0.2			
Monochlorobenzene	µg/L	0.5				< 0.5			
Styrene	µg/L	0.5				< 0.5			
1,1,2,2-Tetrachloroethane	µg/L	0.5				< 0.5			
Tetrachloroethene	µg/L	0.5				< 0.5			
Trichloroethylene	µg/L	0.5				< 0.5			
Trichlorofluoromethane	µg/L	5.0				< 5			
1,1,1-Trichloroethane	µg/L	0.5				< 0.5			
1,1,2-Trichloroethane	µg/L	0.5				< 0.5			
1,1,1,2-Tetrachloroethane	µg/L	0.5				< 0.5			

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
MW-1-1					
Total Dissolved Solids	SM 2540C	mg/L	746	500	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	87.8		20
MW-3-1					
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	30.4		20
Dissolved Organic Carbon	SM 5310	mg/L	6	5	
MW-4-1					
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.212	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	35.1		20
MW-5-1					
Alkalinity	SM 2320	mg/L as CaCO3	609	500	
Total Dissolved Solids	SM 2540C	mg/L	711	500	
Iron (dissolved)	SM 3030/EPA 200.8	mg/L	3.74	0.3	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	2.59	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	55.1		20
Dissolved Organic Carbon	SM 5310	mg/L	14	5	
MW-6-1					
Total Dissolved Solids	SM 2540C	mg/L	617	500	
Iron (dissolved)	SM 3030/EPA 200.8	mg/L	0.410	0.3	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	1.72	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	75.1		20
Dissolved Organic Carbon	SM 5310	mg/L	7	5	
MW-7-1					
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	163		20
MW-8-1					
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	52.1		20
MW-9-1					
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.0699	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	56.2		20
MW-10-1					
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.119	0.05	

MW-11-1

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
MW-11-1 (continued)					
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.0680	0.05	
MW-12-2					
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.110	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	47.9		20
MW-12-3					
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.0627	0.05	
MW-13-1					
Total Dissolved Solids	SM 2540C	mg/L	503	500	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	70.3		20

QC SUMMARY

Alkalinity

Method: SM 2320 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0028-JUN20	mg/L as CaCO3	2	< 2	0	20	100	80	120	NA		

Ammonia by SFA

Method: SM 4500 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0243-MAY20	as N mg/L	0.1	<0.1	ND	10	100	90	110	102	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO0068-JUN20	mg/L	1	<1	0	20	108	80	120	93	75	125
Sulphate	DIO0068-JUN20	mg/L	2	<2	1	20	104	80	120	101	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0478-MAY20	mg/L	0.03	<0.03	1	20	97	80	120	100	75	125
Nitrate (as N)	DIO0478-MAY20	mg/L	0.06	<0.06	0	20	102	80	120	105	75	125

QC SUMMARY

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Dissolved Organic Carbon	SKA0218-MAY20	mg/L	1	<1	0	20	107	90	110	91	75	125

Chemical Oxygen Demand

Method: HACH 8000 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Chemical Oxygen Demand	EWL0003-JUN20	mg/L	8	<8	0	20	102	80	120	99	75	125
Chemical Oxygen Demand	EWL0479-MAY20	mg/L	8	<8	ND	20	114	80	120	95	75	125

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Conductivity	EWL0028-JUN20	uS/cm	2	< 2	ND	20	99	90	110	NA		

QC SUMMARY

Mercury by CVAAS

Method: SM 3112/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0023-MAY20	ug/L	0.01	<0.01	ND	20	105	80	120	116	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (dissolved)	EMS0130-MAY20	mg/L	0.0002	<0.0002	18	20	103	90	110	99	70	130
Barium (dissolved)	EMS0130-MAY20	mg/L	0.00002	<0.00002	4	20	98	90	110	93	70	130
Boron (dissolved)	EMS0130-MAY20	mg/L	0.002	<0.002	4	20	91	90	110	91	70	130
Calcium (dissolved)	EMS0130-MAY20	mg/L	0.01	<0.01	2	20	96	90	110	98	70	130
Cadmium (dissolved)	EMS0130-MAY20	mg/L	0.000003	<0.000003	ND	20	100	90	110	104	70	130
Chromium (dissolved)	EMS0130-MAY20	mg/L	0.00008	<0.00008	ND	20	99	90	110	93	70	130
Copper (dissolved)	EMS0130-MAY20	mg/L	0.0002	<0.0002	1	20	102	90	110	97	70	130
Iron (dissolved)	EMS0130-MAY20	mg/L	0.007	<0.007	ND	20	99	90	110	75	70	130
Potassium (dissolved)	EMS0130-MAY20	mg/L	0.009	<0.009	1	20	97	90	110	96	70	130
Magnesium (dissolved)	EMS0130-MAY20	mg/L	0.001	<0.001	1	20	100	90	110	101	70	130
Manganese (dissolved)	EMS0130-MAY20	mg/L	0.00001	<0.00001	8	20	102	90	110	98	70	130
Sodium (dissolved)	EMS0130-MAY20	mg/L	0.01	<0.01	1	20	100	90	110	101	70	130
Lead (dissolved)	EMS0130-MAY20	mg/L	0.00001	<0.00001	5	20	103	90	110	99	70	130
Phosphorus (dissolved)	EMS0130-MAY20	mg/L	0.003	<0.003	ND	20	96	90	110	NV	70	130
Zinc (dissolved)	EMS0130-MAY20	mg/L	0.002	<0.002	8	20	106	90	110	102	70	130

FINAL REPORT

QC SUMMARY

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0028-JUN20	no unit	0.05	NA	1		101			NA		

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0226-MAY20	mg/L	0.002	<0.002	ND	10	92	80	120	94	75	125

Phosphorus by SFA

Method: SM 4500-P J | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	SKA0233-MAY20	mg/L	0.03	<0.03	1	10	102	90	110	91	75	125

QC SUMMARY

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0004-JUN20	mg/L	30	<30	2	20	96	90	110	NA		
Total Dissolved Solids	EWL0017-JUN20	mg/L	30	<30	2	20	99	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0230-MAY20	as N mg/L	0.5	<0.5	0	10	95	90	110	86	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
1,1,1,2-Tetrachloroethane	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	105	60	130	102	50	140
1,1,1-Trichloroethane	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	94	60	130	93	50	140
1,1,2,2-Tetrachloroethane	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	106	60	130	108	50	140
1,1,2-Trichloroethane	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	103	60	130	102	50	140
1,1-Dichloroethane	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	97	60	130	95	50	140
1,1-Dichloroethylene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	99	60	130	96	50	140
1,2-Dichlorobenzene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	106	60	130	104	50	140
1,2-Dichloroethane	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	99	60	130	98	50	140
1,2-Dichloropropane	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	99	60	130	99	50	140
1,3-Dichlorobenzene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	106	60	130	102	50	140
1,4-Dichlorobenzene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	105	60	130	103	50	140
Benzene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	101	60	130	99	50	140
Bromodichloromethane	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	103	60	130	100	50	140
Bromoform	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	102	60	130	97	50	140
Bromomethane	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	96	50	140	93	50	140
Carbon tetrachloride	GCM0412-MAY20	ug/L	0.2	<0.2	ND	30	101	60	130	98	50	140
Chloroethane	GCM0412-MAY20	ug/L	5.0	<5	ND	30	101	60	130	97	50	140
Chloroform	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	101	60	130	99	50	140
Chloromethane	GCM0412-MAY20	ug/L	5.0	<5	ND	30	105	60	130	98	50	140
cis-1,2-Dichloroethene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	98	60	130	95	50	140

QC SUMMARY

Volatile Organics (continued)

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
cis-1,3-Dichloropropene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	104	60	130	102	50	140
Dibromochloromethane	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	101	60	130	98	50	140
Dichloromethane	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	98	60	130	96	50	140
Ethylbenzene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	105	60	130	102	50	140
Ethylenedibromide	GCM0412-MAY20	ug/L	0.2	<0.2	ND	30	104	60	130	103	50	140
m/p-xylene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	104	60	130	102	50	140
Monochlorobenzene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	105	60	130	102	50	140
o-xylene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	104	60	130	102	50	140
Styrene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	106	60	130	103	50	140
Tetrachloroethene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	102	60	130	99	50	140
Toluene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	102	60	130	100	50	140
trans-1,2-Dichloroethene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	95	60	130	93	50	140
trans-1,3-Dichloropropene	GCM0412-MAY20	ug/L	0.5	<0.5	ND	30	104	60	130	99	50	140
Trichloroethylene	GCM0412-MAY20	ug/L	0.5	<0.5	3	30	97	60	130	88	50	140
Trichlorofluoromethane	GCM0412-MAY20	ug/L	5.0	<5	ND	30	103	50	140	101	50	140
Vinyl Chloride	GCM0412-MAY20	ug/L	0.2	<0.2	ND	30	89	60	130	88	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. “Temperature Upon Receipt” is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act” published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
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Schedule 5 Column 3, Column 1 metals

Project : 11212878-01, Hallls Glenn Landfill

21-July-2020

GHD Limited - 735
Attn : Steve Gagne

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8, Canada

Phone: 705-749-3317
Fax:

Date Rec. : 26 May 2020
LR Report: **CA14955-MAY20**
Reference: 73519804, 11212878-01, Hallls Glenn Landfill, Steve Gagne

Copy: 1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	3: Analysis Completed Date	4: Analysis Completed Time	5: MW-3-2	6: MW-4-2	7: MW-5-2	8: MW-6-2	9: MW-7-2	10: MW-8-2	11: MW-9-2	12: MW-10-2
Sample Date & Time			26-May-20	26-May-20	26-May-20	26-May-20	26-May-20	26-May-20	26-May-20	26-May-20
Temp Upon Receipt [°C]	--	---	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
BOD5 [mg/L]	01-Jun-20	12:50	14	4	66	6	< 4	< 4	< 4	4
TSS [mg/L]	01-Jun-20	11:47	379	3020	800	115	264	20	6	42
Alkalinity [mg/L as CaCO3]	03-Jun-20	12:10	674	382	780	1090	212	235	233	243
pH [no unit]	03-Jun-20	12:10	7.36	7.79	7.18	7.25	7.95	7.85	7.90	7.83
Conductivity [uS/cm]	03-Jun-20	12:10	1360	415	1560	2190	383	452	591	618
TDS [mg/L]	02-Jun-20	14:32	814	251	900	1370	223	240	311	389
COD [mg/L]	03-Jun-20	15:00	26	10	62	102	10	16	< 8	8
Total P [mg/L]	28-May-20	15:19	0.27	0.55	0.32	0.08	0.09	< 0.03	< 0.03	0.04
TKN [as N mg/L]	28-May-20	15:04	1.3	< 0.5	13.5	32.8	< 0.5	< 0.5	< 0.5	0.8
NH3+NH4 [as N mg/L]	02-Jun-20	09:57	0.6	< 0.1	13.6	31.8	< 0.1	< 0.1	< 0.1	0.9
4AAP-Phenolics [mg/L]	28-May-20	15:39	< 0.001	0.001	0.005*	0.005*	0.002*	< 0.001	< 0.001	< 0.001
SO4 [mg/L]	04-Jun-20	10:01	89	4	9	150	5	6	10	10
Cl [mg/L]	04-Jun-20	10:01	54	5	110	92	10	9	50	54

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Schedule 5 Column 3, Column 1 metals

Project : 11212878-01, Hallls Glenn Landfill

LR Report : CA14955-MAY20

Analysis	3: Analysis Completed Date	4: Analysis Completed Time	5: MW-3-2	6: MW-4-2	7: MW-5-2	8: MW-6-2	9: MW-7-2	10: MW-8-2	11: MW-9-2	12: MW-10-2
NO2 [as N mg/L]	29-May-20	15:50	0.05	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
NO3 [as N mg/L]	29-May-20	15:50	1.76	< 0.06	0.07	< 0.06	< 0.06	0.15	< 0.06	< 0.06
Hg (tot) [µg/L]	28-May-20	12:18	0.02	0.02	0.02	0.04	0.02	0.01	< 0.01	0.01
As (diss) [mg/L]	29-May-20	17:52	0.0003	< 0.0002	0.0014	0.0006	< 0.0002	< 0.0002	0.0004	< 0.0002
Ba (diss) [mg/L]	29-May-20	17:52	0.157	0.0900	0.700	0.544	0.0838	0.0811	0.285	0.491
B (diss) [mg/L]	29-May-20	17:52	0.466	0.022	0.427	0.739	0.046	0.026	0.143	0.106
Ca (diss) [mg/L]	29-May-20	17:52	222	90.8	264	342	74.6	80.1	80.8	98.5
Cd (diss) [mg/L]	29-May-20	17:52	0.000039	< 0.000003	0.000017	0.000014	< 0.000003	0.000025	0.000007	< 0.000003
Cr (diss) [mg/L]	29-May-20	17:52	0.00032	0.00020	0.00079	0.00113	0.00019	0.00026	0.00023	0.00016
Cu (diss) [mg/L]	29-May-20	17:52	0.0020	0.0007	0.0010	0.0051	0.0006	0.0014	< 0.0002	0.0004
Fe (diss) [mg/L]	29-May-20	17:52	0.028	< 0.007	26.1	7.21	< 0.007	0.024	0.302	0.886
K (diss) [mg/L]	29-May-20	17:52	22.9	0.911	27.2	38.4	0.631	0.738	2.74	2.46
Mg (diss) [mg/L]	29-May-20	17:52	27.2	2.64	29.0	42.4	3.18	2.68	8.76	12.7
Mn (diss) [mg/L]	29-May-20	17:52	0.822	0.00073	8.52	8.49	0.00030	0.00434	0.0332	0.0951
Na (diss) [mg/L]	29-May-20	17:52	107	7.43	77.1	90.8	12.6	23.5	44.4	9.83
Pb (diss) [mg/L]			0.00001	0.00001	0.00011	0.00002	< 0.00001	0.00009	0.00001	< 0.00001
Zn (diss) [mg/L]	29-May-20	17:52	< 0.002	< 0.002	0.006	0.003	< 0.002	0.009	0.002	0.002
Benzene [ug/L]	02-Jun-20	14:32	< 0.5	< 0.5	0.6	< 0.5	< 0.5	---	---	---
Bromodichloromethane [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Bromoform [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Bromomethane [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Carbon tetrachloride [µg/L]	02-Jun-20	14:32	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	---	---	---
Chloroethane [µg/L]	02-Jun-20	14:32	< 5	< 5	< 5	< 5	< 5	---	---	---
Chloroform [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Chloromethane [µg/L]	02-Jun-20	14:32	< 5	< 5	< 5	< 5	< 5	---	---	---
Dibromochloromethane [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
1,2-Dichlorobenzene [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
1,3-Dichlorobenzene [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
1,4-Dichlorobenzene [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---

OnLine LIMS

0002189971

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Schedule 5 Column 3, Column 1 metals

Project : 11212878-01, Hallls Glenn Landfill

LR Report : **CA14955-MAY20**

Analysis	3: Analysis Completed Date	4: Analysis Completed Time	5: MW-3-2	6: MW-4-2	7: MW-5-2	8: MW-6-2	9: MW-7-2	10: MW-8-2	11: MW-9-2	12: MW-10-2
1,1-Dichloroethane [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
1,2-Dichloroethane [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
1,1-Dichloroethylene [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
1,2-Dichloropropane [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
trans-1,2-Dichloroet [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
cis-1,2-Dichloroethe [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
cis-1,3-Dichloroprop [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
trans-1,3-Dichloropr [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Ethylbenzene [ug/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Ethylenedibromide [µg/L]	02-Jun-20	14:32	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	---	---	---
Dichloromethane [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Monochlorobenzene [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Styrene [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
1,1,2,2-Tetrachloroe [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Tetrachloroethene [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Toluene [ug/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Trichloroethylene [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Vinyl Chloride [µg/L]	02-Jun-20	14:32	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	---	---	---
Trichlorofluorometha [µg/L]	02-Jun-20	14:32	< 5	< 5	< 5	< 5	< 5	---	---	---
1,1,1-Trichloroethan [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
1,1,2-Trichloroethan [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
Xylene (total) [ug/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
o-xylene [ug/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
m-p-xylene [ug/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---
1,1,1,2-Tetrachloroe [µg/L]	02-Jun-20	14:32	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	---	---

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Schedule 5 Column 3, Column 1 metals

Project : 11212878-01, Hallls Glenn Landfill

LR Report : **CA14955-MAY20**

Analysis	13: MW-11-2	14: MW-12-1	15: MW-13-2
Sample Date & Time	26-May-20	26-May-20	26-May-20
Temp Upon Receipt [°C]	19.0	19.0	19.0
BOD5 [mg/L]	7	5	< 4
TSS [mg/L]	8	8	56
Alkalinity [mg/L as CaCO3]	227	278	318
pH [no unit]	7.76	7.71	7.41
Conductivity [uS/cm]	520	684	862
TDS [mg/L]	274	397	526
COD [mg/L]	13	< 8	15
Total P [mg/L]	< 0.03	< 0.03	0.03
TKN [as N mg/L]	0.6	< 0.5	< 0.5
NH3+NH4 [as N mg/L]	0.7	< 0.1	0.2
4AAP-Phenolics [mg/L]	0.002*	0.002*	0.003*
SO4 [mg/L]	17	23	22
Cl [mg/L]	21	55	85
NO2 [as N mg/L]	< 0.03	< 0.03	< 0.03
NO3 [as N mg/L]	0.13	< 0.06	1.27
Hg (tot) [µg/L]	0.03	0.03	0.02
As (diss) [mg/L]	< 0.0002	< 0.0002	< 0.0002
Ba (diss) [mg/L]	0.504	0.621	0.158
B (diss) [mg/L]	0.150	0.106	0.049
Ca (diss) [mg/L]	102	115	149
Cd (diss) [mg/L]	0.000005	< 0.000003	0.000024
Cr (diss) [mg/L]	0.00018	0.00013	0.00026
Cu (diss) [mg/L]	0.0005	0.0003	0.0016
Fe (diss) [mg/L]	2.13	0.020	0.016
K (diss) [mg/L]	2.86	3.34	4.01
Mg (diss) [mg/L]	12.7	12.9	5.68
Mn (diss) [mg/L]	0.0314	0.00518	0.00127

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Schedule 5 Column 3, Column 1 metals

Project : 11212878-01, Hallls Glenn Landfill

LR Report : **CA14955-MAY20**

Analysis	13: MW-11-2	14: MW-12-1	15: MW-13-2
Na (diss) [mg/L]	8.39	16.9	46.8
Pb (diss) [mg/L]	0.00003	0.00001	0.00008
Zn (diss) [mg/L]	0.008	0.002	0.012
Benzene [ug/L]	< 0.5	---	---
Bromodichloromethane [µg/L]	< 0.5	---	---
Bromoform [µg/L]	< 0.5	---	---
Bromomethane [µg/L]	< 0.5	---	---
Carbon tetrachloride [µg/L]	< 0.2	---	---
Chloroethane [µg/L]	< 5	---	---
Chloroform [µg/L]	< 0.5	---	---
Chloromethane [µg/L]	< 5	---	---
Dibromochloromethane [µg/L]	< 0.5	---	---
1,2-Dichlorobenzene [µg/L]	< 0.5	---	---
1,3-Dichlorobenzene [µg/L]	< 0.5	---	---
1,4-Dichlorobenzene [µg/L]	< 0.5	---	---
1,1-Dichloroethane [µg/L]	< 0.5	---	---
1,2-Dichloroethane [µg/L]	< 0.5	---	---
1,1-Dichloroethylene [µg/L]	< 0.5	---	---
1,2-Dichloropropane [µg/L]	< 0.5	---	---
trans-1,2-Dichloroet [µg/L]	< 0.5	---	---
cis-1,2-Dichloroethe [µg/L]	< 0.5	---	---
cis-1,3-Dichloroprop [µg/L]	< 0.5	---	---
trans-1,3-Dichloropr [µg/L]	< 0.5	---	---
Ethylbenzene [ug/L]	< 0.5	---	---
Ethylenedibromide [µg/L]	< 0.2	---	---
Dichloromethane [µg/L]	< 0.5	---	---
Monochlorobenzene [µg/L]	< 0.5	---	---
Styrene [µg/L]	< 0.5	---	---
1,1,2,2-Tetrachloroe [µg/L]	< 0.5	---	---

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Analysis	13: MW-11-2	14: MW-12-1	15: MW-13-2
Tetrachloroethene [µg/L]	< 0.5	---	---
Toluene [ug/L]	< 0.5	---	---
Trichloroethylene [µg/L]	< 0.5	---	---
Vinyl Chloride [µg/L]	< 0.2	---	---
Trichlorofluorometha [µg/L]	< 5	---	---
1,1,1-Trichloroethan [µg/L]	< 0.5	---	---
1,1,2-Trichloroethan [µg/L]	< 0.5	---	---
Xylene (total) [ug/L]	< 0.5	---	---
o-xylene [ug/L]	< 0.5	---	---
m-p-xylene [ug/L]	< 0.5	---	---
1,1,1,2-Tetrachloroe [µg/L]	< 0.5	---	---

Temperature of Sample upon Receipt: 19 degrees C
Cooling Agent Present:Yes
Custody Seal Present:No

Chain of Custody Number:NA

Jill Campbell

Jill Campbell, B.Sc.,GISAS
Project Specialist, Environment, Health & Safety

OnLine LIMS

0002189971

FINAL REPORT

CA14882-MAY20 R1

11212878-01,Halls Glen Landfill

Prepared for

GHD Limited - 735

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	GHD Limited - 735	Project Specialist	Brad Moore Hon. B.Sc
		Laboratory	SGS Canada Inc.
Address	347 Pido Rd., Unit #29 Peterborough, ON K9J 6Z8, Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Steve Gagne	Telephone	705-652-2143
Telephone	705-749-3317	Facsimile	705-652-6365
Facsimile		Email	brad.moore@sgs.com
Email	steve.gagne@ghd.com;gus.bolin@ghd.com;pascal.renella@gh	SGS Reference	CA14882-MAY20
Project	11212878-01,Halls Glen Landfill	Received	05/26/2020
Order Number		Approved	06/17/2020
Samples	Ground Water (3)	Report Number	CA14882-MAY20 R1
		Date Reported	06/17/2020

COMMENTS

Temperature of Sample upon Receipt: 5 degrees C
Cooling Agent Present:Yes
Custody Seal Present:No

Chain of Custody Number:NA

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

Client: GHD Limited - 735

Project: 11212878-01,Halls Glen Landfill

Project Manager: Steve Gagne

Samplers: Gus Bolin

PACKAGE: **BTEX** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7
				Sample Name	R-1	R-3	R-4
				Sample Matrix	Ground Water	Ground Water	Ground Water
				Sample Date	25/05/2020	25/05/2020	25/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**
BTEX							
Benzene	ug/L	0.5			< 0.5	< 0.5	< 0.5
Ethylbenzene	ug/L	0.5			< 0.5	< 0.5	< 0.5
Toluene	ug/L	0.5			< 0.5	< 0.5	< 0.5
Xylene (total)	ug/L	0.5			< 0.5	< 0.5	< 0.5
o-xylene	ug/L	0.5			< 0.5	< 0.5	< 0.5
m/p-xylene	ug/L	0.5			< 0.5	< 0.5	< 0.5
General Chemistry							
Alkalinity	mg/L as CaCO3	2	500		1710	237	304
Conductivity	uS/cm	2			611	530	1130
Total Dissolved Solids	mg/L	30	500		337	331	629
Chemical Oxygen Demand	mg/L	8			< 8	< 8	< 8
Total Kjeldahl Nitrogen	as N mg/L	0.5			< 0.5	< 0.5	< 0.5
Ammonia+Ammonium (N)	as N mg/L	0.1			< 0.1	< 0.1	< 0.1
Dissolved Organic Carbon	mg/L	1	5		3	3	2

FINAL REPORT

CA14882-MAY20 R1

Client: GHD Limited - 735

Project: 11212878-01,Halls Glen Landfill

Project Manager: Steve Gagne

Samplers: Gus Bolin

PACKAGE: **Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7
				Sample Name	R-1	R-3	R-4
				Sample Matrix	Ground Water	Ground Water	Ground Water
				Sample Date	25/05/2020	25/05/2020	25/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**
Metals and Inorganics							
Phosphorus (total)	mg/L	0.03			< 0.03	< 0.03	< 0.03
Sulphate	mg/L	2	500		4	8	10
Nitrite (as N)	as N mg/L	0.03		1	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		10	0.09	2.16	0.56
Arsenic (dissolved)	mg/L	0.0002		0.01	< 0.0002	< 0.0002	< 0.0002
Barium (dissolved)	mg/L	0.00002		1	0.0768	0.0279	0.114
Boron (dissolved)	mg/L	0.002		5	0.013	0.026	0.016
Calcium (dissolved)	mg/L	0.01			83.3	27.2	116
Cadmium (dissolved)	mg/L	0.000003		0.005	0.000015	0.000015	0.000007
Chromium (dissolved)	mg/L	0.00008		0.05	0.00017	0.00010	0.00029
Copper (dissolved)	mg/L	0.0002	1		0.0009	1.79	0.0705
Iron (dissolved)	mg/L	0.007	0.3		< 0.007	0.009	0.011
Potassium (dissolved)	mg/L	0.009			0.870	0.700	2.95
Magnesium (dissolved)	mg/L	0.001			2.98	1.16	3.75
Manganese (dissolved)	mg/L	0.00001	0.05		0.00033	0.0734	0.00042
Sodium (dissolved)	mg/L	0.01	200	20	36.0	124	138
Lead (dissolved)	mg/L	0.00001		0.01	0.00002	0.297	0.00156
Zinc (dissolved)	mg/L	0.002	5		0.004	0.024	0.031

FINAL REPORT

Client: GHD Limited - 735

Project: 11212878-01,Halls Glen Landfill

Project Manager: Steve Gagne

Samplers: Gus Bolin

PACKAGE: **Other (ORP)** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7
				Sample Name	R-1	R-3	R-4
				Sample Matrix	Ground Water	Ground Water	Ground Water
				Sample Date	25/05/2020	25/05/2020	25/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**
Other (ORP)							
pH	no unit	0.05	8.5		8.03	7.96	7.72
Chloride	mg/L	1	250		58	41	210
Mercury (total)	µg/L	0.01			< 0.01	< 0.01	< 0.01
Phenols							
4AAP-Phenolics	mg/L	0.002			< 0.002	< 0.002	0.002
THMs (VOC)							
Bromodichloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5
Bromoform	µg/L	0.5			< 0.5	< 0.5	< 0.5
Dibromochloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5
VOCs							
Bromomethane	µg/L	0.5			< 0.5	< 0.5	< 0.5
Carbon tetrachloride	µg/L	0.2			< 0.2	< 0.2	< 0.2
Chloroethane	µg/L	5.0			< 5	< 5	< 5
Chloroform	µg/L	0.5			< 0.5	< 0.5	< 0.5
Chloromethane	µg/L	5.0			< 5	< 5	< 5
1,2-Dichlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5
1,4-Dichlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5
1,1-Dichloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5
1,2-Dichloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5
1,1-Dichloroethylene	µg/L	0.5			< 0.5	< 0.5	< 0.5
1,2-Dichloropropane	µg/L	0.5			< 0.5	< 0.5	< 0.5
trans-1,2-Dichloroethene	µg/L	0.5			< 0.5	< 0.5	< 0.5

FINAL REPORT

CA14882-MAY20 R1

Client: GHD Limited - 735

Project: 11212878-01,Halls Glen Landfill

Project Manager: Steve Gagne

Samplers: Gus Bolin

PACKAGE: **VOCs** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7
				Sample Name	R-1	R-3	R-4
				Sample Matrix	Ground Water	Ground Water	Ground Water
				Sample Date	25/05/2020	25/05/2020	25/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**
VOCs (continued)							
cis-1,2-Dichloroethene	µg/L	0.5			< 0.5	< 0.5	< 0.5
cis-1,3-Dichloropropene	µg/L	0.5			< 0.5	< 0.5	< 0.5
trans-1,3-Dichloropropene	µg/L	0.5			< 0.5	< 0.5	< 0.5
Ethylenedibromide	µg/L	0.2			< 0.2	< 0.2	< 0.2
Dichloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5
Monochlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5
Styrene	µg/L	0.5			< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5
Tetrachloroethene	µg/L	0.5			< 0.5	< 0.5	< 0.5
Trichloroethylene	µg/L	0.5			< 0.5	< 0.5	< 0.5
Vinyl Chloride	µg/L	0.2			< 0.2	< 0.2	< 0.2
Trichlorofluoromethane	µg/L	5.0			< 5	< 5	< 5
1,1,1-Trichloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5
1,1,1,2-Tetrachloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
R-1					
Alkalinity	SM 2320	mg/L as CaCO3	1710	500	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	36.0		20
R-3					
Copper (dissolved)	SM 3030/EPA 200.8	mg/L	1.79	1	
Lead (dissolved)	SM 3030/EPA 200.8	mg/L	0.297		0.01
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.0734	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	124		20
R-4					
Total Dissolved Solids	SM 2540C	mg/L	629	500	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	138		20

FINAL REPORT

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Alkalinity	EWL0419-MAY20	mg/L as CaCO3	2	< 2	0	20	104	80	120	NA		
Alkalinity	EWL0463-MAY20	mg/L as CaCO3	2	< 2	0	20	96	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Ammonia+Ammonium (N)	SKA0243-MAY20	as N mg/L	0.1	<0.1	ND	10	100	90	110	102	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO0045-JUN20	mg/L	1	<1	1	20	106	80	120	97	75	125
Sulphate	DIO0045-JUN20	mg/L	2	<2	ND	20	105	80	120	111	75	125
Chloride	DIO0546-MAY20	mg/L	1	<1	0	20	108	80	120	89	75	125
Sulphate	DIO0546-MAY20	mg/L	2	<2	2	20	99	80	120	101	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0451-MAY20	mg/L	0.03	<0.03	5	20	97	80	120	100	75	125
Nitrate (as N)	DIO0451-MAY20	mg/L	0.06	<0.06	NV	20	102	80	120	NV	75	125
Nitrite (as N)	DIO0467-MAY20	mg/L	0.03	<0.03	1	20	98	80	120	101	75	125
Nitrate (as N)	DIO0467-MAY20	mg/L	0.06	<0.06	NV	20	102	80	120	NV	75	125

QC SUMMARY

Carbon by SFA

Method: SM 5310 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0218-MAY20	mg/L	1	<1	0	20	107	90	110	91	75	125
Dissolved Organic Carbon	SKA0235-MAY20	mg/L	1	<1	0	20	105	90	110	77	75	125

Chemical Oxygen Demand

Method: HACH 8000 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0440-MAY20	mg/L	8	<8	0	20	96	80	120	91	75	125

QC SUMMARY

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0419-MAY20	uS/cm	2	< 2	0	20	99	90	110	NA		
Conductivity	EWL0463-MAY20	uS/cm	2	< 2	3	20	100	90	110	NA		

Mercury by CVAAS

Method: SM 3112/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0023-MAY20	ug/L	0.01	<0.01	ND	20	105	80	120	116	70	130
Mercury (total)	EHG0024-MAY20	ug/L	0.01	<0.01	ND	20	119	80	120	NV	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Arsenic (dissolved)	EMS0113-MAY20	mg/L	0.0002	<0.0002	9	20	96	90	110	95	70	130
Barium (dissolved)	EMS0113-MAY20	mg/L	0.00002	<0.00002	8	20	96	90	110	99	70	130
Boron (dissolved)	EMS0113-MAY20	mg/L	0.002	<0.002	9	20	98	90	110	97	70	130
Calcium (dissolved)	EMS0113-MAY20	mg/L	0.01	<0.01	5	20	95	90	110	100	70	130
Cadmium (dissolved)	EMS0113-MAY20	mg/L	0.000003	<0.000003	15	20	99	90	110	102	70	130
Chromium (dissolved)	EMS0113-MAY20	mg/L	0.00008	<0.00008	1	20	97	90	110	99	70	130
Copper (dissolved)	EMS0113-MAY20	mg/L	0.0002	<0.0002	5	20	98	90	110	103	70	130
Iron (dissolved)	EMS0113-MAY20	mg/L	0.007	<0.007	2	20	95	90	110	125	70	130
Potassium (dissolved)	EMS0113-MAY20	mg/L	0.009	<0.009	6	20	94	90	110	96	70	130
Magnesium (dissolved)	EMS0113-MAY20	mg/L	0.001	<0.001	7	20	100	90	110	102	70	130
Manganese (dissolved)	EMS0113-MAY20	mg/L	0.00001	<0.00001	7	20	98	90	110	102	70	130
Sodium (dissolved)	EMS0113-MAY20	mg/L	0.01	<0.01	ND	20	106	90	110	105	70	130
Lead (dissolved)	EMS0113-MAY20	mg/L	0.00001	<0.00001	4	20	98	90	110	101	70	130
Zinc (dissolved)	EMS0113-MAY20	mg/L	0.002	<0.002	6	20	99	90	110	111	70	130
Boron (dissolved)	EMS0122-MAY20	mg/L	0.002	<0.002	2	20	98	90	110	NV	70	130
Arsenic (dissolved)	EMS9003-JUN20	mg/L	0.0002	<0.0002	4	20	102	90	110	101	70	130
Barium (dissolved)	EMS9003-JUN20	mg/L	0.00002	<0.00002	1	20	99	90	110	100	70	130
Boron (dissolved)	EMS9003-JUN20	mg/L	0.002	<0.002	1	20	101	90	110	104	70	130
Calcium (dissolved)	EMS9003-JUN20	mg/L	0.01	<0.01	1	20	102	90	110	105	70	130
Cadmium (dissolved)	EMS9003-JUN20	mg/L	0.000003	<0.000003	6	20	101	90	110	106	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 I Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chromium (dissolved)	EMS9003-JUN20	mg/L	0.00008	<0.00008	10	20	100	90	110	110	70	130
Copper (dissolved)	EMS9003-JUN20	mg/L	0.0002	<0.0002	3	20	101	90	110	105	70	130
Iron (dissolved)	EMS9003-JUN20	mg/L	0.007	<0.007	13	20	104	90	110	125	70	130
Potassium (dissolved)	EMS9003-JUN20	mg/L	0.009	<0.009	1	20	104	90	110	101	70	130
Magnesium (dissolved)	EMS9003-JUN20	mg/L	0.001	<0.001	1	20	101	90	110	102	70	130
Manganese (dissolved)	EMS9003-JUN20	mg/L	0.00001	<0.00001	0	20	100	90	110	102	70	130
Sodium (dissolved)	EMS9003-JUN20	mg/L	0.01	<0.01	0	20	102	90	110	107	70	130
Lead (dissolved)	EMS9003-JUN20	mg/L	0.00001	<0.00001	ND	20	99	90	110	98	70	130
Zinc (dissolved)	EMS9003-JUN20	mg/L	0.002	<0.002	4	20	100	90	110	NV	70	130

pH

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0419-MAY20	no unit	0.05	NA	0		101			NA		
pH	EWL0463-MAY20	no unit	0.05	NA	0		101			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0226-MAY20	mg/L	0.002	<0.002	ND	10	92	80	120	94	75	125
4AAP-Phenolics	SKA0237-MAY20	mg/L	0.002	<0.002	4	10	98	80	120	84	75	125

Phosphorus by SFA

Method: SM 4500-P J | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	SKA0233-MAY20	mg/L	0.03	<0.03	1	10	102	90	110	91	75	125

QC SUMMARY

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0004-JUN20	mg/L	30	<30	2	20	96	90	110	NA		
Total Dissolved Solids	EWL0414-MAY20	mg/L	30	<30	2	20	99	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0230-MAY20	as N mg/L	0.5	<0.5	0	10	95	90	110	86	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,1,2-Tetrachloroethane	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	102	60	130	96	50	140
1,1,1-Trichloroethane	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	97	60	130	91	50	140
1,1,2,2-Tetrachloroethane	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	104	60	130	100	50	140
1,1,2-Trichloroethane	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	100	60	130	100	50	140
1,1-Dichloroethane	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	96	60	130	94	50	140
1,1-Dichloroethylene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	98	60	130	91	50	140
1,2-Dichlorobenzene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	106	60	130	93	50	140
1,2-Dichloroethane	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	99	60	130	98	50	140
1,2-Dichloropropane	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	101	60	130	100	50	140
1,3-Dichlorobenzene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	106	60	130	90	50	140
1,4-Dichlorobenzene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	105	60	130	92	50	140
Benzene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	102	60	130	97	50	140
Bromodichloromethane	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	103	60	130	101	50	140
Bromoform	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	100	60	130	100	50	140
Bromomethane	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	97	50	140	95	50	140
Carbon tetrachloride	GCM0004-JUN20	ug/L	0.2	<0.2	ND	30	104	60	130	95	50	140
Chloroethane	GCM0004-JUN20	ug/L	5.0	<5	ND	30	103	60	130	96	50	140
Chloroform	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	101	60	130	96	50	140
Chloromethane	GCM0004-JUN20	ug/L	5.0	<5	ND	30	103	60	130	104	50	140
cis-1,2-Dichloroethene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	100	60	130	95	50	140

QC SUMMARY

Volatile Organics (continued)

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
cis-1,3-Dichloropropene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	101	60	130	98	50	140
Dibromochloromethane	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	98	60	130	99	50	140
Dichloromethane	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	101	60	130	97	50	140
Ethylbenzene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	105	60	130	92	50	140
Ethylenedibromide	GCM0004-JUN20	ug/L	0.2	<0.2	ND	30	103	60	130	105	50	140
m/p-xylene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	105	60	130	92	50	140
Monochlorobenzene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	105	60	130	95	50	140
o-xylene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	105	60	130	93	50	140
Styrene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	105	60	130	94	50	140
Tetrachloroethene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	105	60	130	92	50	140
Toluene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	103	60	130	96	50	140
trans-1,2-Dichloroethene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	95	60	130	90	50	140
trans-1,3-Dichloropropene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	100	60	130	99	50	140
Trichloroethylene	GCM0004-JUN20	ug/L	0.5	<0.5	ND	30	100	60	130	94	50	140
Trichlorofluoromethane	GCM0004-JUN20	ug/L	5.0	<5	ND	30	108	50	140	101	50	140
Vinyl Chloride	GCM0004-JUN20	ug/L	0.2	<0.2	ND	30	93	60	130	89	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. “Temperature Upon Receipt” is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act” published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Schedule 5 Column 1 with VOC short list

Project : 11212878-01, Halls Glenn Landfill

GHD Limited - 735
Attn : Steve Gagne

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8, Canada

Phone: 705-749-3317
Fax:

03-June-2020

Date Rec. : 26 May 2020
LR Report: **CA14956-MAY20**
Reference: 73519804, 11212878-01, Halls Glenn Landfill, Steve Gagne

Copy: 1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	**1: Analysis Start Date**	**2: Analysis Start Time**	**3: Analysis Completed Date**	**4: Analysis Completed Time**	**5: R-2**
Sample Date & Time					26-May-20
Temp Upon Receipt [°C]	---	---	--	---	19.0
Alkalinity [mg/L as CaCO3]	27-May-20	13:10	28-May-20	12:53	254
pH [no unit]	27-May-20	13:10	28-May-20	12:53	7.96
Conductivity [uS/cm]	27-May-20	13:10	28-May-20	12:53	702
TDS [mg/L]	27-May-20	16:50	31-May-20	19:38	397
COD [mg/L]	01-Jun-20	08:33	02-Jun-20	12:38	9
Total P [mg/L]	27-May-20	19:20	28-May-20	15:19	< 0.03
TKN [as N mg/L]	27-May-20	18:14	28-May-20	15:53	< 0.5
NH3+NH4 [as N mg/L]	28-May-20	19:15	29-May-20	12:46	< 0.1
4AAP-Phenolics [mg/L]	27-May-20	08:35	28-May-20	00:20	< 0.002
SO4 [mg/L]	30-May-20	09:35	01-Jun-20	12:10	9
Cl [mg/L]	30-May-20	09:40	01-Jun-20	12:10	59
NO2 [as N mg/L]	27-May-20	16:38	02-Jun-20	08:19	< 0.03
NO3 [as N mg/L]	27-May-20	16:38	02-Jun-20	08:19	1.77

SGS Canada Inc.
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Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: R-2
DOC [mg/L]	27-May-20	06:39	27-May-20	11:48	1
Hg (tot) [µg/L]	27-May-20	12:03	28-May-20	12:19	0.01
As (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	0.0002
Ba (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	0.0877
B (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	0.011
Ca (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	114
Cd (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	< 0.000003
Cr (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	0.00011
Cu (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	0.110
Fe (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	< 0.007
K (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	0.869
Mg (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	2.91
Mn (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	0.00007
Na (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	26.3
P (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	< 0.003
Pb (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	0.00040
Zn (diss) [mg/L]	28-May-20	15:10	29-May-20	11:07	0.008
Benzene [ug/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
1,4-Dichlorobenzene [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Dichloromethane [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Toluene [ug/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Vinyl Chloride [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.2
Bromodichloromethane [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Bromoform [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Bromomethane [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Carbon tetrachloride [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.2
Chloroethane [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 5
Chloroform [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Chloromethane [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 5

SGS Canada Inc.
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Schedule 5 Column 1 with VOC short list

Project : 11212878-01, Halls Glenn Landfill

LR Report : **CA14956-MAY20**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: R-2
Dibromochloromethane [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
1,2-Dichlorobenzene [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
1,3-Dichlorobenzene [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
1,1-Dichloroethane [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
1,2-Dichloroethane [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
1,1-Dichloroethylene [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
1,2-Dichloropropane [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
trans-1,2-Dichloroet [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
cis-1,2-Dichloroethe [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
cis-1,3-Dichloroprop [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
trans-1,3-Dichloropr [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Ethylbenzene [ug/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Ethylenedibromide [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.2
Monochlorobenzene [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Styrene [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
1,1,2,2-Tetrachloroe [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Tetrachloroethene [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Trichloroethylene [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Trichlorofluorometha [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 5
1,1,1-Trichloroethan [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
1,1,2-Trichloroethan [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
Xylene (total) [ug/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
o-xylene [ug/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
m-p-xylene [ug/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5
1,1,1,2-Tetrachloroe [µg/L]	30-May-20	08:01	02-Jun-20	19:36	< 0.5

Temperature of Sample upon Receipt: 19 degrees C
Cooling Agent Present:Yes
Custody Seal Present:No

Chain of Custody Number:NA

OnLine LIMS

0002136615

SGS Canada Inc.
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Jill Campbell

Jill Campbell, B.Sc.,GISAS
Project Specialist, Environment, Health & Safety

OnLine LIMS

0002136615

FINAL REPORT

CA14883-MAY20 R

11212878-01, Halls Glen Landfill

Prepared for

GHD Limited - 735

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	GHD Limited - 735	Project Specialist	Brad Moore Hon. B.Sc
		Laboratory	SGS Canada Inc.
Address	347 Pido Rd., Unit #29 Peterborough, ON K9J 6Z8, Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Steve Gagne	Telephone	705-652-2143
Telephone	705-749-3317	Facsimile	705-652-6365
Facsimile		Email	brad.moore@sgs.com
Email	steve.gagne@ghd.com;gus.bolin@ghd.com;pascal.renella@gh	SGS Reference	CA14883-MAY20
Project	11212878-01, Halls Glen Landfill	Received	05/26/2020
Order Number		Approved	06/03/2020
Samples	Surface Water (2)	Report Number	CA14883-MAY20 R
		Date Reported	06/03/2020

COMMENTS

Temperature of Sample upon Receipt: 5 degrees C

Cooling Agent Present:Yes

Custody Seal Present:No

Chain of Custody Number:NA

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

FINAL REPORT

CA14883-MAY20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Steve Gagne

Samplers: Gus Bolin

PACKAGE: **General Chemistry** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6
				Sample Name	S-1	S-2
				Sample Matrix	Surface Water	Surface Water
				Sample Date	25/05/2020	25/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
General Chemistry						
Biochemical Oxygen Demand (BOD5)	mg/L	2			7	< 4↑
Total Suspended Solids	mg/L	2			15	27
Alkalinity	mg/L as CaCO3	2	500		232	225
Conductivity	uS/cm	2			570	558
Total Dissolved Solids	mg/L	30	500		340	334
Chemical Oxygen Demand	mg/L	8			< 8	19
Total Kjeldahl Nitrogen	as N mg/L	0.5			< 0.5	< 0.5
Ammonia+Ammonium (N)	as N mg/L	0.1			< 0.1	< 0.1
Metals and Inorganics						
Sulphate	mg/L	2	500		5	5
Nitrite (as N)	as N mg/L	0.03		1	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		10	0.07	< 0.06
Arsenic (total)	mg/L	0.0002		0.01	0.0003	0.0003
Barium (total)	mg/L	0.00002		1	0.0956	0.109
Boron (total)	mg/L	0.002		5	0.011	0.014
Calcium (total)	mg/L	0.01			101	104
Cadmium (total)	mg/L	0.000003		0.005	0.000011	0.000036
Chromium (total)	mg/L	0.00008		0.05	0.00028	0.00053
Copper (total)	mg/L	0.0002	1		0.0008	0.0036
Iron (total)	mg/L	0.007	0.3		0.275	0.284
Potassium (total)	mg/L	0.009			1.29	2.26

FINAL REPORT

CA14883-MAY20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Steve Gagne

Samplers: Gus Bolin

PACKAGE: **Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6
				Sample Name	S-1	S-2
				Sample Matrix	Surface Water	Surface Water
				Sample Date	25/05/2020	25/05/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Magnesium (total)	mg/L	0.001			3.07	3.32
Manganese (total)	mg/L	0.00001	0.05		0.0347	0.0271
Sodium (total)	mg/L	0.01			30.2	23.0
Phosphorus (total)	mg/L	0.003			0.118	0.091
Lead (total)	mg/L	0.00001		0.01	0.00023	0.00078
Zinc (total)	mg/L	0.002	5		< 0.002	0.004
Other (ORP)						
pH	no unit	0.05	8.5		8.10	7.76
Chloride	mg/L	1	250		46	37
Mercury (total)	µg/L	0.01			< 0.01	< 0.01
Phenols						
4AAP-Phenolics	mg/L	0.001			< 0.001	0.004

EXCEEDANCE SUMMARY

No exceedances are present above the regulatory limit(s) indicated

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0419-MAY20	mg/L as CaCO3	2	< 2	0	20	104	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0217-MAY20	as N mg/L	0.1	<0.1	0	10	99	90	110	105	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO0045-JUN20	mg/L	1	<1	1	20	106	80	120	97	75	125
Sulphate	DIO0045-JUN20	mg/L	2	<2	ND	20	105	80	120	111	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0451-MAY20	mg/L	0.03	<0.03	5	20	97	80	120	100	75	125
Nitrate (as N)	DIO0451-MAY20	mg/L	0.06	<0.06	NV	20	102	80	120	NV	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0051-MAY20	mg/L	2	< 2	4	30	100	70	130	NV	70	130

Chemical Oxygen Demand

Method: HACH 8000 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0440-MAY20	mg/L	8	<8	0	20	96	80	120	91	75	125
Chemical Oxygen Demand	EWL0478-MAY20	mg/L	8	<8	5	20	104	80	120	93	75	125

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0419-MAY20	uS/cm	2	< 2	0	20	99	90	110	NA		

QC SUMMARY

Mercury by CVAAS

Method: SM 3112/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0023-MAY20	ug/L	0.01	<0.01	ND	20	105	80	120	116	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (total)	EMS0119-MAY20	mg/L	0.0002	<0.0002	6	20	106	90	110	104	70	130
Barium (total)	EMS0119-MAY20	mg/L	0.00002	<0.00002	6	20	97	90	110	97	70	130
Boron (total)	EMS0119-MAY20	mg/L	0.002	<0.002	1	20	99	90	110	100	70	130
Calcium (total)	EMS0119-MAY20	mg/L	0.01	<0.01	1	20	100	90	110	102	70	130
Cadmium (total)	EMS0119-MAY20	mg/L	0.000003	<0.000003	3	20	100	90	110	103	70	130
Chromium (total)	EMS0119-MAY20	mg/L	0.00008	<0.00008	11	20	103	90	110	105	70	130
Copper (total)	EMS0119-MAY20	mg/L	0.0002	<0.0002	7	20	104	90	110	98	70	130
Iron (total)	EMS0119-MAY20	mg/L	0.007	<0.007	2	20	100	90	110	100	70	130
Potassium (total)	EMS0119-MAY20	mg/L	0.009	<0.009	2	20	99	90	110	98	70	130
Magnesium (total)	EMS0119-MAY20	mg/L	0.001	<0.001	4	20	99	90	110	99	70	130
Manganese (total)	EMS0119-MAY20	mg/L	0.00001	<0.00001	0	20	101	90	110	105	70	130
Sodium (total)	EMS0119-MAY20	mg/L	0.01	<0.01	2	20	107	90	110	100	70	130
Lead (total)	EMS0119-MAY20	mg/L	0.00001	<0.00001	19	20	100	90	110	99	70	130
Phosphorus (total)	EMS0119-MAY20	mg/L	0.003	<0.003	1	20	97	90	110	NV	70	130
Zinc (total)	EMS0119-MAY20	mg/L	0.002	<0.002	0	20	102	90	110	100	70	130

QC SUMMARY

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0419-MAY20	no unit	0.05	NA	0		101			NA		

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0226-MAY20	mg/L	0.001	0.0015	ND	10	92	90	110	94	75	125

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0414-MAY20	mg/L	30	<30	2	20	99	90	110	NA		

QC SUMMARY

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0442-MAY20	mg/L	2	< 2	0	10	101	90	110	NA		
Total Suspended Solids	EWL0445-MAY20	mg/L	2	< 2	2	10	100	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0216-MAY20	as N mg/L	0.5	<0.5	1	10	94	90	110	75	75	125

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. “Temperature Upon Receipt” is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act” published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

FINAL REPORT

CA14564-NOV20 R

11212878-01 HIls Glenn Landfill

Prepared for

GHD Limited - 735

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	GHD Limited - 735	Project Specialist	Brad Moore Hon. B.Sc
		Laboratory	SGS Canada Inc.
Address	347 Pido Rd., Unit #29 Peterborough, ON K9J 6Z8. Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Gus Bolin	Telephone	705-652-2143
Telephone	705-749-3317	Facsimile	705-652-6365
Facsimile		Email	brad.moore@sgs.com
Email	gus.bolin@ghd.com	SGS Reference	CA14564-NOV20
Project	11212878-01 Hlls Glenn Landfill	Received	11/18/2020
Order Number		Approved	12/01/2020
Samples	Ground Water (5)	Report Number	CA14564-NOV20 R
		Date Reported	12/01/2020

COMMENTS

Temperature of Sample upon Receipt: 4 degrees C

Cooling Agent Present:Yes

Custody Seal Present:No

Chain of Custody Number:NA

SIGNATORIES

Brad Moore Hon. B.Sc

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FINAL REPORT

CA14564-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01 Hlls Glenn Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **BTEX** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

Sample Number	8
Sample Name	MW-11-1
Sample Matrix	Ground Water
Sample Date	18/11/2020

Parameter	Units	RL	L1	L2	Result				
BTEX									
Benzene	ug/L	0.5			< 0.5				
Ethylbenzene	ug/L	0.5			< 0.5				
Toluene	ug/L	0.5			< 0.5				
Xylene (total)	ug/L	0.5			< 0.5				
o-xylene	ug/L	0.5			< 0.5				
m/p-xylene	ug/L	0.5			< 0.5				
General Chemistry									
Alkalinity	mg/L as CaCO3	2	500		287	335	241	290	289
Conductivity	uS/cm	2			791	598	631	657	793
Total Dissolved Solids	mg/L	30	500		440	320	351	346	451
Chemical Oxygen Demand	mg/L	8			< 8	35	< 8	10	< 8
Ammonia+Ammonium (N)	as N mg/L	0.1			< 0.1	0.7	0.3	0.8	< 0.1
Dissolved Organic Carbon	mg/L	1	5		1	1	1	< 1	2

FINAL REPORT

CA14564-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01 Hlls Glenn Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7	8	9
				Sample Name	MW-8-1	MW-9-1	MW-10-1	MW-11-1	MW-14-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	18/11/2020	18/11/2020	18/11/2020	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics									
Sulphate	mg/L	2	500		18	66	25	64	17
Nitrate (as N)	as N mg/L	0.06		10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Barium (dissolved)	mg/L	0.00002		1	0.0976	0.612	0.662	1.74	0.0955
Boron (dissolved)	mg/L	0.002		5	0.099	0.468	0.201	0.438	0.106
Calcium (dissolved)	mg/L	0.01			111	57.5	96.3	101	118
Iron (dissolved)	mg/L	0.007	0.3		0.019	< 0.007	0.023	< 0.007	0.021
Magnesium (dissolved)	mg/L	0.001			11.4	20.8	20.1	27.3	11.5
Sodium (dissolved)	mg/L	0.01	200	20	48.5	47.0	12.9	15.9	48.6
Arsenic (dissolved)	mg/L	0.0002		0.01	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Cadmium (dissolved)	mg/L	0.000003		0.005	0.000003	< 0.000003	< 0.000003	< 0.000003	0.000006
Chromium (dissolved)	mg/L	0.00008		0.05	0.00077	0.00067	0.00071	0.00067	0.00074
Copper (dissolved)	mg/L	0.0002	1		0.0012	< 0.0002	0.0003	< 0.0002	0.0008
Lead (dissolved)	mg/L	0.00001		0.01	< 0.00001	< 0.00001	0.00002	< 0.00001	< 0.00001
Manganese (dissolved)	mg/L	0.00001	0.05		0.0564	0.0583	0.124	0.0643	0.0568
Potassium (dissolved)	mg/L	0.009			3.58	5.42	4.46	5.00	3.67
Zinc (dissolved)	mg/L	0.002	5		< 0.002	< 0.002	0.003	< 0.002	< 0.002

FINAL REPORT

CA14564-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01 Hlls Glenn Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **Other (ORP)** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7	8	9
				Sample Name	MW-8-1	MW-9-1	MW-10-1	MW-11-1	MW-14-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	18/11/2020	18/11/2020	18/11/2020	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**
Other (ORP)									
pH	No unit	0.05	8.5		7.73	8.24	7.91	8.09	7.68
Chloride	mg/L	1	250		85	15	51	28	84
THMs (VOC)									
Bromodichloromethane	µg/L	0.5			< 0.5				
Bromoform	µg/L	0.5			< 0.5				
Dibromochloromethane	µg/L	0.5			< 0.5				
VOCs									
Bromomethane	µg/L	0.5			< 0.5				
Carbon tetrachloride	µg/L	0.2			< 0.2				
Chloroethane	µg/L	5.0			< 5				
Chloroform	µg/L	0.5			< 0.5				
Chloromethane	µg/L	5.0			< 5				
1,2-Dichlorobenzene	µg/L	0.5			< 0.5				
1,3-Dichlorobenzene	µg/L	0.5			< 0.5				
1,4-Dichlorobenzene	µg/L	0.5			< 0.5				
1,1-Dichloroethane	µg/L	0.5			< 0.5				
1,2-Dichloroethane	µg/L	0.5			< 0.5				
1,1-Dichloroethylene	µg/L	0.5			< 0.5				
1,2-Dichloropropane	µg/L	0.5			< 0.5				
trans-1,2-Dichloroethene	µg/L	0.5			< 0.5				
cis-1,2-Dichloroethene	µg/L	0.5			< 0.5				
cis-1,3-Dichloropropene	µg/L	0.5			< 0.5				
trans-1,3-Dichloropropene	µg/L	0.5			< 0.5				

FINAL REPORT

CA14564-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01 Hlls Glenn Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **VOCs** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

Sample Number	8
Sample Name	MW-11-1
Sample Matrix	Ground Water
Sample Date	18/11/2020

Parameter	Units	RL	L1	L2	Result
VOCs (continued)					
Ethylenedibromide	μg/L	0.2			< 0.2
Dichloromethane	μg/L	0.5			< 0.5
Monochlorobenzene	μg/L	0.5			< 0.5
Styrene	μg/L	0.5			< 0.5
1,1,2,2-Tetrachloroethane	μg/L	0.5			< 0.5
Tetrachloroethene	μg/L	0.5			< 0.5
Trichloroethylene	μg/L	0.5			< 0.5
Vinyl Chloride	μg/L	0.2			< 0.2
Trichlorofluoromethane	μg/L	5.0			< 5
1,1,1-Trichloroethane	μg/L	0.5			< 0.5
1,1,2-Trichloroethane	μg/L	0.5			< 0.5
1,1,1,2-Tetrachloroethane	μg/L	0.5			< 0.5

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
MW-8-1					
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.0564	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	48.5		20
MW-9-1					
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.0583	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	47.0		20
MW-10-1					
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.124	0.05	
MW-11-1					
Barium (dissolved)	SM 3030/EPA 200.8	mg/L	1.74		1
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.0643	0.05	
MW-14-1					
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.0568	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	48.6		20

QC SUMMARY

Alkalinity

Method: SM 2320 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0349-NOV20	mg/L as CaCO3	2	< 2	3	20	94	80	120	NA		

Ammonia by SFA

Method: SM 4500 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0219-NOV20	as N mg/L	0.1	<0.1	ND	10	100	90	110	101	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5120-NOV20	mg/L	1	<1	0	20	107	80	120	100	75	125
Sulphate	DIO5120-NOV20	mg/L	2	<2	1	20	97	80	120	98	75	125
Chloride	DIO5125-NOV20	mg/L	1	<1	1	20	105	80	120	101	75	125
Sulphate	DIO5125-NOV20	mg/L	2	<2	1	20	98	80	120	90	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 I Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrate (as N)	DIO0460-NOV20	mg/L	0.06	<0.06	ND	20	104	80	120	105	75	125
Nitrate (as N)	DIO0469-NOV20	mg/L	0.06	<0.06	ND	20	101	80	120	101	75	125

QC SUMMARY

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0217-NOV20	mg/L	1	<1	4	20	92	90	110	93	75	125

Chemical Oxygen Demand

Method: HACH 8000 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0332-NOV20	mg/L	8	<8	ND	20	108	80	120	106	75	125
Chemical Oxygen Demand	EWL0354-NOV20	mg/L	8	<8	8	20	102	80	120	106	75	125

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0349-NOV20	uS/cm	2	< 2	2	20	103	90	110	NA		

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (dissolved)	EMS0136-NOV20	mg/L	0.0002	<0.0002	ND	20	96	90	110	96	70	130
Barium (dissolved)	EMS0136-NOV20	mg/L	0.00002	<0.00002	6	20	96	90	110	101	70	130
Boron (dissolved)	EMS0136-NOV20	mg/L	0.002	<0.002	ND	20	96	90	110	100	70	130
Calcium (dissolved)	EMS0136-NOV20	mg/L	0.01	<0.01	2	20	103	90	110	101	70	130
Cadmium (dissolved)	EMS0136-NOV20	mg/L	0.000003	<0.000003	5	20	98	90	110	99	70	130
Chromium (dissolved)	EMS0136-NOV20	mg/L	0.00008	<0.00008	ND	20	97	90	110	106	70	130
Copper (dissolved)	EMS0136-NOV20	mg/L	0.0002	<0.0002	2	20	97	90	110	107	70	130
Iron (dissolved)	EMS0136-NOV20	mg/L	0.007	<0.007	3	20	107	90	110	NV	70	130
Potassium (dissolved)	EMS0136-NOV20	mg/L	0.009	<0.009	5	20	110	90	110	99	70	130
Magnesium (dissolved)	EMS0136-NOV20	mg/L	0.001	<0.001	4	20	108	90	110	100	70	130
Manganese (dissolved)	EMS0136-NOV20	mg/L	0.00001	<0.00001	3	20	98	90	110	100	70	130
Sodium (dissolved)	EMS0136-NOV20	mg/L	0.01	<0.01	19	20	104	90	110	106	70	130
Lead (dissolved)	EMS0136-NOV20	mg/L	0.00001	<0.00001	3	20	95	90	110	95	70	130
Zinc (dissolved)	EMS0136-NOV20	mg/L	0.002	<0.002	2	20	97	90	110	NV	70	130

QC SUMMARY

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0349-NOV20	No unit	0.05	NA	1		100			NA		

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0343-NOV20	mg/L	30	<30	2	20	99	90	110	NA		

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,1,2-Tetrachloroethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	102	60	130	99	50	140
1,1,1-Trichloroethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	97	50	140
1,1,2,2-Tetrachloroethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	122	50	140
1,1,2-Trichloroethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	102	50	140
1,1-Dichloroethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	97	50	140
1,1-Dichloroethylene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	102	60	130	99	50	140
1,2-Dichlorobenzene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	97	50	140
1,2-Dichloroethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	98	50	140
1,2-Dichloropropane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	99	50	140
1,3-Dichlorobenzene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	95	50	140
1,4-Dichlorobenzene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	96	50	140
Benzene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	97	50	140
Bromodichloromethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	96	50	140
Bromoform	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	95	60	130	92	50	140
Bromomethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	78	50	140	78	50	140
Carbon tetrachloride	GCM0403-NOV20	ug/L	0.2	<0.2	ND	30	98	60	130	95	50	140
Chloroethane	GCM0403-NOV20	ug/L	5.0	<5	ND	30	81	60	130	78	50	140
Chloroform	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	96	50	140
Chloromethane	GCM0403-NOV20	ug/L	5.0	<5	ND	30	79	60	130	76	50	140
cis-1,2-Dichloroethene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	98	50	140

QC SUMMARY

Volatile Organics (continued)

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
cis-1,3-Dichloropropene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	98	50	140
Dibromochloromethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	97	60	130	97	50	140
Dichloromethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	96	50	140
Ethylbenzene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	98	50	140
Ethylenedibromide	GCM0403-NOV20	ug/L	0.2	<0.2	ND	30	102	60	130	102	50	140
m/p-xylene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	96	50	140
Monochlorobenzene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	97	50	140
o-xylene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	97	50	140
Styrene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	98	50	140
Tetrachloroethene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	96	50	140
Toluene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	99	50	140
trans-1,2-Dichloroethene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	98	50	140
trans-1,3-Dichloropropene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	102	50	140
Trichloroethylene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	85	50	140
Trichlorofluoromethane	GCM0403-NOV20	ug/L	5.0	<5	ND	30	76	50	140	72	50	140
Vinyl Chloride	GCM0403-NOV20	ug/L	0.2	<0.2	ND	30	76	60	130	76	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. “Temperature Upon Receipt” is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act” published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

FINAL REPORT

CA14588-NOV20 R

11212878-01, Halls Glen Landfill

Prepared for

GHD Limited - 735

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	GHD Limited - 735	Project Specialist	Jill Campbell, B.Sc.,GISAS
		Laboratory	SGS Canada Inc.
Address	347 Pido Rd., Unit #29 Peterborough, ON K9J 6Z8, Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Gus Bolin	Telephone	2165
Telephone	705-749-3317	Facsimile	705-652-6365
Facsimile		Email	jill.campbell@sgs.com
Email	gus.bolin@ghd.com	SGS Reference	CA14588-NOV20
Project	11212878-01, Halls Glen Landfill	Received	11/19/2020
Order Number		Approved	12/01/2020
Samples	Ground Water (3)	Report Number	CA14588-NOV20 R
		Date Reported	12/01/2020

COMMENTS

Temperature of Sample upon Receipt: 6 degrees C
Cooling Agent Present:YES
Custody Seal Present:YES

Chain of Custody Number:NA

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

Jill Campbell

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FINAL REPORT

CA14588-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **General Chemistry** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7
				Sample Name	MW-12-2	MW-12-3	MW-13-1
				Sample Matrix	Ground Water	Ground Water	Ground Water
				Sample Date	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**
General Chemistry							
Alkalinity	mg/L as CaCO3	2	500		291	334	245
Conductivity	uS/cm	2			708	663	517
Total Dissolved Solids	mg/L	30	500		431	394	294
Chemical Oxygen Demand	mg/L	8			< 8	< 8	< 8
Ammonia+Ammonium (N)	as N mg/L	0.1			0.4	< 0.1	< 0.1
Dissolved Organic Carbon	mg/L	1	5		1	1	1
Metals and Inorganics							
Sulphate	mg/L	2	500		80	21	7
Nitrate (as N)	as N mg/L	0.06		10	< 0.06	< 0.06	0.35
Barium (dissolved)	mg/L	0.00002		1	0.180	0.0292	0.0716
Boron (dissolved)	mg/L	0.002		5	0.566	0.069	0.023
Calcium (dissolved)	mg/L	0.01			86.0	134	79.1
Iron (dissolved)	mg/L	0.007	0.3		0.015	0.056	< 0.007
Magnesium (dissolved)	mg/L	0.001			27.0	5.37	2.22
Sodium (dissolved)	mg/L	0.01	200	20	39.0	13.2	34.0
Arsenic (dissolved)	mg/L	0.0002		0.01	< 0.0002	< 0.0002	< 0.0002
Cadmium (dissolved)	mg/L	0.000003		0.005	< 0.000003	0.000003	< 0.000003
Chromium (dissolved)	mg/L	0.00008		0.05	0.00058	0.00072	0.00073
Copper (dissolved)	mg/L	0.0002	1		< 0.0002	0.0003	0.0007
Lead (dissolved)	mg/L	0.00001		0.01	< 0.00001	< 0.00001	< 0.00001
Manganese (dissolved)	mg/L	0.00001	0.05		0.09681	0.0193	0.00012

FINAL REPORT

CA14588-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7
				Sample Name	MW-12-2	MW-12-3	MW-13-1
				Sample Matrix	Ground Water	Ground Water	Ground Water
				Sample Date	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**
Metals and Inorganics (continued)							
Potassium (dissolved)	mg/L	0.009			3.70	1.66	2.16
Zinc (dissolved)	mg/L	0.002	5		0.004	< 0.002	< 0.002
Other (ORP)							
pH	No unit	0.05	8.5		7.79	7.70	7.76
Chloride	mg/L	1	250		32	47	21

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2

MW-12-2

Parameter	Method	Units	Result	L1	L2
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.09681	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	39.0		20

MW-13-1

Parameter	Method	Units	Result	L1	L2
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	34.0		20

FINAL REPORT

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0385-NOV20	mg/L as CaCO3	2	< 2	1	20	100	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0229-NOV20	as N mg/L	0.1	<0.1	ND	10	99	90	110	101	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5000-DEC20	mg/L	1	<1	0	20	107	80	120	91	75	125
Sulphate	DIO5000-DEC20	mg/L	2	<2	1	20	103	80	120	97	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrate (as N)	DIO0495-NOV20	mg/L	0.06	<0.06	0	20	101	80	120	100	75	125

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0245-NOV20	mg/L	1	<1	4	20	96	90	110	92	75	125

QC SUMMARY

Chemical Oxygen Demand

Method: HACH 8000 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0391-NOV20	mg/L	8	<8	6	20	114	80	120	111	75	125
Chemical Oxygen Demand	EWL0394-NOV20	mg/L	8	<8	11	20	118	80	120	115	75	125
Chemical Oxygen Demand	EWL0412-NOV20	mg/L	8	<8	10	20	104	80	120	104	75	125

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0385-NOV20	uS/cm	2	< 2	2	20	99	90	110	NA		

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (dissolved)	EMS0136-NOV20	mg/L	0.0002	<0.0002	ND	20	96	90	110	96	70	130
Barium (dissolved)	EMS0136-NOV20	mg/L	0.00002	<0.00002	6	20	96	90	110	101	70	130
Boron (dissolved)	EMS0136-NOV20	mg/L	0.002	<0.002	ND	20	96	90	110	100	70	130
Calcium (dissolved)	EMS0136-NOV20	mg/L	0.01	<0.01	2	20	103	90	110	101	70	130
Cadmium (dissolved)	EMS0136-NOV20	mg/L	0.000003	<0.000003	5	20	98	90	110	99	70	130
Chromium (dissolved)	EMS0136-NOV20	mg/L	0.00008	<0.00008	ND	20	97	90	110	106	70	130
Copper (dissolved)	EMS0136-NOV20	mg/L	0.0002	<0.0002	2	20	97	90	110	107	70	130
Iron (dissolved)	EMS0136-NOV20	mg/L	0.007	<0.007	3	20	107	90	110	NV	70	130
Potassium (dissolved)	EMS0136-NOV20	mg/L	0.009	<0.009	5	20	110	90	110	99	70	130
Magnesium (dissolved)	EMS0136-NOV20	mg/L	0.001	<0.001	4	20	108	90	110	100	70	130
Manganese (dissolved)	EMS0136-NOV20	mg/L	0.00001	<0.00001	3	20	98	90	110	100	70	130
Sodium (dissolved)	EMS0136-NOV20	mg/L	0.01	<0.01	19	20	104	90	110	106	70	130
Lead (dissolved)	EMS0136-NOV20	mg/L	0.00001	<0.00001	3	20	95	90	110	95	70	130
Zinc (dissolved)	EMS0136-NOV20	mg/L	0.002	<0.002	2	20	97	90	110	NV	70	130
Arsenic (dissolved)	EMS0162-NOV20	mg/L	0.0002	<0.0002	0	20	101	90	110	95	70	130
Barium (dissolved)	EMS0162-NOV20	mg/L	0.00002	<0.00002	2	20	95	90	110	93	70	130
Boron (dissolved)	EMS0162-NOV20	mg/L	0.002	<0.002	6	20	94	90	110	93	70	130
Calcium (dissolved)	EMS0162-NOV20	mg/L	0.01	<0.01	1	20	103	90	110	96	70	130
Cadmium (dissolved)	EMS0162-NOV20	mg/L	0.000003	<0.000003	12	20	99	90	110	100	70	130
Chromium (dissolved)	EMS0162-NOV20	mg/L	0.00008	<0.00008	ND	20	97	90	110	93	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 I Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Copper (dissolved)	EMS0162-NOV20	mg/L	0.0002	<0.0002	3	20	99	90	110	106	70	130
Iron (dissolved)	EMS0162-NOV20	mg/L	0.007	<0.007	ND	20	102	90	110	NV	70	130
Potassium (dissolved)	EMS0162-NOV20	mg/L	0.009	<0.009	1	20	109	90	110	115	70	130
Magnesium (dissolved)	EMS0162-NOV20	mg/L	0.001	<0.001	0	20	105	90	110	99	70	130
Manganese (dissolved)	EMS0162-NOV20	mg/L	0.00001	<0.00001	1	20	99	90	110	95	70	130
Sodium (dissolved)	EMS0162-NOV20	mg/L	0.01	<0.01	0	20	105	90	110	104	70	130
Lead (dissolved)	EMS0162-NOV20	mg/L	0.00001	<0.00001	ND	20	95	90	110	97	70	130
Zinc (dissolved)	EMS0162-NOV20	mg/L	0.002	<0.002	4	20	99	90	110	NV	70	130

pH

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
pH	EWL0385-NOV20	No unit	0.05	NA	1		100			NA		

QC SUMMARY

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0351-NOV20	mg/L	30	<30	0	20	98	90	110	NA		

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. “Temperature Upon Receipt” is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act” published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

FINAL REPORT

CA14590-NOV20 R

11212878-01, Halls Glen Landfill

Prepared for

GHD Limited - 735

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	GHD Limited - 735	Project Specialist	Brad Moore Hon. B.Sc
		Laboratory	SGS Canada Inc.
Address	347 Pido Rd., Unit #29 Peterborough, ON K9J 6Z8, Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Gus Bolin	Telephone	705-652-2143
Telephone	705-749-3317	Facsimile	705-652-6365
Facsimile		Email	brad.moore@sgs.com
Email	gus.bolin@ghd.com	SGS Reference	CA14590-NOV20
Project	11212878-01, Halls Glen Landfill	Received	11/19/2020
Order Number		Approved	12/01/2020
Samples	Ground Water (6)	Report Number	CA14590-NOV20 R
		Date Reported	12/01/2020

COMMENTS

Temperature of Sample upon Receipt: 6 degrees C

Cooling Agent Present:Yes

Custody Seal Present:Yes

Chain of Custody Number:NA

SIGNATORIES

Brad Moore Hon. B.Sc

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CA14590-NOV20 R

FINAL REPORT

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **BTEX** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	6	7	8	9	10	
				Sample Name	MW-3-1	MW-4-1	MW-5-1	MW-6-1	MW-7-1	
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	
				Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	
BTEX										
Benzene	μg/L	0.5			< 0.5	< 0.5	0.7	< 0.5	< 0.5	
Ethylbenzene	μg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Toluene	μg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Xylene (total)	μg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
o-xylene	μg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
m/p-xylene	μg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
General Chemistry										
Alkalinity	mg/L as CaCO3	2	500		304	343	390	661	454	367
Conductivity	uS/cm	2			1250	772	862	1470	1300	808
Total Dissolved Solids	mg/L	30	500		737	451	469	823	749	466
Chemical Oxygen Demand	mg/L	8			< 8	< 8	< 8	49	19	< 8
Ammonia+Ammonium (N)	as N mg/L	0.1			< 0.1	< 0.1	0.4	11.3	6.7	< 0.1
Dissolved Organic Carbon	mg/L	1	5		2	2	2	12	5	1

FINAL REPORT

CA14590-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7	8	9	10
				Sample Name	MW-1-1	MW-3-1	MW-4-1	MW-5-1	MW-6-1	MW-7-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics										
Sulphate	mg/L	2	500		87	14	12	10	33	29
Nitrate (as N)	as N mg/L	0.06		10	2.84	1.26	2.65	0.53	0.12	0.23
Barium (dissolved)	mg/L	0.00002		1	0.227	0.105	0.143	0.512	0.278	0.130
Boron (dissolved)	mg/L	0.002		5	0.102	0.040	0.049	0.304	0.176	0.432
Calcium (dissolved)	mg/L	0.01			177	118	157	225	172	35.4
Iron (dissolved)	mg/L	0.007	0.3		< 0.007	< 0.007	0.021	25.0	1.63	< 0.007
Magnesium (dissolved)	mg/L	0.001			15.2	4.13	5.31	20.0	11.5	7.82
Sodium (dissolved)	mg/L	0.01	200	20	75.5	30.2	36.0	64.3	63.5	143
Arsenic (dissolved)	mg/L	0.0002		0.01	< 0.0002	< 0.0002	< 0.0002	0.0021	0.0004	0.0007
Cadmium (dissolved)	mg/L	0.000003		0.005	0.000003	0.000007	0.000006	0.000009	< 0.000003	0.000011
Chromium (dissolved)	mg/L	0.00008		0.05	0.00087	0.00075	0.00096	0.00111	0.00080	0.00081
Copper (dissolved)	mg/L	0.0002	1		0.0016	0.0012	0.0010	0.0006	0.0018	0.0009
Lead (dissolved)	mg/L	0.00001		0.01	0.00001	0.00001	0.00002	0.00003	0.00015	0.00006
Manganese (dissolved)	mg/L	0.00001	0.05		0.00109	0.00396	0.0509	2.00	1.38	0.00271
Potassium (dissolved)	mg/L	0.009			5.17	4.75	4.75	25.1	14.6	2.29
Zinc (dissolved)	mg/L	0.002	5		0.003	< 0.002	< 0.002	0.002	0.003	0.007

FINAL REPORT

CA14590-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **Other (ORP)** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7	8	9	10
				Sample Name	MW-1-1	MW-3-1	MW-4-1	MW-5-1	MW-6-1	MW-7-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Other (ORP)										
pH	No unit	0.05	8.5		7.81	7.39	7.26	7.31	7.49	8.08
Chloride	mg/L	1	250		180	43	57	110	120	48
THMs (VOC)										
Bromodichloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Bromoform	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Dibromochloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
VOCs										
Bromomethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Carbon tetrachloride	µg/L	0.2			< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
Chloroethane	µg/L	5.0			< 5	< 5	< 5	< 5	< 5	
Chloroform	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Chloromethane	µg/L	5.0			< 5	< 5	< 5	< 5	< 5	
1,2-Dichlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
1,3-Dichlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
1,4-Dichlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
1,1-Dichloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
1,2-Dichloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
1,1-Dichloroethylene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
1,2-Dichloropropane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
trans-1,2-Dichloroethene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
cis-1,2-Dichloroethene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
cis-1,3-Dichloropropene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
trans-1,3-Dichloropropene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	

PACKAGE: **VOCs** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	6	7	8	9	10
				Sample Name	MW-3-1	MW-4-1	MW-5-1	MW-6-1	MW-7-1
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**	**Result**
VOCs (continued)									
Ethylenedibromide	µg/L	0.2			< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dichloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Monochlorobenzene	µg/L	0.5			< 0.5	< 0.5	0.7	< 0.5	< 0.5
Styrene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl Chloride	µg/L	0.2			< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Trichlorofluoromethane	µg/L	5.0			< 5	< 5	< 5	< 5	< 5
1,1,1-Trichloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,1,2-Tetrachloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
MW-1-1					
Total Dissolved Solids	SM 2540C	mg/L	737	500	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	75.5		20
MW-3-1					
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	30.2		20
MW-4-1					
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	0.0509	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	36.0		20
MW-5-1					
Alkalinity	SM 2320	mg/L as CaCO3	661	500	
Total Dissolved Solids	SM 2540C	mg/L	823	500	
Iron (dissolved)	SM 3030/EPA 200.8	mg/L	25.0	0.3	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	2.00	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	64.3		20
Dissolved Organic Carbon	SM 5310	mg/L	12	5	
MW-6-1					
Total Dissolved Solids	SM 2540C	mg/L	749	500	
Iron (dissolved)	SM 3030/EPA 200.8	mg/L	1.63	0.3	
Manganese (dissolved)	SM 3030/EPA 200.8	mg/L	1.38	0.05	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	63.5		20
MW-7-1					
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	143		20

QC SUMMARY

Alkalinity

Method: SM 2320 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Alkalinity	EWL0349-NOV20	mg/L as CaCO3	2	< 2	3	20	94	80	120	NA		

Ammonia by SFA

Method: SM 4500 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Ammonia+Ammonium (N)	SKA0249-NOV20	as N mg/L	0.1	<0.1	ND	10	100	90	110	100	75	125
Ammonia+Ammonium (N)	SKA0254-NOV20	as N mg/L	0.1	<0.1	ND	10	100	90	110	101	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5000-DEC20	mg/L	1	<1	0	20	107	80	120	91	75	125
Sulphate	DIO5000-DEC20	mg/L	2	<2	1	20	103	80	120	97	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrate (as N)	DIO0496-NOV20	mg/L	0.06	<0.06	0	20	102	80	120	99	75	125

QC SUMMARY

Carbon by SFA

Method: SM 5310 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0217-NOV20	mg/L	1	<1	4	20	92	90	110	93	75	125
Dissolved Organic Carbon	SKA0245-NOV20	mg/L	1	<1	4	20	96	90	110	92	75	125

Chemical Oxygen Demand

Method: HACH 8000 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0394-NOV20	mg/L	8	<8	11	20	118	80	120	115	75	125

Conductivity

Method: SM 2510 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0349-NOV20	uS/cm	2	< 2	2	20	103	90	110	NA		

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (dissolved)	EMS0136-NOV20	mg/L	0.0002	<0.0002	ND	20	96	90	110	96	70	130
Barium (dissolved)	EMS0136-NOV20	mg/L	0.00002	<0.00002	6	20	96	90	110	101	70	130
Boron (dissolved)	EMS0136-NOV20	mg/L	0.002	<0.002	ND	20	96	90	110	100	70	130
Calcium (dissolved)	EMS0136-NOV20	mg/L	0.01	<0.01	2	20	103	90	110	101	70	130
Cadmium (dissolved)	EMS0136-NOV20	mg/L	0.000003	<0.000003	5	20	98	90	110	99	70	130
Chromium (dissolved)	EMS0136-NOV20	mg/L	0.00008	<0.00008	ND	20	97	90	110	106	70	130
Copper (dissolved)	EMS0136-NOV20	mg/L	0.0002	<0.0002	2	20	97	90	110	107	70	130
Iron (dissolved)	EMS0136-NOV20	mg/L	0.007	<0.007	3	20	107	90	110	NV	70	130
Potassium (dissolved)	EMS0136-NOV20	mg/L	0.009	<0.009	5	20	110	90	110	99	70	130
Magnesium (dissolved)	EMS0136-NOV20	mg/L	0.001	<0.001	4	20	108	90	110	100	70	130
Manganese (dissolved)	EMS0136-NOV20	mg/L	0.00001	<0.00001	3	20	98	90	110	100	70	130
Sodium (dissolved)	EMS0136-NOV20	mg/L	0.01	<0.01	19	20	104	90	110	106	70	130
Lead (dissolved)	EMS0136-NOV20	mg/L	0.00001	<0.00001	3	20	95	90	110	95	70	130
Zinc (dissolved)	EMS0136-NOV20	mg/L	0.002	<0.002	2	20	97	90	110	NV	70	130

QC SUMMARY

pH

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
pH	EWL0349-NOV20	No unit	0.05	NA	1		100			NA		

Solids Analysis

Method: SM 2540C I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Total Dissolved Solids	EWL0343-NOV20	mg/L	30	<30	2	20	99	90	110	NA		

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,1,2-Tetrachloroethane	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	101	60	130	101	50	140
1,1,1-Trichloroethane	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	100	50	140
1,1,2,2-Tetrachloroethane	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	101	50	140
1,1,2-Trichloroethane	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	102	60	130	100	50	140
1,1-Dichloroethane	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	101	50	140
1,1-Dichloroethylene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	104	60	130	104	50	140
1,2-Dichlorobenzene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	99	50	140
1,2-Dichloroethane	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	97	50	140
1,2-Dichloropropane	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	100	50	140
1,3-Dichlorobenzene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	97	60	130	100	50	140
1,4-Dichlorobenzene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	99	50	140
Benzene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	100	50	140
Bromodichloromethane	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	97	60	130	97	50	140
Bromoform	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	95	50	140
Bromomethane	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	63	50	140	73	50	140
Carbon tetrachloride	GCM0436-NOV20	µg/L	0.2	<0.2	ND	30	101	60	130	100	50	140
Chloroethane	GCM0436-NOV20	µg/L	5.0	<5	ND	30	76	60	130	77	50	140
Chloroform	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	99	50	140
Chloromethane	GCM0436-NOV20	µg/L	5.0	<5	ND	30	76	60	130	78	50	140
cis-1,2-Dichloroethene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	102	50	140

QC SUMMARY

Volatile Organics (continued)

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
cis-1,3-Dichloropropene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	98	50	140
Dibromochloromethane	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	96	50	140
Dichloromethane	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	99	50	140
Ethylbenzene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	102	50	140
Ethylenedibromide	GCM0436-NOV20	µg/L	0.2	<0.2	ND	30	102	60	130	99	50	140
m/p-xylene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	102	50	140
Monochlorobenzene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	100	50	140
o-xylene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	101	50	140
Styrene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	100	50	140
Tetrachloroethene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	101	50	140
Toluene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	102	50	140
trans-1,2-Dichloroethene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	100	50	140
trans-1,3-Dichloropropene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	102	60	130	100	50	140
Trichloroethylene	GCM0436-NOV20	µg/L	0.5	<0.5	ND	30	97	60	130	97	50	140
Trichlorofluoromethane	GCM0436-NOV20	µg/L	5.0	<5	ND	30	80	50	140	78	50	140
Vinyl Chloride	GCM0436-NOV20	µg/L	0.2	<0.2	ND	30	77	60	130	79	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. “Temperature Upon Receipt” is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act” published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

FINAL REPORT

CA14561-NOV20 R

11212878-01, Halls Glen Landfill

Prepared for

GHD Limited - 735

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	GHD Limited - 735	Project Specialist	Jill Campbell, B.Sc.,GISAS
		Laboratory	SGS Canada Inc.
Address	347 Pido Rd., Unit #29 Peterborough, ON K9J 6Z8, Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Gus Bolin	Telephone	2165
Telephone	705-749-3317	Facsimile	705-652-6365
Facsimile		Email	jill.campbell@sgs.com
Email	gus.bolin@ghd.com	SGS Reference	CA14561-NOV20
Project	11212878-01, Halls Glen Landfill	Received	11/18/2020
Order Number		Approved	11/30/2020
Samples	Surface Water (4)	Report Number	CA14561-NOV20 R
		Date Reported	11/30/2020

COMMENTS

Temperature of Sample upon Receipt: 4 degrees C
Cooling Agent Present:Yes
Custody Seal Present:No

Chain of Custody Number:NA

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

Jill Campbell

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FINAL REPORT

CA14561-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **PWQO - BTEX** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	8
			Sample Name	MW-11-2
			Sample Matrix	Surface Water
			Sample Date	18/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**
BTEX				
Benzene	ug/L	0.5	100	< 0.5
Toluene	ug/L	0.5	0.8	< 0.5
Ethylbenzene	ug/L	0.5	8	< 0.5
Xylene (total)	ug/L	0.5		< 0.5
o-xylene	ug/L	0.5	40	< 0.5
m/p-xylene	ug/L	0.5	2	< 0.5

PACKAGE: **PWQO - General Chemistry** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	5	6	7	8
			Sample Name	MW-8-2	MW-9-2	MW-10-2	MW-11-2
			Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water
			Sample Date	18/11/2020	18/11/2020	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**
General Chemistry							
Biochemical Oxygen Demand (BOD5)	mg/L	2		< 4↑	< 4↑	< 4↑	< 4↑
Total Suspended Solids	mg/L	2		22	2	56	17
Alkalinity	mg/L as CaCO3	2		283	295	258	242
Conductivity	uS/cm	2		838	791	623	547
Total Dissolved Solids	mg/L	30		480	437	351	343
Chemical Oxygen Demand	mg/L	8		< 8	< 8	< 8	< 8
Total Kjeldahl Nitrogen	as N mg/L	0.5		< 0.5	< 0.5	1.0	0.8
Ammonia+Ammonium (N)	as N mg/L	0.1		< 0.1	< 0.1	1.0	0.9

FINAL REPORT

CA14561-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **PWQO - Metals and Inorganics** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	5	6	7	8
			Sample Name	MW-8-2	MW-9-2	MW-10-2	MW-11-2
			Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water
			Sample Date	18/11/2020	18/11/2020	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics							
Phosphorus (total)	mg/L	0.03		< 0.03	< 0.03	0.08	0.03
Sulphate	mg/L	2		10	10	6	9
Nitrite (as N)	as N mg/L	0.03		< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		0.67	1.17	< 0.06	< 0.06
Arsenic (dissolved)	mg/L	0.0002		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Barium (dissolved)	mg/L	0.00002		0.162	0.176	0.416	0.358
Boron (dissolved)	mg/L	0.002		0.023	0.039	0.096	0.164
Calcium (dissolved)	mg/L	0.01		145	126	99.9	93.4
Cadmium (dissolved)	mg/L	0.000003		< 0.000003	0.000010	< 0.000003	< 0.000003
Chromium (dissolved)	mg/L	0.00008		0.00031	0.00028	0.00022	0.00021
Copper (dissolved)	mg/L	0.0002		0.0011	0.0042	0.0008	0.0004
Iron (dissolved)	mg/L	0.007		0.015	0.015	3.29	1.06
Potassium (dissolved)	mg/L	0.009		1.21	2.65	2.60	3.72
Magnesium (dissolved)	mg/L	0.001		5.28	4.27	10.4	12.3
Manganese (dissolved)	mg/L	0.00001		0.00097	0.00331	0.0580	0.0198
Sodium (dissolved)	mg/L	0.01		29.4	44.6	6.93	6.20
Lead (dissolved)	mg/L	0.00001		0.00004	0.00004	0.00004	0.00004
Zinc (dissolved)	mg/L	0.002		< 0.002	< 0.002	< 0.002	< 0.002

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **PWQO - Other (ORP)** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	5	6	7	8
			Sample Name	MW-8-2	MW-9-2	MW-10-2	MW-11-2
			Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water
			Sample Date	18/11/2020	18/11/2020	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**
Other (ORP)							
pH	No unit	0.05	8.5	7.81	7.91	7.79	7.77
Chloride	mg/L	1		120	77	53	43
Mercury (total)	µg/L	0.01	0.2	< 0.01	< 0.01	< 0.01	< 0.01

PACKAGE: **PWQO - Phenols** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	5	6	7	8
			Sample Name	MW-8-2	MW-9-2	MW-10-2	MW-11-2
			Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water
			Sample Date	18/11/2020	18/11/2020	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**
Phenols							
4AAP-Phenolics	mg/L	0.001	0.001	< 0.001	< 0.001	0.001	0.001

PACKAGE: **PWQO - THMs (VOC)** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	8
			Sample Name	MW-11-2
			Sample Matrix	Surface Water
			Sample Date	18/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**
THMs (VOC)				
Bromodichloromethane	µg/L	0.5	200	< 0.5
Bromoform	µg/L	0.5	60	< 0.5
Dibromochloromethane	µg/L	0.5	40	< 0.5

FINAL REPORT

CA14561-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **PWQO - VOCs** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number	8
Sample Name	MW-11-2
Sample Matrix	Surface Water
Sample Date	18/11/2020

Parameter	Units	RL	L1	Result
VOCs				
1,4-Dichlorobenzene	µg/L	0.5	4	< 0.5
Dichloromethane	µg/L	0.5		< 0.5
Vinyl Chloride	µg/L	0.2	600	< 0.2
Bromomethane	µg/L	0.5	0.9	< 0.5
Carbon tetrachloride	µg/L	0.2		< 0.2
Chloroethane	µg/L	5.0		< 5
Chloroform	µg/L	0.5		< 0.5
Chloromethane	µg/L	5.0		< 5
1,2-Dichlorobenzene	µg/L	0.5	2.5	< 0.5
1,3-Dichlorobenzene	µg/L	0.5	2.5	< 0.5
1,1-Dichloroethane	µg/L	0.5	200	< 0.5
1,2-Dichloroethane	µg/L	0.5	100	< 0.5
1,1-Dichloroethylene	µg/L	0.5	40	< 0.5
1,2-Dichloropropane	µg/L	0.5	0.7	< 0.5
trans-1,2-Dichloroethene	µg/L	0.5	200	< 0.5
cis-1,2-Dichloroethene	µg/L	0.5	200	< 0.5
cis-1,3-Dichloropropene	µg/L	0.5		< 0.5
trans-1,3-Dichloropropene	µg/L	0.5	7	< 0.5
Ethylenedibromide	µg/L	0.2	5	< 0.2
Monochlorobenzene	µg/L	0.5		< 0.5
Styrene	µg/L	0.5	4	< 0.5
1,1,2,2-Tetrachloroethane	µg/L	0.5	70	< 0.5
Tetrachloroethene	µg/L	0.5		< 0.5

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **PWQO - VOCs** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number	8
Sample Name	MW-11-2
Sample Matrix	Surface Water
Sample Date	18/11/2020

Parameter	Units	RL	L1	Result
VOCs (continued)				
Trichloroethylene	µg/L	0.5	20	< 0.5
Trichlorofluoromethane	µg/L	5.0		< 5
1,1,1-Trichloroethane	µg/L	0.5	10	< 0.5
1,1,2-Trichloroethane	µg/L	0.5	800	< 0.5
1,1,1,2-Tetrachloroethane	µg/L	0.5	20	< 0.5

EXCEEDANCE SUMMARY

No exceedances are present above the regulatory limit(s) indicated

QC SUMMARY

Alkalinity

Method: SM 2320 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0349-NOV20	mg/L as CaCO3	2	< 2	3	20	94	80	120	NA		

Ammonia by SFA

Method: SM 4500 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0219-NOV20	as N mg/L	0.1	<0.1	ND	10	100	90	110	101	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5125-NOV20	mg/L	1	<1	1	20	105	80	120	101	75	125
Sulphate	DIO5125-NOV20	mg/L	2	<2	1	20	98	80	120	90	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0457-NOV20	mg/L	0.03	<0.03	ND	20	98	80	120	102	75	125
Nitrate (as N)	DIO0457-NOV20	mg/L	0.06	<0.06	ND	20	102	80	120	102	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0033-NOV20	mg/L	2	< 2	1	30	104	70	130	90	70	130

Chemical Oxygen Demand

Method: HACH 8000 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0332-NOV20	mg/L	8	<8	ND	20	108	80	120	106	75	125

Conductivity

Method: SM 2510 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0349-NOV20	uS/cm	2	< 2	2	20	103	90	110	NA		

QC SUMMARY

Mercury by CVAAS

Method: SM 3112/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0028-NOV20	ug/L	0.01	-0.00	ND	20	116	80	120	NV	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (dissolved)	EMS0136-NOV20	mg/L	0.0002	<0.0002	ND	20	96	90	110	96	70	130
Barium (dissolved)	EMS0136-NOV20	mg/L	0.00002	<0.00002	6	20	96	90	110	101	70	130
Boron (dissolved)	EMS0136-NOV20	mg/L	0.002	<0.002	ND	20	96	90	110	100	70	130
Calcium (dissolved)	EMS0136-NOV20	mg/L	0.01	<0.01	2	20	103	90	110	101	70	130
Cadmium (dissolved)	EMS0136-NOV20	mg/L	0.000003	<0.000003	5	20	98	90	110	99	70	130
Chromium (dissolved)	EMS0136-NOV20	mg/L	0.00008	<0.00008	ND	20	97	90	110	106	70	130
Copper (dissolved)	EMS0136-NOV20	mg/L	0.0002	<0.0002	2	20	97	90	110	107	70	130
Iron (dissolved)	EMS0136-NOV20	mg/L	0.007	<0.007	3	20	107	90	110	NV	70	130
Potassium (dissolved)	EMS0136-NOV20	mg/L	0.009	<0.009	5	20	110	90	110	99	70	130
Magnesium (dissolved)	EMS0136-NOV20	mg/L	0.001	<0.001	4	20	108	90	110	100	70	130
Manganese (dissolved)	EMS0136-NOV20	mg/L	0.00001	<0.00001	3	20	98	90	110	100	70	130
Sodium (dissolved)	EMS0136-NOV20	mg/L	0.01	<0.01	19	20	104	90	110	106	70	130
Lead (dissolved)	EMS0136-NOV20	mg/L	0.00001	<0.00001	3	20	95	90	110	95	70	130
Zinc (dissolved)	EMS0136-NOV20	mg/L	0.002	<0.002	2	20	97	90	110	NV	70	130

QC SUMMARY

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0349-NOV20	No unit	0.05	NA	1		100			NA		

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0216-NOV20	mg/L	0.001	<0.001	ND	10	106	90	110	95	75	125

Phosphorus by SFA

Method: SM 4500-P J | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	SKA0231-NOV20	mg/L	0.03	<0.03	3	10	103	90	110	97	75	125
Phosphorus (total)	SKA0250-NOV20	mg/L	0.03	<0.03	2	10	103	90	110	100	75	125

QC SUMMARY

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0343-NOV20	mg/L	30	<30	2	20	99	90	110	NA		

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0379-NOV20	mg/L	2	< 2	0	10	101	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0246-NOV20	as N mg/L	0.5	<0.5	ND	10	103	90	110	77	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,1,2-Tetrachloroethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	102	60	130	99	50	140
1,1,1-Trichloroethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	97	50	140
1,1,2,2-Tetrachloroethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	122	50	140
1,1,2-Trichloroethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	102	50	140
1,1-Dichloroethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	97	50	140
1,1-Dichloroethylene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	102	60	130	99	50	140
1,2-Dichlorobenzene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	97	50	140
1,2-Dichloroethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	98	50	140
1,2-Dichloropropane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	99	50	140
1,3-Dichlorobenzene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	95	50	140
1,4-Dichlorobenzene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	96	50	140
Benzene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	97	50	140
Bromodichloromethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	96	50	140
Bromoform	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	95	60	130	92	50	140
Bromomethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	78	50	140	78	50	140
Carbon tetrachloride	GCM0403-NOV20	ug/L	0.2	<0.2	ND	30	98	60	130	95	50	140
Chloroethane	GCM0403-NOV20	ug/L	5.0	<5	ND	30	81	60	130	78	50	140
Chloroform	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	96	50	140
Chloromethane	GCM0403-NOV20	ug/L	5.0	<5	ND	30	79	60	130	76	50	140
cis-1,2-Dichloroethene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	98	50	140

QC SUMMARY

Volatile Organics (continued)

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
cis-1,3-Dichloropropene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	98	50	140
Dibromochloromethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	97	60	130	97	50	140
Dichloromethane	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	96	50	140
Ethylbenzene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	98	50	140
Ethylenedibromide	GCM0403-NOV20	ug/L	0.2	<0.2	ND	30	102	60	130	102	50	140
m/p-xylene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	96	50	140
Monochlorobenzene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	97	50	140
o-xylene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	97	50	140
Styrene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	98	50	140
Tetrachloroethene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	96	50	140
Toluene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	99	50	140
trans-1,2-Dichloroethene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	98	50	140
trans-1,3-Dichloropropene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	102	50	140
Trichloroethylene	GCM0403-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	85	50	140
Trichlorofluoromethane	GCM0403-NOV20	ug/L	5.0	<5	ND	30	76	50	140	72	50	140
Vinyl Chloride	GCM0403-NOV20	ug/L	0.2	<0.2	ND	30	76	60	130	76	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. “Temperature Upon Receipt” is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act” published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

FINAL REPORT

CA14589-NOV20 R

11212878-01, Halls Glen Landfill

Prepared for

GHD Limited - 735

FINAL REPORT

First Page

CLIENT DETAILS

Client	GHD Limited - 735
Address	347 Pido Rd., Unit #29 Peterborough, ON K9J 6Z8, Canada
Contact	Gus Bolin
Telephone	705-749-3317
Facsimile	
Email	gus.bolin@ghd.com
Project	11212878-01, Halls Glen Landfill
Order Number	
Samples	Ground Water (7)

LABORATORY DETAILS

Project Specialist	Jill Campbell, B.Sc.,GISAS
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	2165
Facsimile	705-652-6365
Email	jill.campbell@sgs.com
SGS Reference	CA14589-NOV20
Received	11/19/2020
Approved	12/01/2020
Report Number	CA14589-NOV20 R
Date Reported	12/01/2020

COMMENTS

Temperature of Sample upon Receipt: 6 degrees C
Cooling Agent Present:YES
Custody Seal Present: YES

Chain of Custody Number:NA

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

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FINAL REPORT

CA14589-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **PWQO - BTEX** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	5	6	8	9
			Sample Name	MW-3-2	MW-4-2	MW-6-2	MW-7-2
			Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water
			Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**
BTEX							
Benzene	ug/L	0.5	100	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	ug/L	0.5	8	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	ug/L	0.5	0.8	< 0.5	< 0.5	< 0.5	< 0.5
Xylene (total)	ug/L	0.5		< 0.5	< 0.5	< 0.5	< 0.5
o-xylene	ug/L	0.5	40	< 0.5	< 0.5	< 0.5	< 0.5
m/p-xylene	ug/L	0.5	2	< 0.5	< 0.5	< 0.5	< 0.5

PACKAGE: **PWQO - General Chemistry** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	5	6	8	9	10	11	12
			Sample Name	MW-3-2	MW-4-2	MW-6-2	MW-7-2	MW-12-1	MW-13-2	MW-14-2
			Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
			Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
General Chemistry										
Biochemical Oxygen Demand (BOD5)	mg/L	2		5	< 4↑	< 4↑	< 4↑	< 4↑	< 4↑	< 4↑
Total Suspended Solids	mg/L	2		1200	1420	92	323	8	45	68
Alkalinity	mg/L as CaCO3	2		841	490	973	397	253	314	970
Conductivity	uS/cm	2		1360	680	1940	840	595	666	1930
Total Dissolved Solids	mg/L	30		900	406	1200	611	351	391	1200
Chemical Oxygen Demand	mg/L	8		< 8	< 8	98	< 8	< 8	10	72
Total Kjeldahl Nitrogen	as N mg/L	0.5		2.2	< 0.5	28.7	< 0.5	< 0.5	< 0.5	28.4
Ammonia+Ammonium (N)	as N mg/L	0.1		1.5	< 0.1	27.0	< 0.1	0.1	< 0.1	27.2

FINAL REPORT

CA14589-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **PWQO - Metals and Inorganics** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	5	6	8	9	10	11	12
			Sample Name	MW-3-2	MW-4-2	MW-6-2	MW-7-2	MW-12-1	MW-13-2	MW-14-2
			Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
			Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics										
Phosphorus (total)	mg/L	0.03		0.56	0.52	0.04	0.06	< 0.03	0.04	0.04
Sulphate	mg/L	2		62	13	64	19	25	12	65
Nitrite (as N)	as N mg/L	0.03		0.49	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		5.18	1.49	0.14	1.62	< 0.06	1.12	0.76
Arsenic (dissolved)	mg/L	0.0002		0.0003	< 0.0002	0.0010	< 0.0002	< 0.0002	< 0.0002	0.0013
Barium (dissolved)	mg/L	0.00002		0.240	0.128	0.401	0.183	0.311	0.113	0.422
Boron (dissolved)	mg/L	0.002		0.408	0.034	0.557	0.062	0.110	0.050	0.674
Calcium (dissolved)	mg/L	0.01		296	115	305	134	113	126	278
Cadmium (dissolved)	mg/L	0.000003		0.000078	0.000004	0.000014	< 0.000003	< 0.000003	0.000006	0.000010
Chromium (dissolved)	mg/L	0.00008		0.00058	0.00025	0.00104	0.00034	0.00028	0.00031	0.00088
Copper (dissolved)	mg/L	0.0002		0.0061	0.0008	0.0145	0.0015	0.0004	0.0010	0.0078
Iron (dissolved)	mg/L	0.007		1.39	0.011	4.59	0.016	0.024	0.046	6.62
Potassium (dissolved)	mg/L	0.009		26.6	1.28	33.4	2.60	2.78	2.97	36.0
Magnesium (dissolved)	mg/L	0.001		24.1	3.24	33.1	7.13	9.82	3.55	34.7
Manganese (dissolved)	mg/L	0.00001		1.01	0.00254	6.34	0.00294	0.0164	0.00328	6.58
Sodium (dissolved)	mg/L	0.01		45.7	16.1	91.0	17.0	11.2	25.6	98.9
Lead (dissolved)	mg/L	0.00001		0.00127	0.00004	0.00009	0.00007	0.00003	0.00005	0.00007
Zinc (dissolved)	mg/L	0.002		0.005	< 0.002	0.003	< 0.002	< 0.002	< 0.002	< 0.002

FINAL REPORT

CA14589-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **PWQO - Other (ORP)** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	5	6	8	9	10	11	12
			Sample Name	MW-3-2	MW-4-2	MW-6-2	MW-7-2	MW-12-1	MW-13-2	MW-14-2
			Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
			Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Other (ORP)										
pH	No unit	0.05	8.5	7.63	7.76	7.67	7.78	7.91	7.77	7.65
Chloride	mg/L	1		59	53	140	53	44	38	130
Mercury (total)	µg/L	0.01	0.2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

PACKAGE: **PWQO - Phenols** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	5	6	8	9	10	11	12
			Sample Name	MW-3-2	MW-4-2	MW-6-2	MW-7-2	MW-12-1	MW-13-2	MW-14-2
			Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
			Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Phenols										
4AAP-Phenolics	mg/L	0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

PACKAGE: **PWQO - THMs (VOC)** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	5	6	8	9
			Sample Name	MW-3-2	MW-4-2	MW-6-2	MW-7-2
			Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water
			Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**
THMs (VOC)							
Bromodichloromethane	µg/L	0.5	200	< 0.5	< 0.5	< 0.5	< 0.5
Bromoform	µg/L	0.5	60	< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane	µg/L	0.5	40	< 0.5	< 0.5	< 0.5	< 0.5

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **PWQO - VOCs** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	5	6	8	9
			Sample Name	MW-3-2	MW-4-2	MW-6-2	MW-7-2
			Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water
			Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**
VOCs							
Bromomethane	µg/L	0.5	0.9	< 0.5	< 0.5	< 0.5	< 0.5
Carbon tetrachloride	µg/L	0.2		< 0.2	< 0.2	< 0.2	< 0.2
Chloroethane	µg/L	5.0		< 5	< 5	< 5	< 5
Chloroform	µg/L	0.5		< 0.5	< 0.5	< 0.5	< 0.5
Chloromethane	µg/L	5.0		< 5	< 5	< 5	< 5
1,2-Dichlorobenzene	µg/L	0.5	2.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene	µg/L	0.5	2.5	< 0.5	< 0.5	< 0.5	< 0.5
1,4-Dichlorobenzene	µg/L	0.5	4	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane	µg/L	0.5	200	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloroethane	µg/L	0.5	100	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethylene	µg/L	0.5	40	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloropropane	µg/L	0.5	0.7	< 0.5	< 0.5	< 0.5	< 0.5
trans-1,2-Dichloroethene	µg/L	0.5	200	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethene	µg/L	0.5	200	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,3-Dichloropropene	µg/L	0.5		< 0.5	< 0.5	< 0.5	< 0.5
trans-1,3-Dichloropropene	µg/L	0.5	7	< 0.5	< 0.5	< 0.5	< 0.5
Ethylenedibromide	µg/L	0.2	5	< 0.2	< 0.2	< 0.2	< 0.2
Dichloromethane	µg/L	0.5		< 0.5	< 0.5	< 0.5	< 0.5
Monochlorobenzene	µg/L	0.5		< 0.5	< 0.5	< 0.5	< 0.5
Styrene	µg/L	0.5	4	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane	µg/L	0.5	70	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethene	µg/L	0.5		< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	µg/L	0.5	20	< 0.5	< 0.5	< 0.5	< 0.5

FINAL REPORT

CA14589-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **PWQO - VOCs** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

			Sample Number	5	6	8	9
			Sample Name	MW-3-2	MW-4-2	MW-6-2	MW-7-2
			Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water
			Sample Date	19/11/2020	19/11/2020	19/11/2020	19/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**	**Result**	**Result**
VOCs (continued)							
Vinyl Chloride	µg/L	0.2	600	< 0.2	< 0.2	< 0.2	< 0.2
Trichlorofluoromethane	µg/L	5.0		< 5	< 5	< 5	< 5
1,1,1-Trichloroethane	µg/L	0.5	10	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane	µg/L	0.5	800	< 0.5	< 0.5	< 0.5	< 0.5
1,1,1,2-Tetrachloroethane	µg/L	0.5	20	< 0.5	< 0.5	< 0.5	< 0.5

EXCEEDANCE SUMMARY

No exceedances are present above the regulatory limit(s) indicated

QC SUMMARY

Alkalinity

Method: SM 2320 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0385-NOV20	mg/L as CaCO3	2	< 2	1	20	100	80	120	NA		

Ammonia by SFA

Method: SM 4500 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0229-NOV20	as N mg/L	0.1	<0.1	ND	10	99	90	110	101	75	125
Ammonia+Ammonium (N)	SKA0236-NOV20	as N mg/L	0.1	<0.1	ND	10	99	90	110	104	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5000-DEC20	mg/L	1	<1	0	20	107	80	120	91	75	125
Sulphate	DIO5000-DEC20	mg/L	2	<2	1	20	103	80	120	97	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0495-NOV20	mg/L	0.03	<0.03	ND	20	95	80	120	101	75	125
Nitrate (as N)	DIO0495-NOV20	mg/L	0.06	<0.06	0	20	101	80	120	100	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0035-NOV20	mg/L	2	< 2	5	30	105	70	130	121	70	130

Chemical Oxygen Demand

Method: HACH 8000 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0391-NOV20	mg/L	8	<8	6	20	114	80	120	111	75	125
Chemical Oxygen Demand	EWL0394-NOV20	mg/L	8	<8	11	20	118	80	120	115	75	125
Chemical Oxygen Demand	EWL0412-NOV20	mg/L	8	<8	10	20	104	80	120	104	75	125

QC SUMMARY

Conductivity

Method: SM 2510 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0385-NOV20	uS/cm	2	< 2	2	20	99	90	110	NA		

Mercury by CVAAS

Method: SM 3112/SM 3112B I Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0029-NOV20	ug/L	0.01	-0.01	ND	20	102	80	120	121	70	130

FINAL REPORT

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (dissolved)	EMS0136-NOV20	mg/L	0.0002	<0.0002	ND	20	96	90	110	96	70	130
Barium (dissolved)	EMS0136-NOV20	mg/L	0.00002	<0.00002	6	20	96	90	110	101	70	130
Boron (dissolved)	EMS0136-NOV20	mg/L	0.002	<0.002	ND	20	96	90	110	100	70	130
Calcium (dissolved)	EMS0136-NOV20	mg/L	0.01	<0.01	2	20	103	90	110	101	70	130
Cadmium (dissolved)	EMS0136-NOV20	mg/L	0.000003	<0.000003	5	20	98	90	110	99	70	130
Chromium (dissolved)	EMS0136-NOV20	mg/L	0.00008	<0.00008	ND	20	97	90	110	106	70	130
Copper (dissolved)	EMS0136-NOV20	mg/L	0.0002	<0.0002	2	20	97	90	110	107	70	130
Iron (dissolved)	EMS0136-NOV20	mg/L	0.007	<0.007	3	20	107	90	110	NV	70	130
Potassium (dissolved)	EMS0136-NOV20	mg/L	0.009	<0.009	5	20	110	90	110	99	70	130
Magnesium (dissolved)	EMS0136-NOV20	mg/L	0.001	<0.001	4	20	108	90	110	100	70	130
Manganese (dissolved)	EMS0136-NOV20	mg/L	0.00001	<0.00001	3	20	98	90	110	100	70	130
Sodium (dissolved)	EMS0136-NOV20	mg/L	0.01	<0.01	19	20	104	90	110	106	70	130
Lead (dissolved)	EMS0136-NOV20	mg/L	0.00001	<0.00001	3	20	95	90	110	95	70	130
Zinc (dissolved)	EMS0136-NOV20	mg/L	0.002	<0.002	2	20	97	90	110	NV	70	130
Arsenic (dissolved)	EMS0162-NOV20	mg/L	0.0002	<0.0002	0	20	101	90	110	95	70	130
Barium (dissolved)	EMS0162-NOV20	mg/L	0.00002	<0.00002	2	20	95	90	110	93	70	130
Boron (dissolved)	EMS0162-NOV20	mg/L	0.002	<0.002	6	20	94	90	110	93	70	130
Calcium (dissolved)	EMS0162-NOV20	mg/L	0.01	<0.01	1	20	103	90	110	96	70	130
Cadmium (dissolved)	EMS0162-NOV20	mg/L	0.000003	<0.000003	12	20	99	90	110	100	70	130
Chromium (dissolved)	EMS0162-NOV20	mg/L	0.00008	<0.00008	ND	20	97	90	110	93	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 I Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Copper (dissolved)	EMS0162-NOV20	mg/L	0.0002	<0.0002	3	20	99	90	110	106	70	130
Iron (dissolved)	EMS0162-NOV20	mg/L	0.007	<0.007	ND	20	102	90	110	NV	70	130
Potassium (dissolved)	EMS0162-NOV20	mg/L	0.009	<0.009	1	20	109	90	110	115	70	130
Magnesium (dissolved)	EMS0162-NOV20	mg/L	0.001	<0.001	0	20	105	90	110	99	70	130
Manganese (dissolved)	EMS0162-NOV20	mg/L	0.00001	<0.00001	1	20	99	90	110	95	70	130
Sodium (dissolved)	EMS0162-NOV20	mg/L	0.01	<0.01	0	20	105	90	110	104	70	130
Lead (dissolved)	EMS0162-NOV20	mg/L	0.00001	<0.00001	ND	20	95	90	110	97	70	130
Zinc (dissolved)	EMS0162-NOV20	mg/L	0.002	<0.002	4	20	99	90	110	NV	70	130

pH

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
pH	EWL0385-NOV20	No unit	0.05	NA	1		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0263-NOV20	mg/L	0.001	<0.001	ND	10	97	90	110	99	75	125

Phosphorus by SFA

Method: SM 4500-P J | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	SKA0231-NOV20	mg/L	0.03	<0.03	3	10	103	90	110	97	75	125

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0351-NOV20	mg/L	30	<30	0	20	98	90	110	NA		

QC SUMMARY

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0364-NOV20	mg/L	2	< 2	2	10	97	90	110	NA		
Total Suspended Solids	EWL0380-NOV20	mg/L	2	< 2	3	10	98	90	110	NA		
Total Suspended Solids	EWL0386-NOV20	mg/L	2	< 2	1	10	91	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0277-NOV20	as N mg/L	0.5	<0.5	2	10	95	90	110	82	75	125
Total Kjeldahl Nitrogen	SKA0288-NOV20	as N mg/L	0.5	<0.5	3	10	92	90	110	93	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,1,2-Tetrachloroethane	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	101	60	130	101	50	140
1,1,1-Trichloroethane	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	100	50	140
1,1,2,2-Tetrachloroethane	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	101	50	140
1,1,2-Trichloroethane	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	102	60	130	100	50	140
1,1-Dichloroethane	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	101	50	140
1,1-Dichloroethylene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	104	60	130	104	50	140
1,2-Dichlorobenzene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	99	50	140
1,2-Dichloroethane	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	97	50	140
1,2-Dichloropropane	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	100	50	140
1,3-Dichlorobenzene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	97	60	130	100	50	140
1,4-Dichlorobenzene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	99	50	140
Benzene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	100	50	140
Bromodichloromethane	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	97	60	130	97	50	140
Bromoform	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	95	50	140
Bromomethane	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	63	50	140	73	50	140
Carbon tetrachloride	GCM0436-NOV20	ug/L	0.2	<0.2	ND	30	101	60	130	100	50	140
Chloroethane	GCM0436-NOV20	ug/L	5.0	<5	ND	30	76	60	130	77	50	140
Chloroform	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	99	50	140
Chloromethane	GCM0436-NOV20	ug/L	5.0	<5	ND	30	76	60	130	78	50	140
cis-1,2-Dichloroethene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	102	50	140

QC SUMMARY

Volatile Organics (continued)

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
cis-1,3-Dichloropropene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	98	50	140
Dibromochloromethane	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	96	50	140
Dichloromethane	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	99	50	140
Ethylbenzene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	102	50	140
Ethylenedibromide	GCM0436-NOV20	ug/L	0.2	<0.2	ND	30	102	60	130	99	50	140
m/p-xylene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	102	50	140
Monochlorobenzene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	100	50	140
o-xylene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	99	60	130	101	50	140
Styrene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	100	60	130	100	50	140
Tetrachloroethene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	101	50	140
Toluene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	102	50	140
trans-1,2-Dichloroethene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	98	60	130	100	50	140
trans-1,3-Dichloropropene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	102	60	130	100	50	140
Trichloroethylene	GCM0436-NOV20	ug/L	0.5	<0.5	ND	30	97	60	130	97	50	140
Trichlorofluoromethane	GCM0436-NOV20	ug/L	5.0	<5	ND	30	80	50	140	78	50	140
Vinyl Chloride	GCM0436-NOV20	ug/L	0.2	<0.2	ND	30	77	60	130	79	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. “Temperature Upon Receipt” is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act” published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

FINAL REPORT

CA14563-NOV20 R

11212878-01 Halls Glenn

Prepared for

GHD Limited - 735

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	GHD Limited - 735	Project Specialist	Brad Moore Hon. B.Sc
		Laboratory	SGS Canada Inc.
Address	347 Pido Rd., Unit #29 Peterborough, ON K9J 6Z8, Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Gus Bolin	Telephone	705-652-2143
Telephone	705-749-3317	Facsimile	705-652-6365
Facsimile		Email	brad.moore@sgs.com
Email	gus.bolin@ghd.com	SGS Reference	CA14563-NOV20
Project	11212878-01 Halls Glenn	Received	11/18/2020
Order Number		Approved	11/30/2020
Samples	Ground Water (4)	Report Number	CA14563-NOV20 R
		Date Reported	11/30/2020

COMMENTS

Temperature of Sample upon Receipt: 4 degrees C

Cooling Agent Present:Yes

Custody Seal Present:No

Chain of Custody Number:NA

SIGNATORIES

Brad Moore Hon. B.Sc

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FINAL REPORT

CA14563-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01 Halls Glenn

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **BTEX** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7	8
				Sample Name	R-1	R-2	R-3	R-4
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	18/11/2020	18/11/2020	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**
BTEX								
Benzene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
Toluene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
Xylene (total)	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
o-xylene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
m/p-xylene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
General Chemistry								
Alkalinity	mg/L as CaCO3	2	500		298	270	277	347
Conductivity	uS/cm	2			864	941	776	1340
Total Dissolved Solids	mg/L	30	500		460	529	434	797
Chemical Oxygen Demand	mg/L	8			< 8	< 8	< 8	18
Ammonia+Ammonium (N)	as N mg/L	0.1			< 0.1	< 0.1	< 0.1	< 0.1
Dissolved Organic Carbon	mg/L	1	5		1	2	2	4

FINAL REPORT

CA14563-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01 Halls Glenn

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7	8
				Sample Name	R-1	R-2	R-3	R-4
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	18/11/2020	18/11/2020	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics								
Sulphate	mg/L	2	500		15	21	8	14
Nitrate (as N)	as N mg/L	0.06		10	1.78	0.54	0.81	2.12
Barium (dissolved)	mg/L	0.00002		1	0.175	0.103	0.0915	0.125
Boron (dissolved)	mg/L	0.002		5	0.033	0.029	0.021	0.031
Calcium (dissolved)	mg/L	0.01			131	139	117	126
Iron (dissolved)	mg/L	0.007	0.3		0.022	0.013	0.017	0.008
Magnesium (dissolved)	mg/L	0.001			4.91	3.97	3.65	3.29
Sodium (dissolved)	mg/L	0.01	200	20	45.9	61.0	49.1	165
Arsenic (dissolved)	mg/L	0.0002		0.01	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Cadmium (dissolved)	mg/L	0.000003		0.005	0.000005	0.000005	0.000009	0.000007
Chromium (dissolved)	mg/L	0.00008		0.05	0.00089	0.00071	0.00093	0.00123
Copper (dissolved)	mg/L	0.0002	1		0.0011	0.120	0.301	0.169
Lead (dissolved)	mg/L	0.00001		0.01	0.00003	0.00048	0.00013	0.00269
Manganese (dissolved)	mg/L	0.00001	0.05		0.00343	0.00038	0.00318	0.00022
Potassium (dissolved)	mg/L	0.009			1.92	1.00	1.57	3.16
Zinc (dissolved)	mg/L	0.002	5		0.003	0.007	0.054	0.030

FINAL REPORT

CA14563-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01 Halls Glenn

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **Other (ORP)** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7	8
				Sample Name	R-1	R-2	R-3	R-4
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	18/11/2020	18/11/2020	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**
Other (ORP)								
pH	No unit	0.05	8.5		8.14	7.60	7.67	7.85
Chloride	mg/L	1	250		92	140	81	220
THMs (VOC)								
Bromodichloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
Bromoform	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
VOCs								
Bromomethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
Carbon tetrachloride	µg/L	0.2			< 0.2	< 0.2	< 0.2	< 0.2
Chloroethane	µg/L	5.0			< 5	< 5	< 5	< 5
Chloroform	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
Chloromethane	µg/L	5.0			< 5	< 5	< 5	< 5
1,2-Dichlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
1,4-Dichlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethylene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloropropane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
trans-1,2-Dichloroethene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
cis-1,3-Dichloropropene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
trans-1,3-Dichloropropene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5

FINAL REPORT

CA14563-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01 Halls Glenn

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **VOCs** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	5	6	7	8
				Sample Name	R-1	R-2	R-3	R-4
				Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water
				Sample Date	18/11/2020	18/11/2020	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**	**Result**
VOCs (continued)								
Ethylenedibromide	µg/L	0.2			< 0.2	< 0.2	< 0.2	< 0.2
Dichloromethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
Monochlorobenzene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
Styrene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
Vinyl Chloride	µg/L	0.2			< 0.2	< 0.2	< 0.2	< 0.2
Trichlorofluoromethane	µg/L	5.0			< 5	< 5	< 5	< 5
1,1,1-Trichloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5
1,1,1,2-Tetrachloroethane	µg/L	0.5			< 0.5	< 0.5	< 0.5	< 0.5

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
R-1					
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	45.9		20
R-2					
Total Dissolved Solids	SM 2540C	mg/L	529	500	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	61.0		20
R-3					
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	49.1		20
R-4					
Total Dissolved Solids	SM 2540C	mg/L	797	500	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	165		20

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Alkalinity	EWL0344-NOV20	mg/L as CaCO3	2	< 2	2	20	104	80	120	NA		
Alkalinity	EWL0349-NOV20	mg/L as CaCO3	2	< 2	3	20	94	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Ammonia+Ammonium (N)	SKA0219-NOV20	as N mg/L	0.1	<0.1	ND	10	100	90	110	101	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5120-NOV20	mg/L	1	<1	0	20	107	80	120	100	75	125
Sulphate	DIO5120-NOV20	mg/L	2	<2	1	20	97	80	120	98	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrate (as N)	DIO0469-NOV20	mg/L	0.06	<0.06	ND	20	101	80	120	101	75	125

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0217-NOV20	mg/L	1	<1	4	20	92	90	110	93	75	125

QC SUMMARY

Chemical Oxygen Demand

Method: HACH 8000 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0332-NOV20	mg/L	8	<8	ND	20	108	80	120	106	75	125
Chemical Oxygen Demand	EWL0354-NOV20	mg/L	8	<8	8	20	102	80	120	106	75	125

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0344-NOV20	uS/cm	2	< 2	1	20	101	90	110	NA		
Conductivity	EWL0349-NOV20	uS/cm	2	< 2	2	20	103	90	110	NA		

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (dissolved)	EMS0136-NOV20	mg/L	0.0002	<0.0002	ND	20	96	90	110	96	70	130
Barium (dissolved)	EMS0136-NOV20	mg/L	0.00002	<0.00002	6	20	96	90	110	101	70	130
Boron (dissolved)	EMS0136-NOV20	mg/L	0.002	<0.002	ND	20	96	90	110	100	70	130
Calcium (dissolved)	EMS0136-NOV20	mg/L	0.01	<0.01	2	20	103	90	110	101	70	130
Cadmium (dissolved)	EMS0136-NOV20	mg/L	0.000003	<0.000003	5	20	98	90	110	99	70	130
Chromium (dissolved)	EMS0136-NOV20	mg/L	0.00008	<0.00008	ND	20	97	90	110	106	70	130
Copper (dissolved)	EMS0136-NOV20	mg/L	0.0002	<0.0002	2	20	97	90	110	107	70	130
Iron (dissolved)	EMS0136-NOV20	mg/L	0.007	<0.007	3	20	107	90	110	NV	70	130
Potassium (dissolved)	EMS0136-NOV20	mg/L	0.009	<0.009	5	20	110	90	110	99	70	130
Magnesium (dissolved)	EMS0136-NOV20	mg/L	0.001	<0.001	4	20	108	90	110	100	70	130
Manganese (dissolved)	EMS0136-NOV20	mg/L	0.00001	<0.00001	3	20	98	90	110	100	70	130
Sodium (dissolved)	EMS0136-NOV20	mg/L	0.01	<0.01	19	20	104	90	110	106	70	130
Lead (dissolved)	EMS0136-NOV20	mg/L	0.00001	<0.00001	3	20	95	90	110	95	70	130
Zinc (dissolved)	EMS0136-NOV20	mg/L	0.002	<0.002	2	20	97	90	110	NV	70	130

QC SUMMARY

pH

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0344-NOV20	No unit	0.05	NA	0		100			NA		
pH	EWL0349-NOV20	No unit	0.05	NA	1		100			NA		

Solids Analysis

Method: SM 2540C I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0343-NOV20	mg/L	30	<30	2	20	99	90	110	NA		
Total Dissolved Solids	EWL0351-NOV20	mg/L	30	<30	0	20	98	90	110	NA		

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,1,2-Tetrachloroethane	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	102	60	130	99	50	140
1,1,1-Trichloroethane	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	97	50	140
1,1,2,2-Tetrachloroethane	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	122	50	140
1,1,2-Trichloroethane	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	102	50	140
1,1-Dichloroethane	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	101	60	130	97	50	140
1,1-Dichloroethylene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	102	60	130	99	50	140
1,2-Dichlorobenzene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	97	50	140
1,2-Dichloroethane	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	98	50	140
1,2-Dichloropropane	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	101	60	130	99	50	140
1,3-Dichlorobenzene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	95	50	140
1,4-Dichlorobenzene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	96	50	140
Benzene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	97	50	140
Bromodichloromethane	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	96	50	140
Bromoform	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	95	60	130	92	50	140
Bromomethane	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	78	50	140	78	50	140
Carbon tetrachloride	GCM0403-NOV20	µg/L	0.2	<0.2	ND	30	98	60	130	95	50	140
Chloroethane	GCM0403-NOV20	µg/L	5.0	<5	ND	30	81	60	130	78	50	140
Chloroform	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	98	60	130	96	50	140
Chloromethane	GCM0403-NOV20	µg/L	5.0	<5	ND	30	79	60	130	76	50	140
cis-1,2-Dichloroethene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	101	60	130	98	50	140

QC SUMMARY

Volatile Organics (continued)

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
cis-1,3-Dichloropropene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	98	50	140
Dibromochloromethane	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	97	60	130	97	50	140
Dichloromethane	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	96	50	140
Ethylbenzene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	101	60	130	98	50	140
Ethylenedibromide	GCM0403-NOV20	µg/L	0.2	<0.2	ND	30	102	60	130	102	50	140
m/p-xylene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	96	50	140
Monochlorobenzene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	97	50	140
o-xylene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	101	60	130	97	50	140
Styrene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	101	60	130	98	50	140
Tetrachloroethene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	96	50	140
Toluene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	101	60	130	99	50	140
trans-1,2-Dichloroethene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	99	60	130	98	50	140
trans-1,3-Dichloropropene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	102	50	140
Trichloroethylene	GCM0403-NOV20	µg/L	0.5	<0.5	ND	30	100	60	130	85	50	140
Trichlorofluoromethane	GCM0403-NOV20	µg/L	5.0	<5	ND	30	76	50	140	72	50	140
Vinyl Chloride	GCM0403-NOV20	µg/L	0.2	<0.2	ND	30	76	60	130	76	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. “Temperature Upon Receipt” is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act” published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

FINAL REPORT

CA15462-NOV20 R

11212878-01, Halls Glen Landfil

Prepared for

GHD Limited - 735

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	GHD Limited - 735	Project Specialist	Jill Campbell, B.Sc.,GISAS
		Laboratory	SGS Canada Inc.
Address	347 Pido Rd., Unit #29 Peterborough, ON K9J 6Z8. Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Gus Bolin	Telephone	2165
Telephone	705-749-3317	Facsimile	705-652-6365
Facsimile		Email	jill.campbell@sgs.com
Email	gus.bolin@ghd.com	SGS Reference	CA15462-NOV20
Project	11212878-01, Halls Glen Landfil	Received	11/18/2020
Order Number		Approved	11/30/2020
Samples	Surface Water (2)	Report Number	CA15462-NOV20 R
		Date Reported	11/30/2020

COMMENTS

Temperature of Sample upon Receipt: 4 degrees C

Cooling Agent Present:Yes

Custody Seal Present:No

Chain of Custody Number:NA

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

Jill Campbell

TABLE OF CONTENTS

FINAL REPORT

CA15462-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfil

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **ODWS_AO_OG - General Chemistry** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

			Sample Number	5	6
			Sample Name	S-1	S-2
			Sample Matrix	Surface Water	Surface Water
			Sample Date	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**
General Chemistry					
Biochemical Oxygen Demand (BOD5)	mg/L	2		< 4↑	10
Total Suspended Solids	mg/L	2		4	34
Alkalinity	mg/L as CaCO3	2	500	267	220
Conductivity	uS/cm	2		717	604
Total Dissolved Solids	mg/L	30	500	406	423
Chemical Oxygen Demand	mg/L	8		< 8	58
Total Kjeldahl Nitrogen	as N mg/L	0.5		< 0.5	0.7
Ammonia+Ammonium (N)	as N mg/L	0.1		< 0.1	< 0.1

PACKAGE: **ODWS_AO_OG - Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

			Sample Number	5	6
			Sample Name	S-1	S-2
			Sample Matrix	Surface Water	Surface Water
			Sample Date	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**
Metals and Inorganics					
Sulphate	mg/L	2	500	17	54
Nitrite (as N)	as N mg/L	0.03		< 0.03	0.05
Nitrate (as N)	as N mg/L	0.06		2.24	0.49
Arsenic (total)	mg/L	0.0002		< 0.0002	0.0008
Barium (total)	mg/L	0.00002		0.132	0.106
Boron (total)	mg/L	0.002		0.052	0.052
Calcium (total)	mg/L	0.01		117	111

SGS

FINAL REPORT

CA15462-NOV20 R

Client: GHD Limited - 735

Project: 11212878-01, Halls Glen Landfil

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **ODWS_AO_OG - Metals and Inorganics** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

			Sample Number	5	6
			Sample Name	S-1	S-2
			Sample Matrix	Surface Water	Surface Water
			Sample Date	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**
Metals and Inorganics (continued)					
Cadmium (total)	mg/L	0.000003		0.000008	0.000111
Chromium (total)	mg/L	0.00008		0.00046	0.00065
Copper (total)	mg/L	0.0002	1	0.0009	0.0050
Iron (total)	mg/L	0.007	0.3	0.068	0.316
Potassium (total)	mg/L	0.009		1.73	7.13
Magnesium (total)	mg/L	0.001		4.59	4.80
Manganese (total)	mg/L	0.00001	0.05	0.0130	0.0635
Sodium (total)	mg/L	0.01		33.7	15.5
Phosphorus (total)	mg/L	0.003		0.009	0.136
Lead (total)	mg/L	0.00001		0.00007	0.00048
Zinc (total)	mg/L	0.002	5	0.003	0.015

FINAL REPORT

Client: GHD Limited - 735
Project: 11212878-01, Halls Glen Landfil
Project Manager: Gus Bolin
Samplers: Gus Bolin

PACKAGE: **ODWS_AO_OG - Other (ORP)** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

			Sample Number	5	6
			Sample Name	S-1	S-2
			Sample Matrix	Surface Water	Surface Water
			Sample Date	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**
Other (ORP)					
pH	No unit	0.05	8.5	7.61	7.72
Chloride	mg/L	1	250	63	33
Mercury (total)	µg/L	0.01		< 0.01	< 0.01

PACKAGE: **ODWS_AO_OG - Phenols** (WATER)

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

			Sample Number	5	6
			Sample Name	S-1	S-2
			Sample Matrix	Surface Water	Surface Water
			Sample Date	18/11/2020	18/11/2020
Parameter	**Units**	**RL**	**L1**	**Result**	**Result**
Phenols					
4AAP-Phenolics	mg/L	0.001		< 0.001	0.002

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1
S-2				
Iron	SM 3030/EPA 200.8	µg/L	0.316	0.3
Manganese	SM 3030/EPA 200.8	µg/L	0.0635	0.05

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Alkalinity	EWL0349-NOV20	mg/L as CaCO3	2	< 2	3	20	94	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Ammonia+Ammonium (N)	SKA0219-NOV20	as N mg/L	0.1	<0.1	ND	10	100	90	110	101	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5125-NOV20	mg/L	1	<1	1	20	105	80	120	101	75	125
Sulphate	DIO5125-NOV20	mg/L	2	<2	1	20	98	80	120	90	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0460-NOV20	mg/L	0.03	<0.03	ND	20	105	80	120	109	75	125
Nitrate (as N)	DIO0460-NOV20	mg/L	0.06	<0.06	ND	20	104	80	120	105	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0033-NOV20	mg/L	2	< 2	1	30	104	70	130	90	70	130

Chemical Oxygen Demand

Method: HACH 8000 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0332-NOV20	mg/L	8	<8	ND	20	108	80	120	106	75	125
Chemical Oxygen Demand	EWL0354-NOV20	mg/L	8	<8	8	20	102	80	120	106	75	125

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0349-NOV20	uS/cm	2	< 2	2	20	103	90	110	NA		

QC SUMMARY

Mercury by CVAAS

Method: SM 3112/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0028-NOV20	ug/L	0.01	-0.00	ND	20	116	80	120	NV	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (total)	EMS0130-NOV20	mg/L	0.0002	<0.0002	3	20	96	90	110	96	70	130
Barium (total)	EMS0130-NOV20	mg/L	0.00002	<0.00002	1	20	96	90	110	101	70	130
Boron (total)	EMS0130-NOV20	mg/L	0.002	<0.002	6	20	96	90	110	100	70	130
Calcium (total)	EMS0130-NOV20	mg/L	0.01	<0.01	4	20	103	90	110	101	70	130
Cadmium (total)	EMS0130-NOV20	mg/L	0.000003	<0.000003	ND	20	98	90	110	99	70	130
Chromium (total)	EMS0130-NOV20	mg/L	0.00008	<0.00008	6	20	97	90	110	106	70	130
Copper (total)	EMS0130-NOV20	mg/L	0.0002	<0.0002	7	20	97	90	110	107	70	130
Iron (total)	EMS0130-NOV20	mg/L	0.007	<0.007	9	20	107	90	110	NV	70	130
Potassium (total)	EMS0130-NOV20	mg/L	0.009	<0.009	2	20	110	90	110	99	70	130
Magnesium (total)	EMS0130-NOV20	mg/L	0.001	<0.001	2	20	108	90	110	100	70	130
Manganese (total)	EMS0130-NOV20	mg/L	0.00001	<0.00001	5	20	98	90	110	100	70	130
Sodium (total)	EMS0130-NOV20	mg/L	0.01	<0.01	0	20	104	90	110	106	70	130
Lead (total)	EMS0130-NOV20	mg/L	0.00001	<0.00001	1	20	95	90	110	95	70	130
Phosphorus (total)	EMS0130-NOV20	mg/L	0.003	<0.003	2	20	106	90	110	NV	70	130
Zinc (total)	EMS0130-NOV20	mg/L	0.002	<0.002	15	20	97	90	110	121	70	130

QC SUMMARY

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0349-NOV20	No unit	0.05	NA	1		100			NA		

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0216-NOV20	mg/L	0.001	<0.001	ND	10	106	90	110	95	75	125

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0343-NOV20	mg/L	30	<30	2	20	99	90	110	NA		

QC SUMMARY

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0330-NOV20	mg/L	2	< 2	1	10	105	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0246-NOV20	as N mg/L	0.5	<0.5	ND	10	103	90	110	77	75	125
Total Kjeldahl Nitrogen	SKA0247-NOV20	as N mg/L	0.5	<0.5	1	10	95	90	110	100	75	125

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

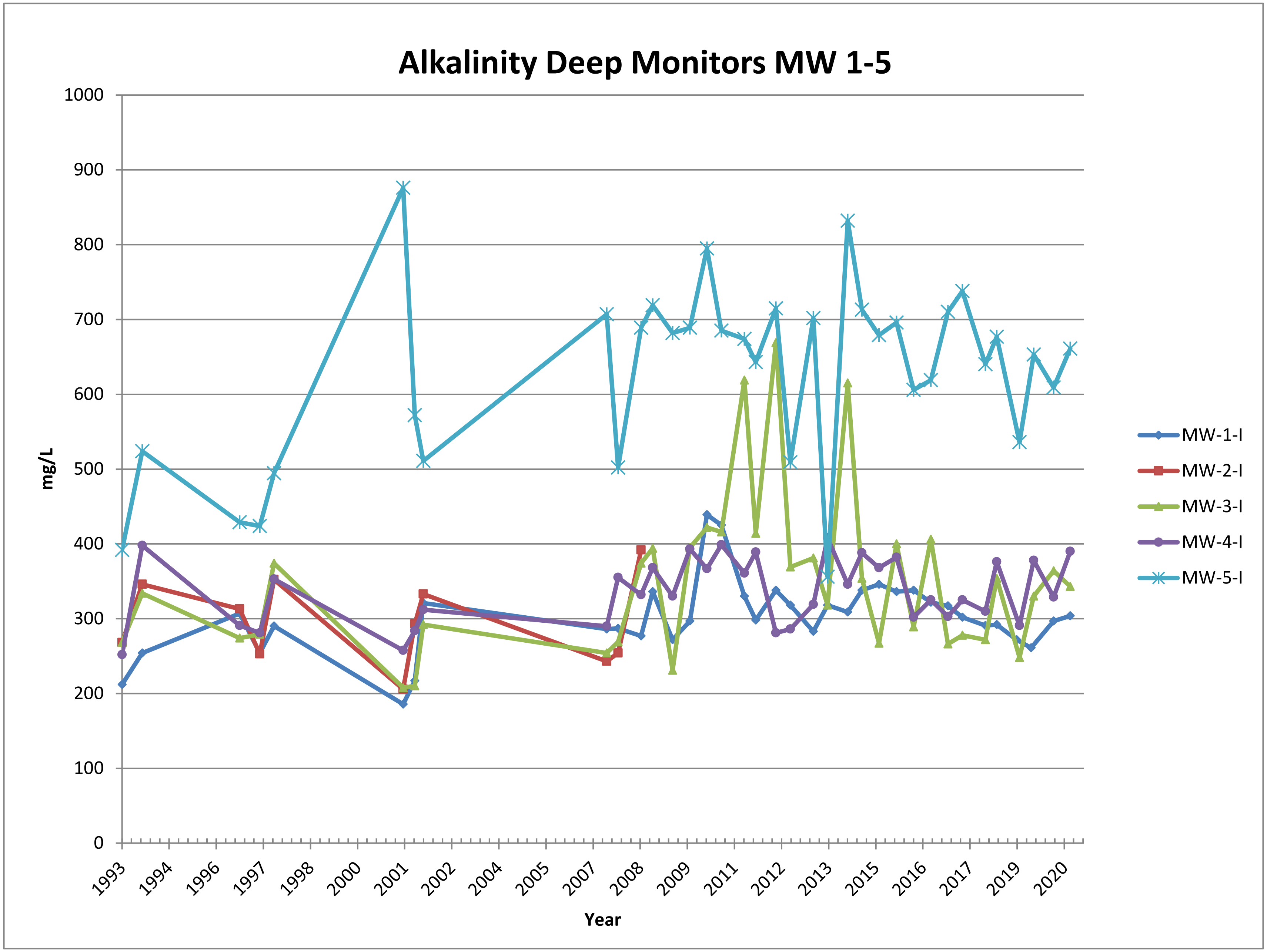
FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --



Alkalinity Deep Monitors MW 1-5
mg/L
Year
0
100
200
300
400
500
600
700
800
900
1000
1993
1994
1996
1997
1998
2000
2001
2002
2004
2005
2007
2008
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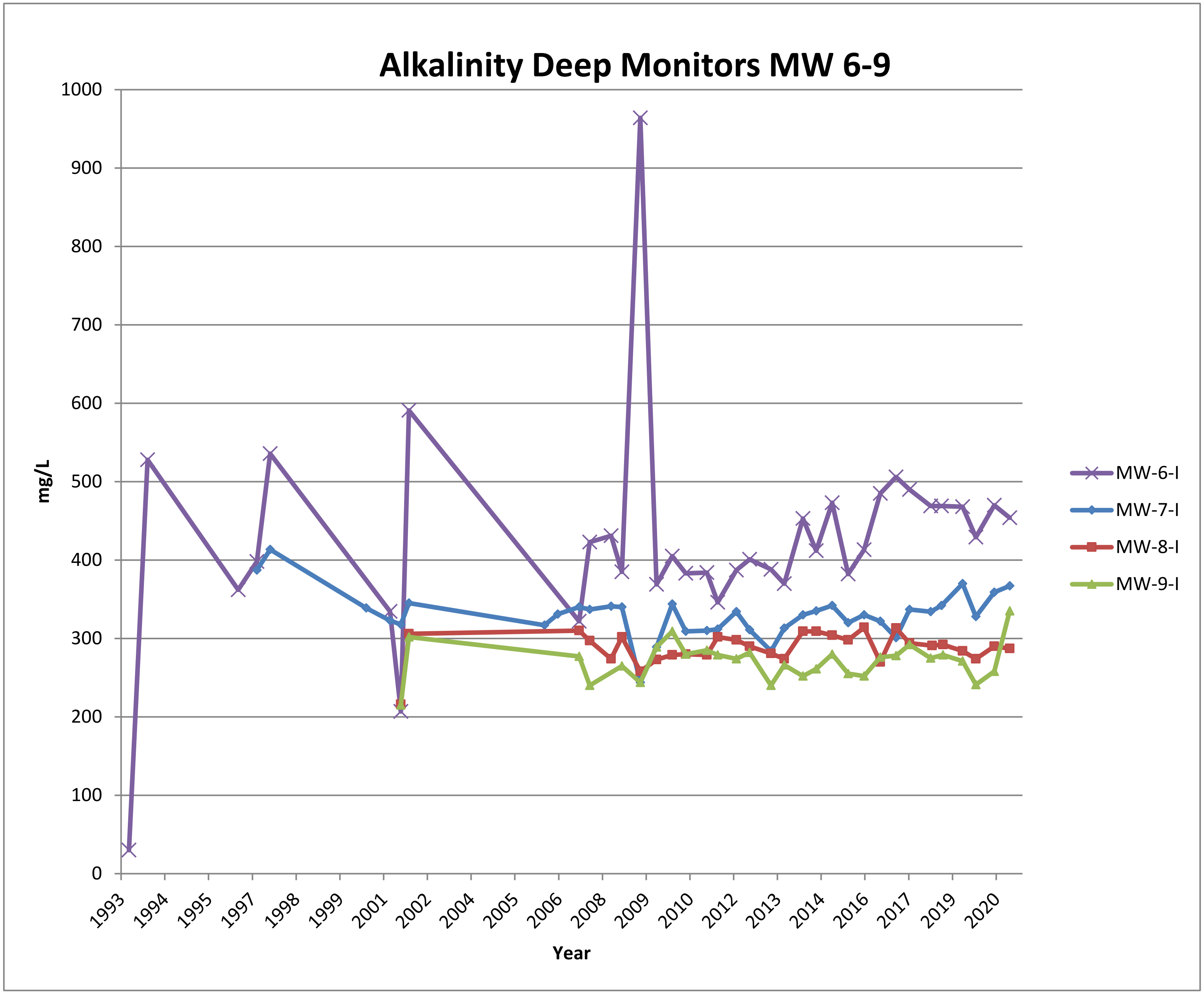
MW-4-I
MW-5-I



Alkalinity Deep Monitors MW 6-9
1000
900
800
700
600
500
400
300
200
100
0
mg/L
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
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2014
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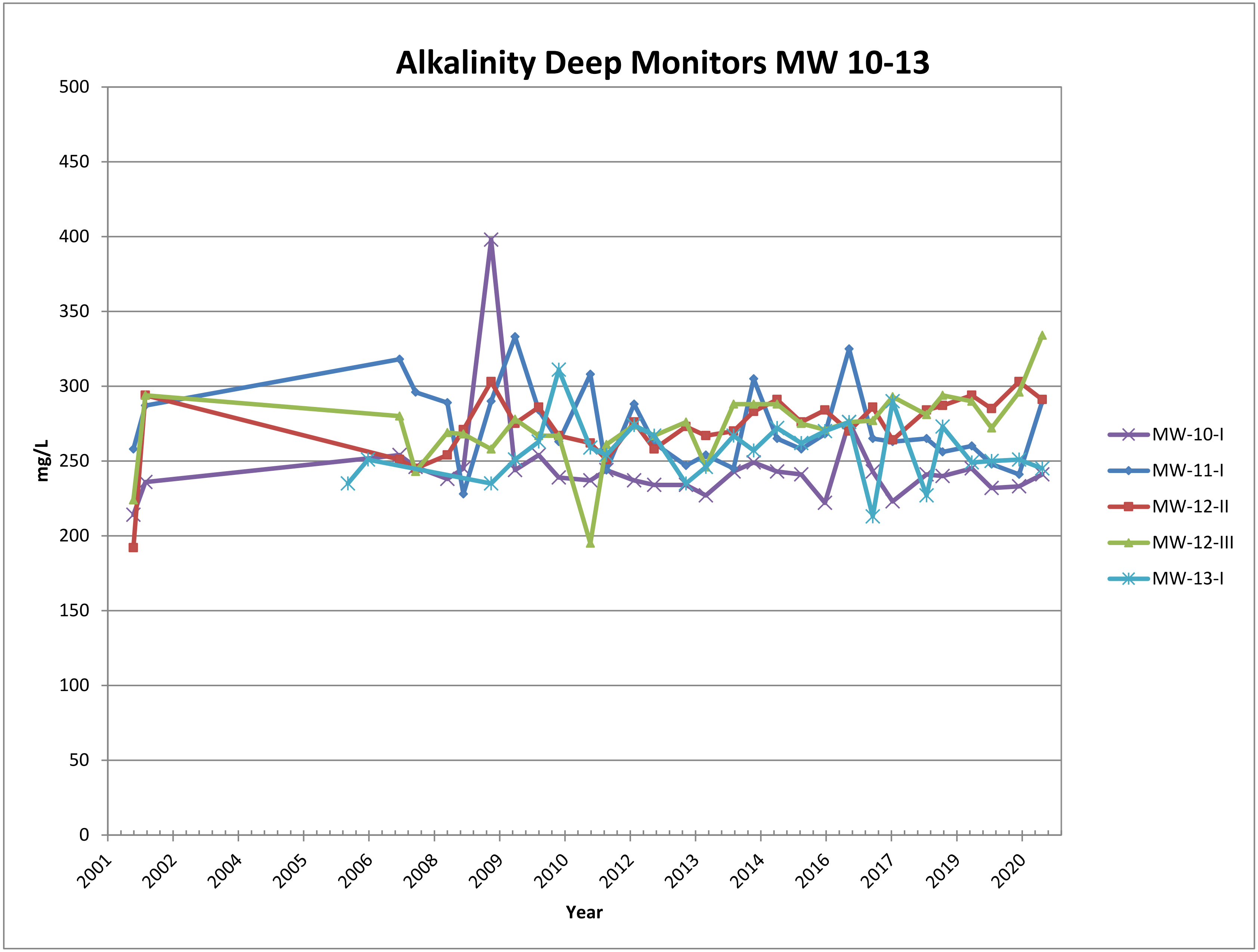
2019
2020
Year
MW-6-I
MW-7-I
MW-8-I
MW-9-I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mg/L
Year
500
450
400
350
300
250
200
150
100
50
0
2001
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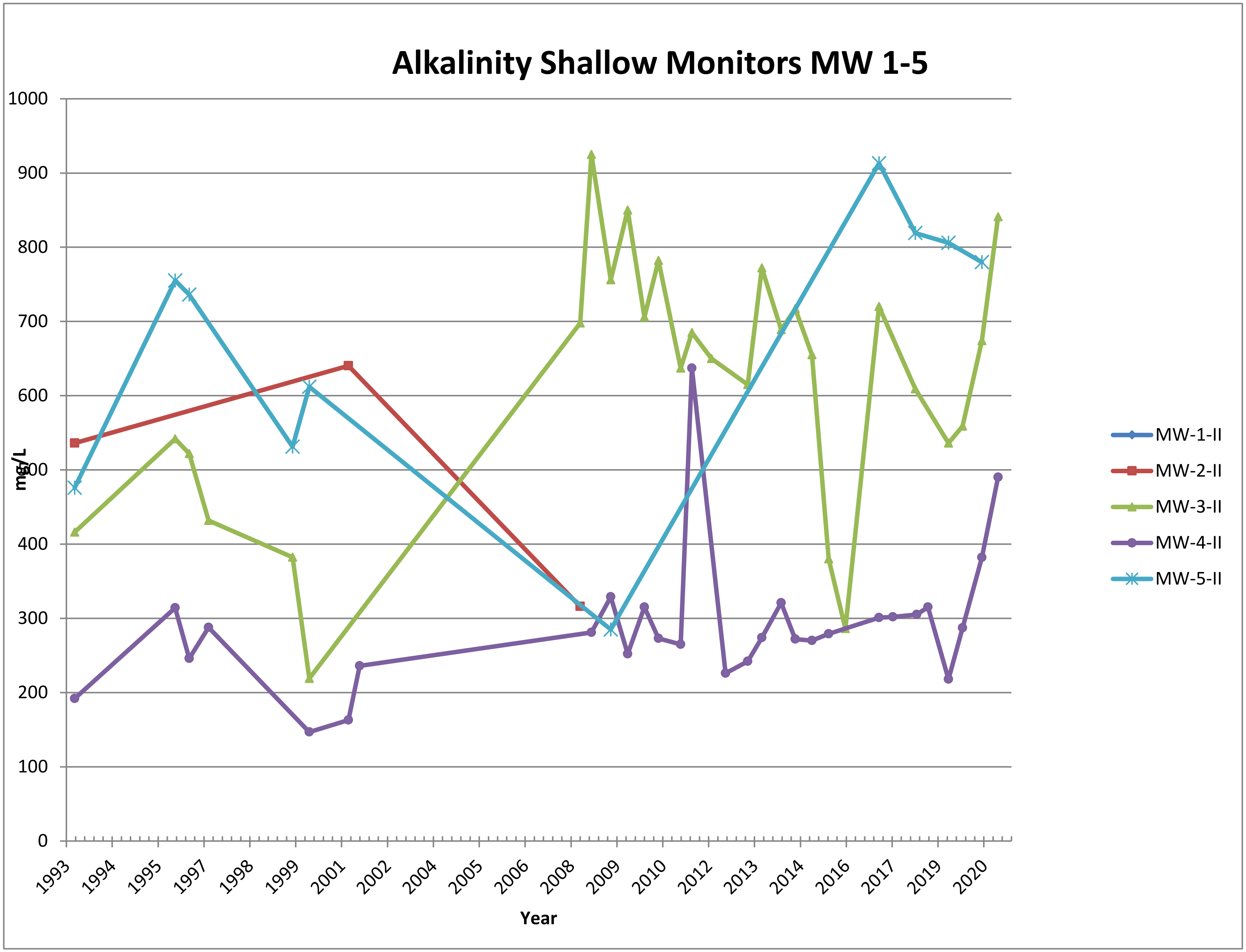
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
MW-10-I
MW-11-I
MW-12-II
MW-12-III
MW-13-I



Alkalinity Shallow Monitors MW 1-5
mg/L
0
100
200
300
400
500
600
700
800
900
1000
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
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2016
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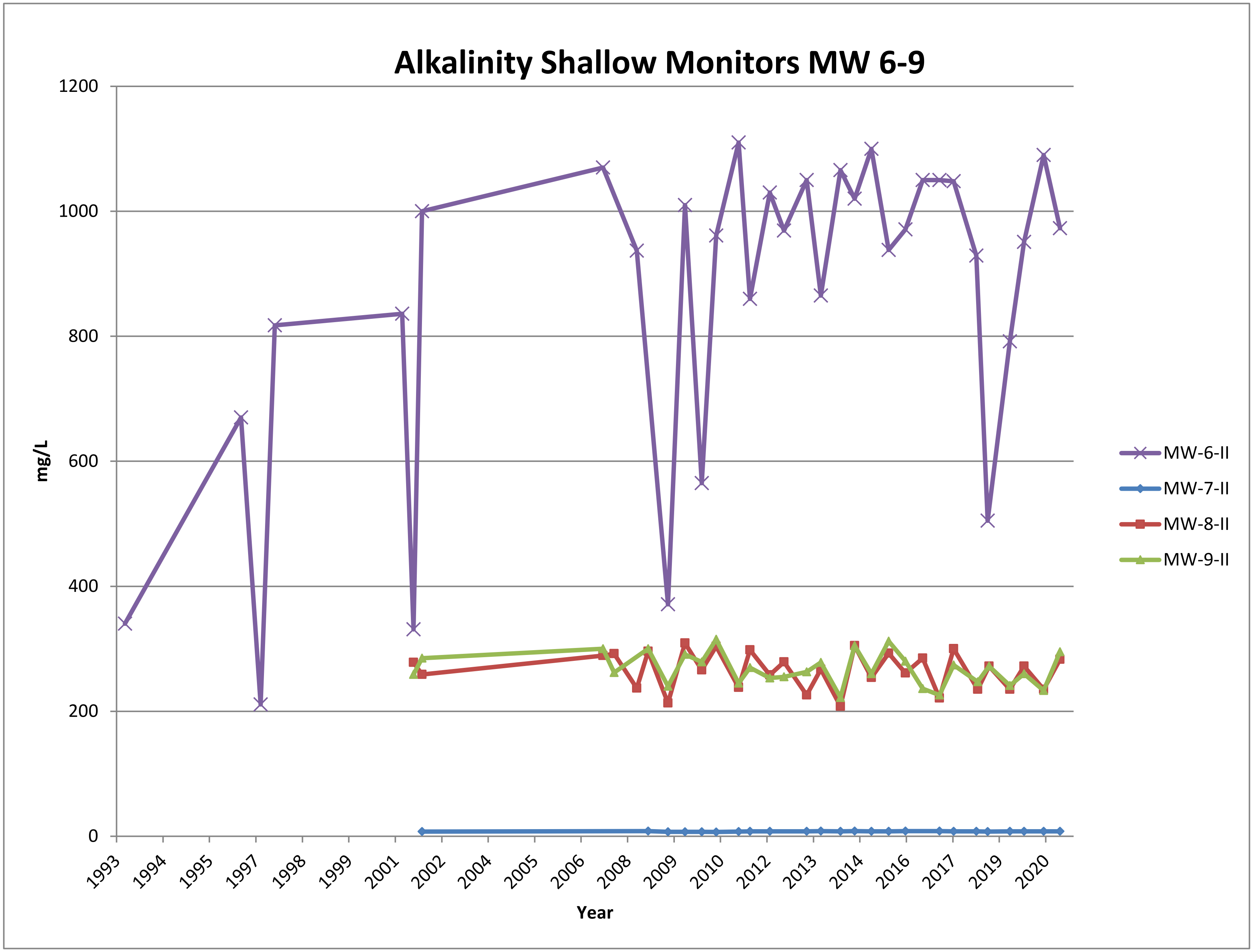
2019
2020
Year
MW-1-II
MW-2-II
MW-3-II
MW-4-II
MW-5-II



Alkalinity Shallow Monitors MW 6-9
mg/L
1200
1000
800
600
400
200
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
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2019
2020
Year
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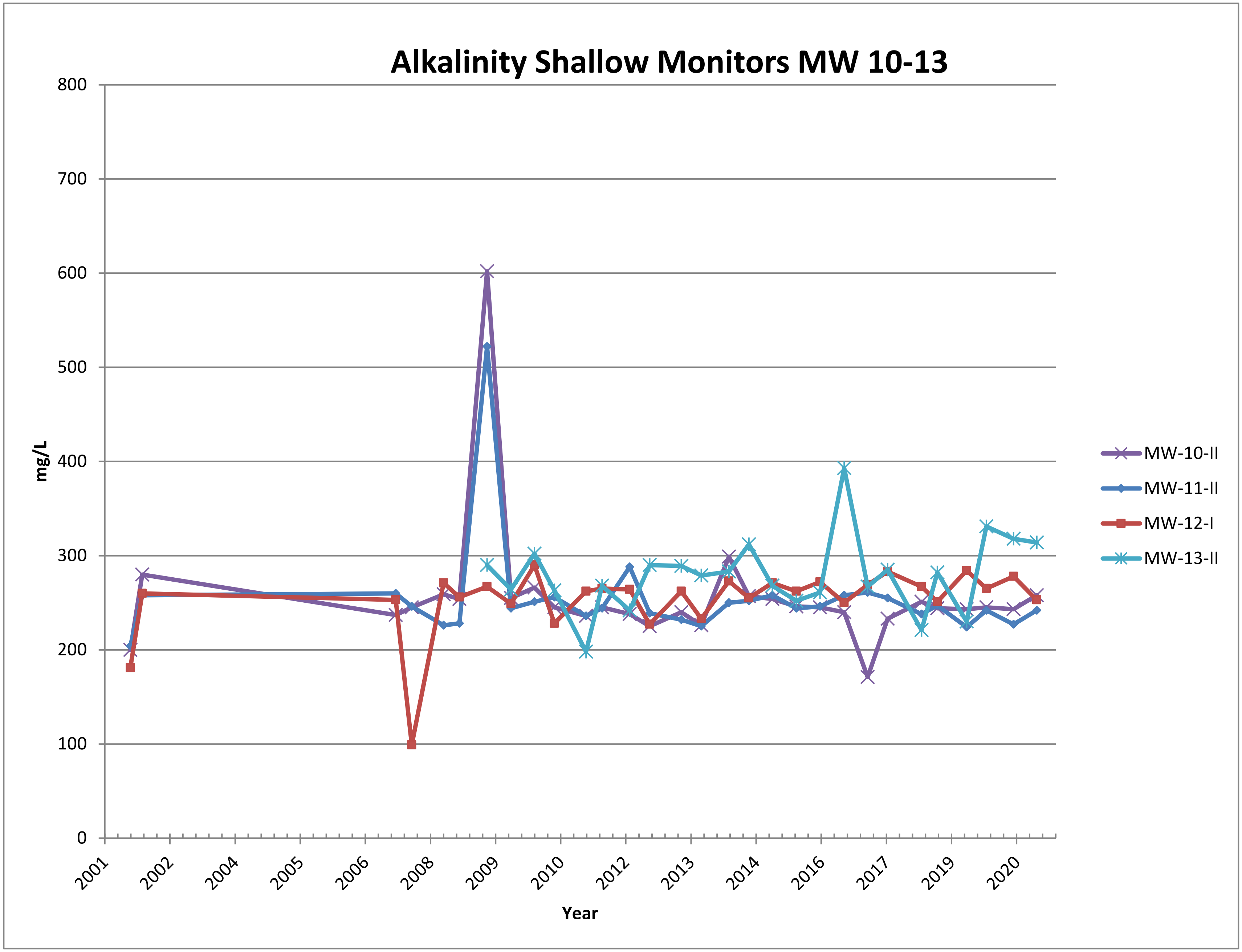
MW-7-II
MW-8-II
MW-9-II



Alkalinity Shallow Monitors MW 10-13
800
700
600
500
400
300
200
100
0
mg/L
2001
2002
2004
2005
2006
2008
2009
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2014
2016
2017
2019
2020
Year
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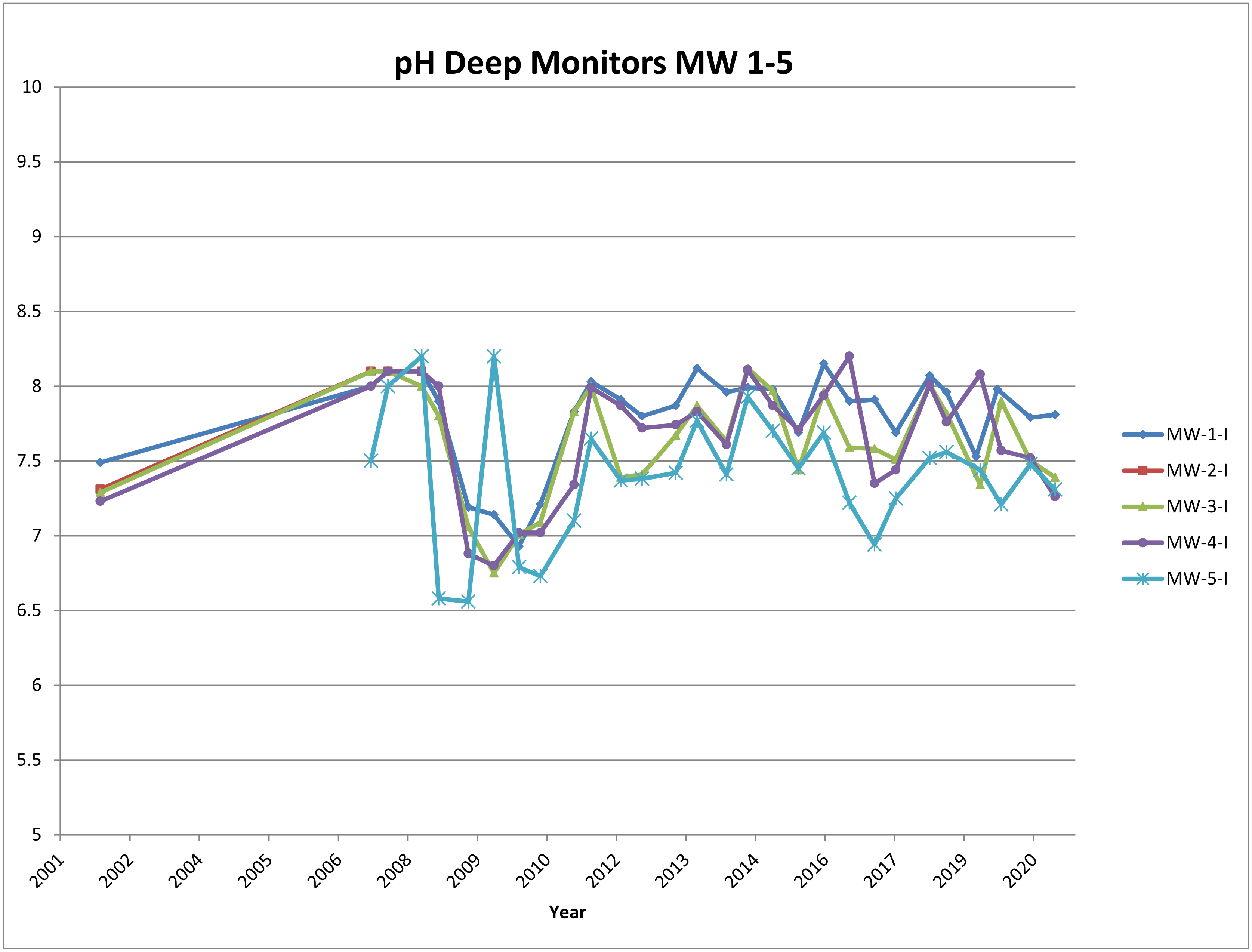
MW-11-II
MW-12-I
MW-13-II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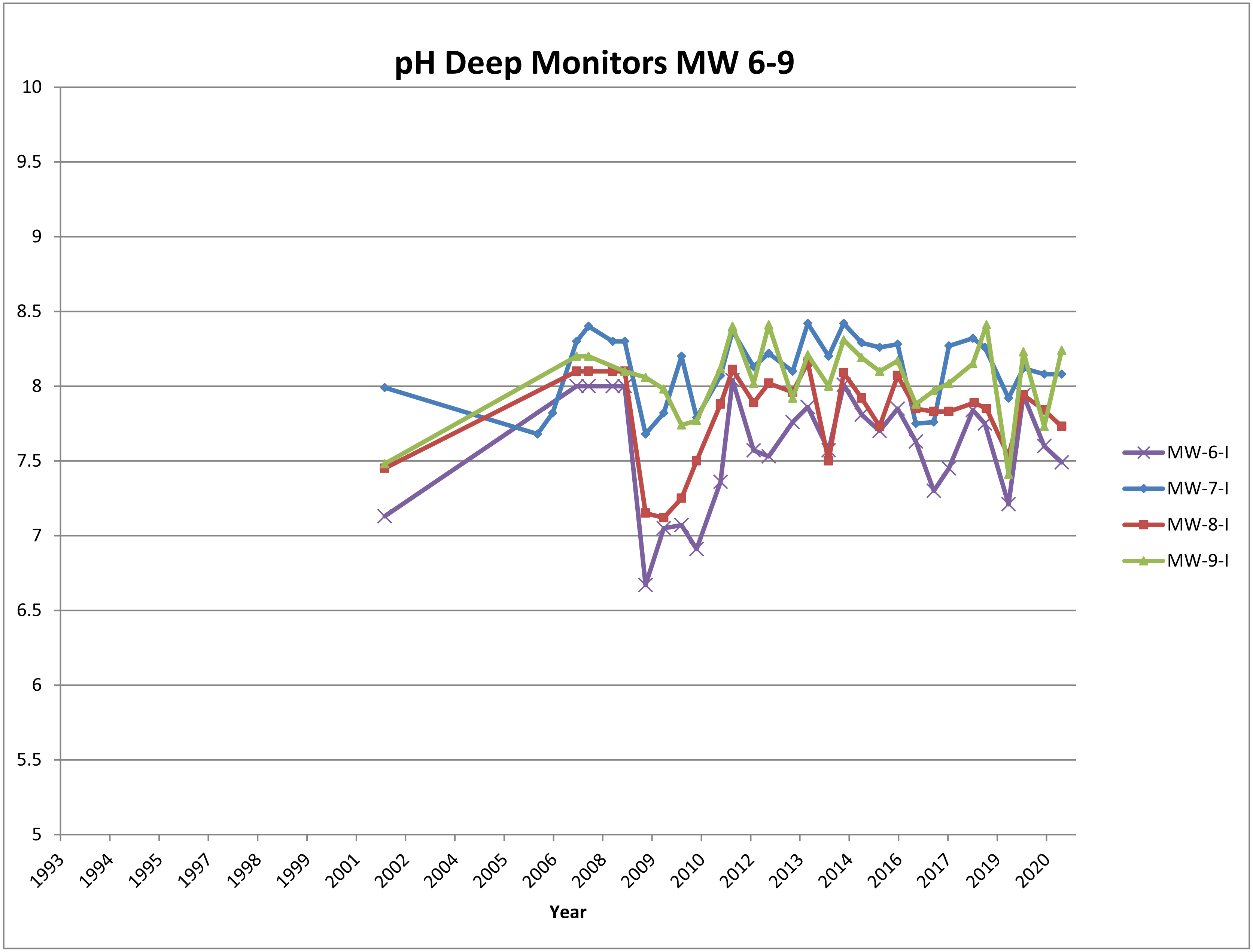
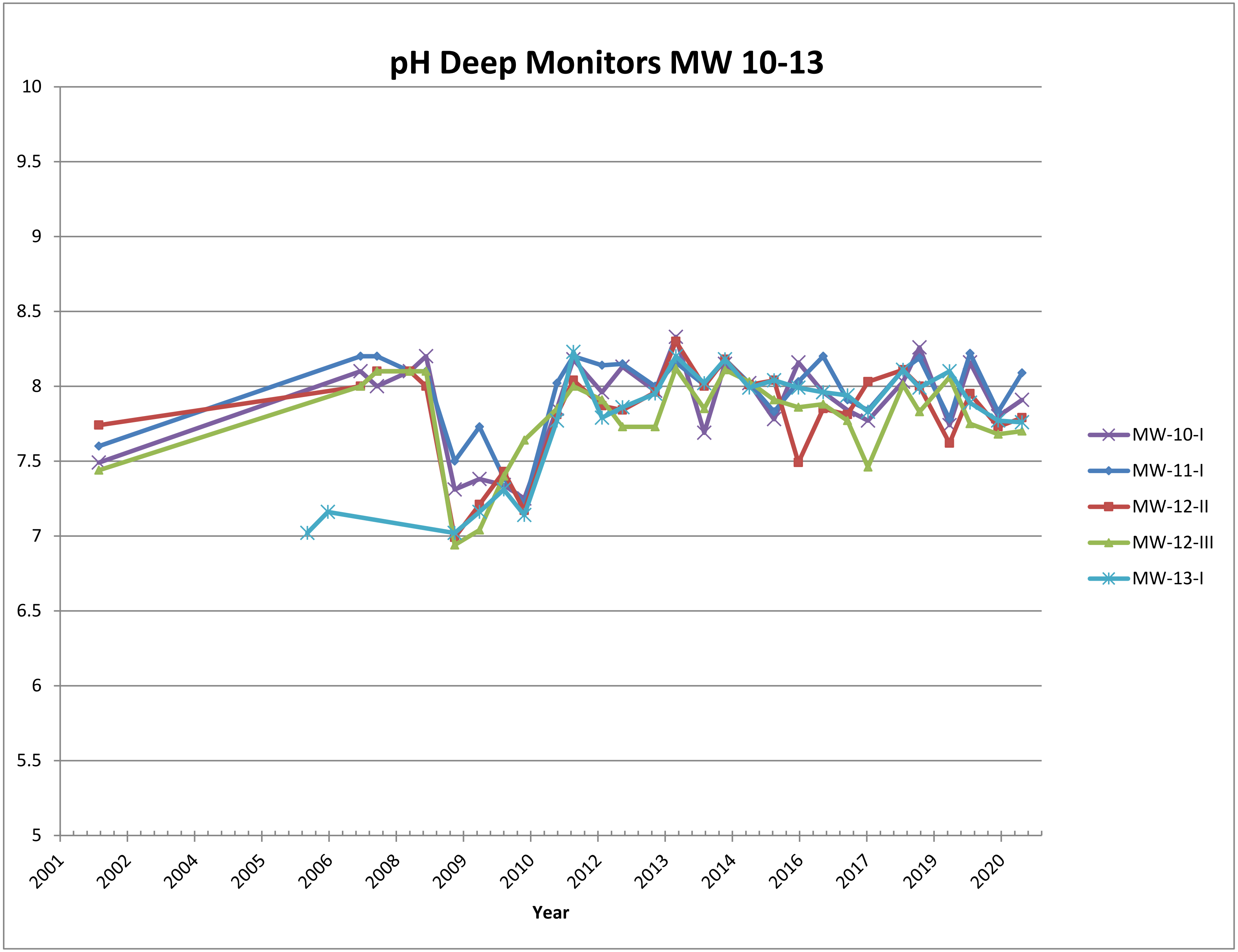
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-1-I
MW-2-I
MW-3-I
MW-4-I
MW-5-I



pH Deep Monitors MW 6-9
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-6-I
MW-7-I
MW-8-I
MW-9-I



pH Deep Monitors MW 10-13
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
2001
2002
2004
2005
2006
2008
2009
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Year
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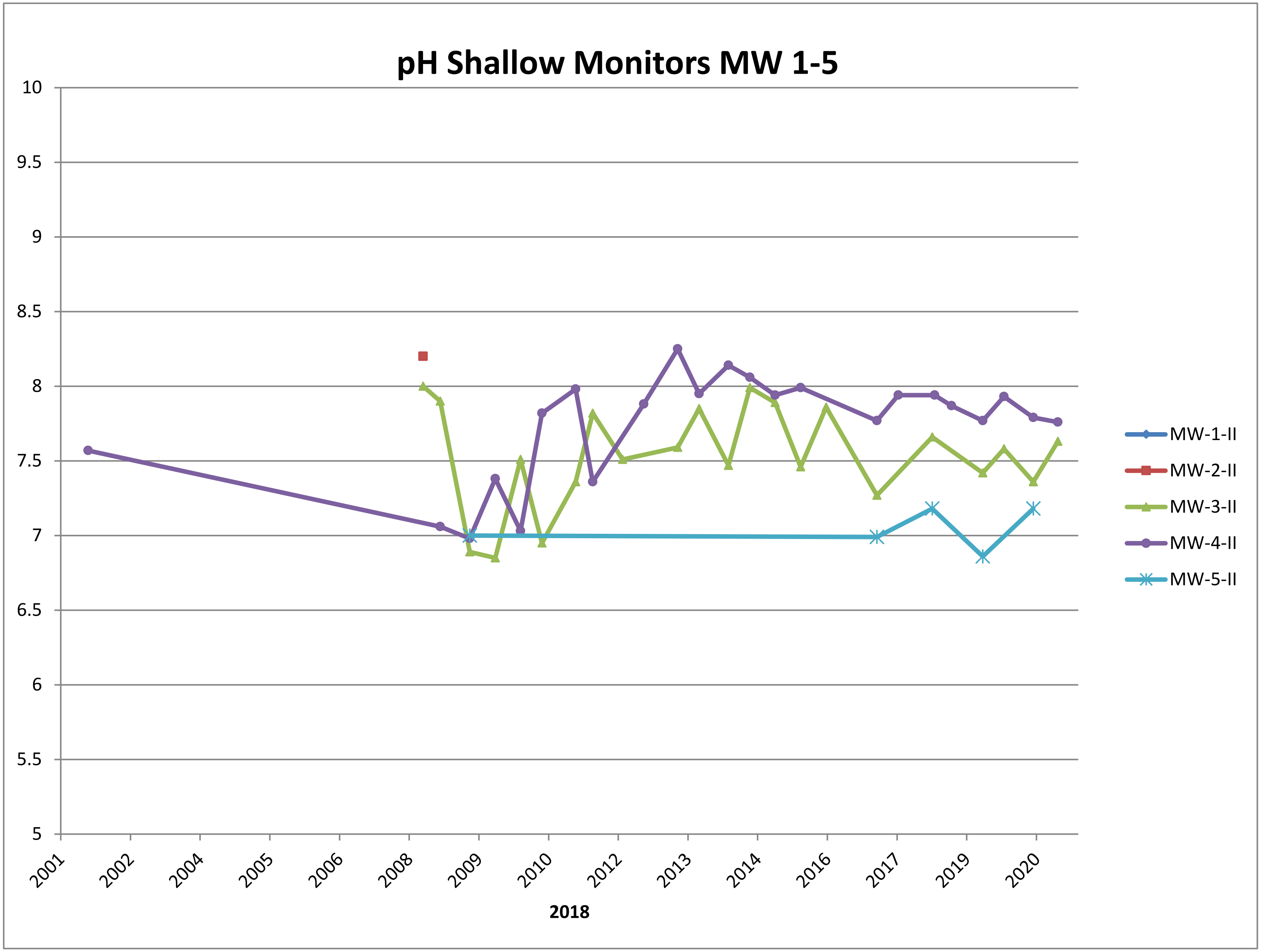
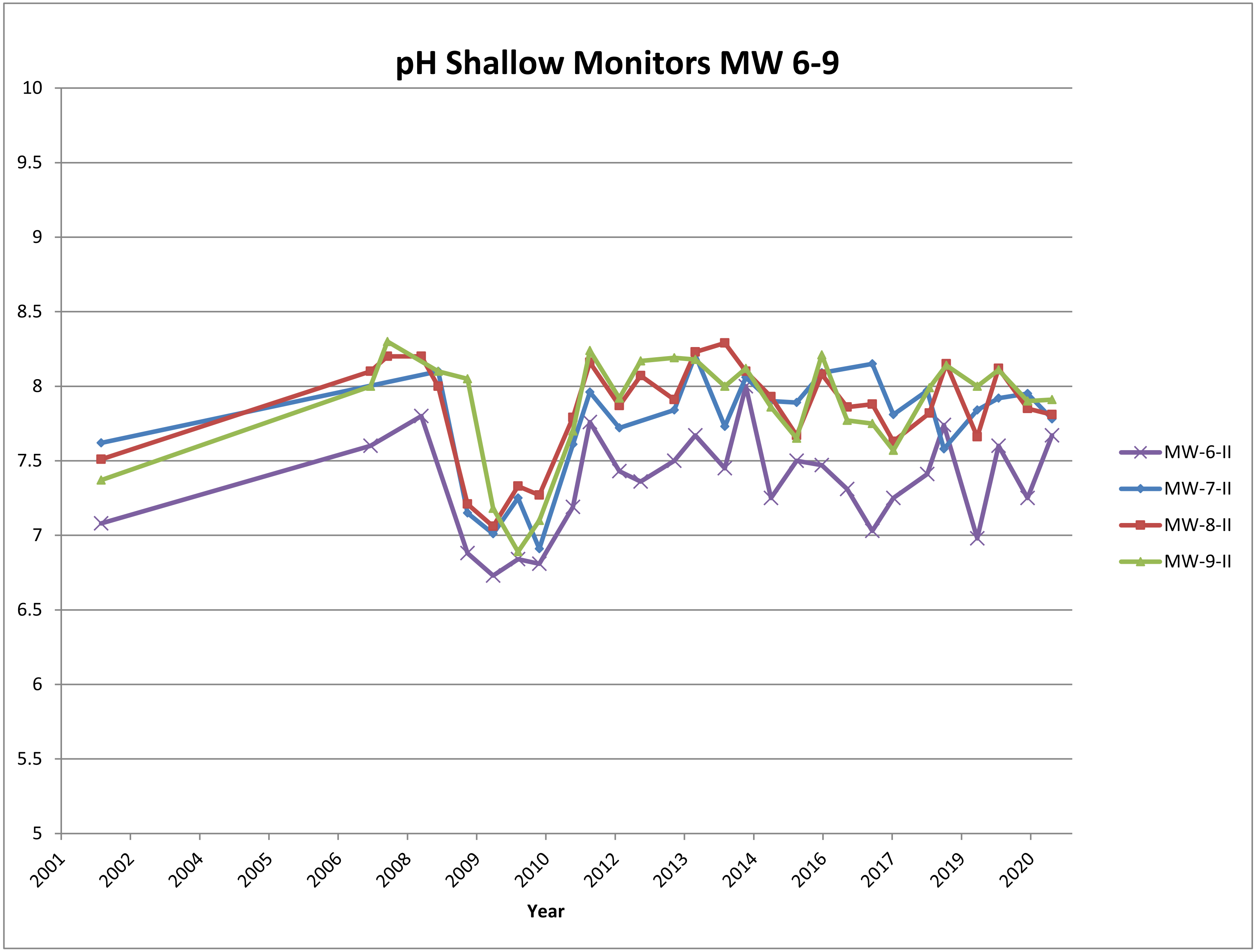
MW-12-III
MW-13-I



pH Shallow Monitors MW 1-5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
2018
MW-1-II
MW-2-II
MW-3-II
MW-4-II
MW-5-II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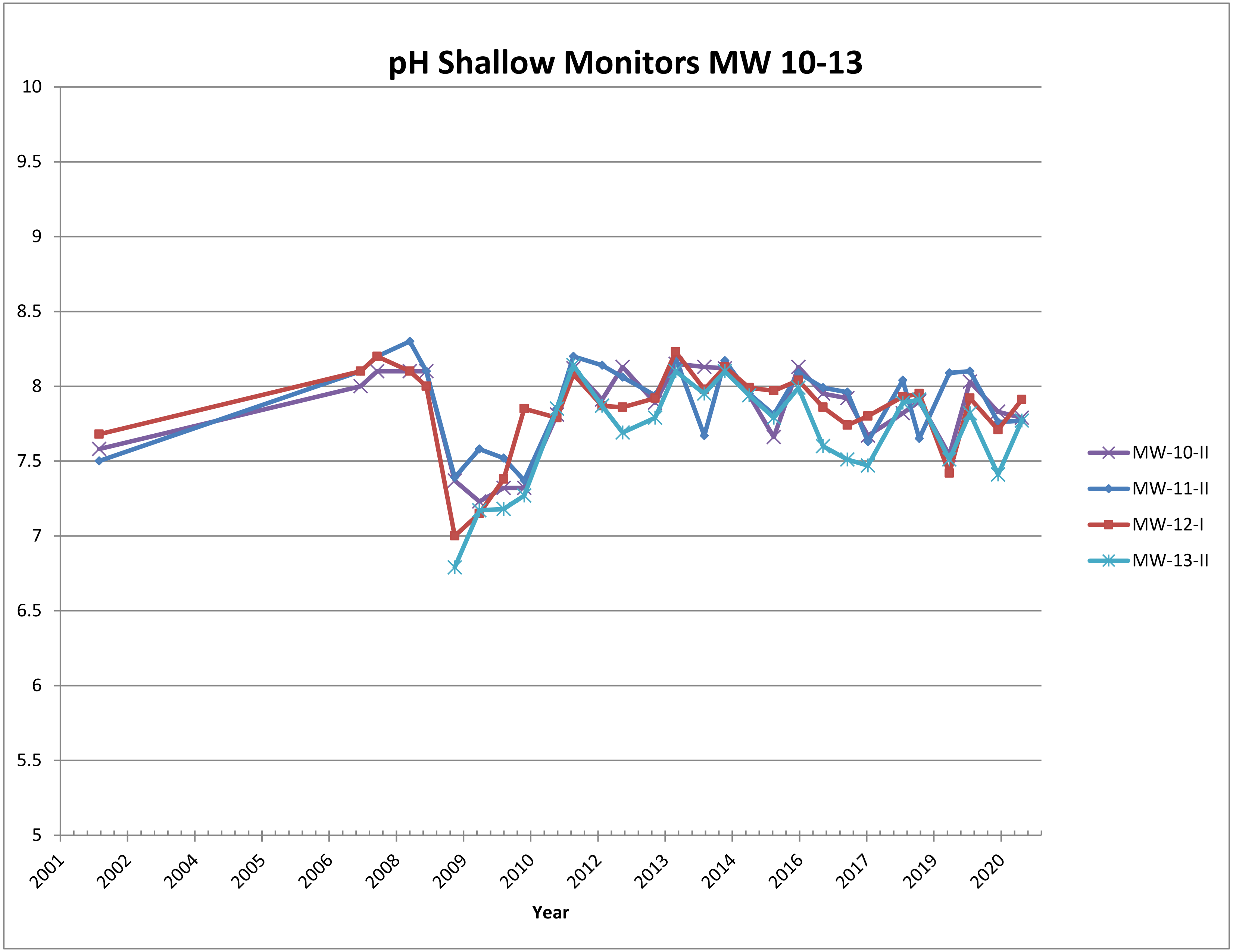
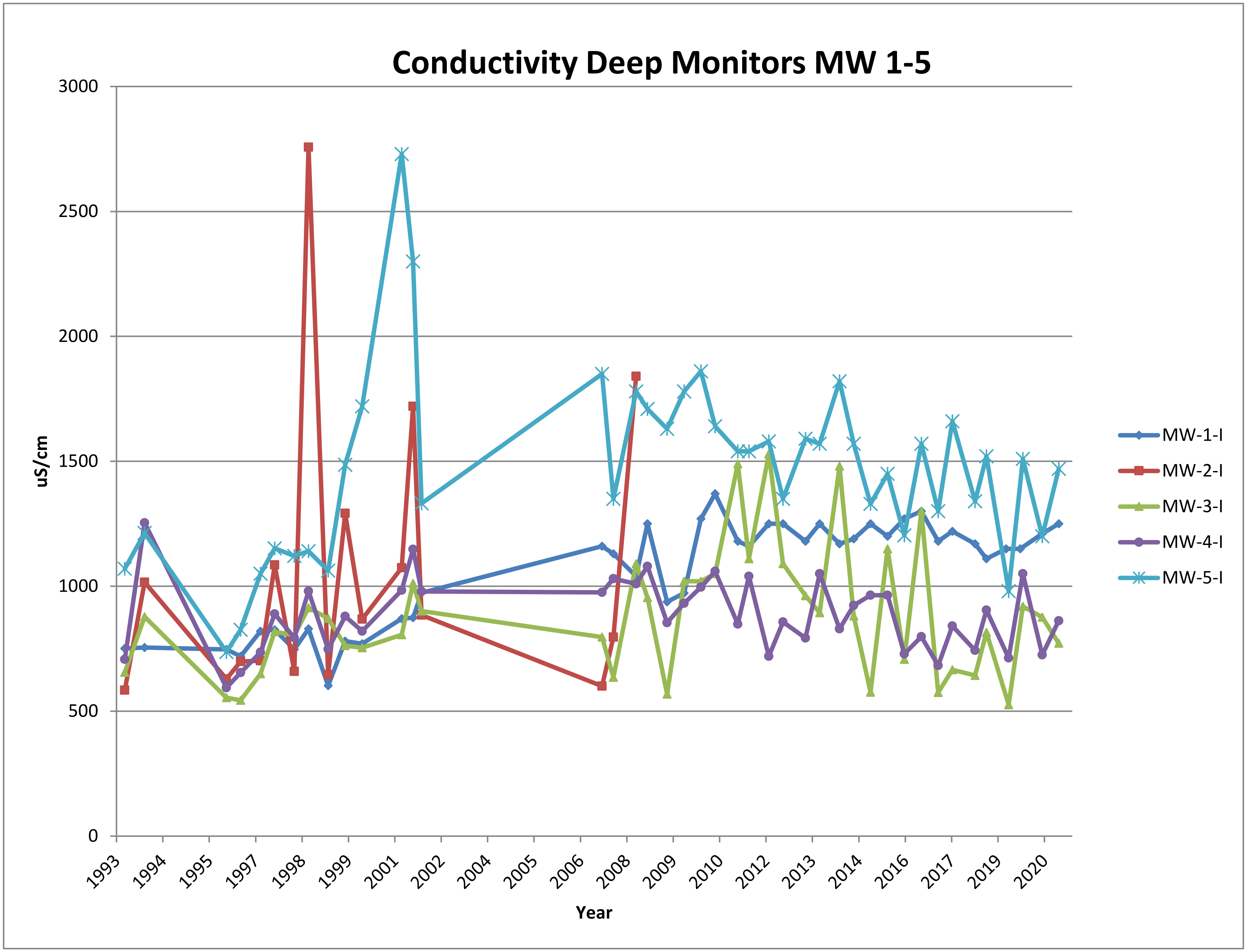
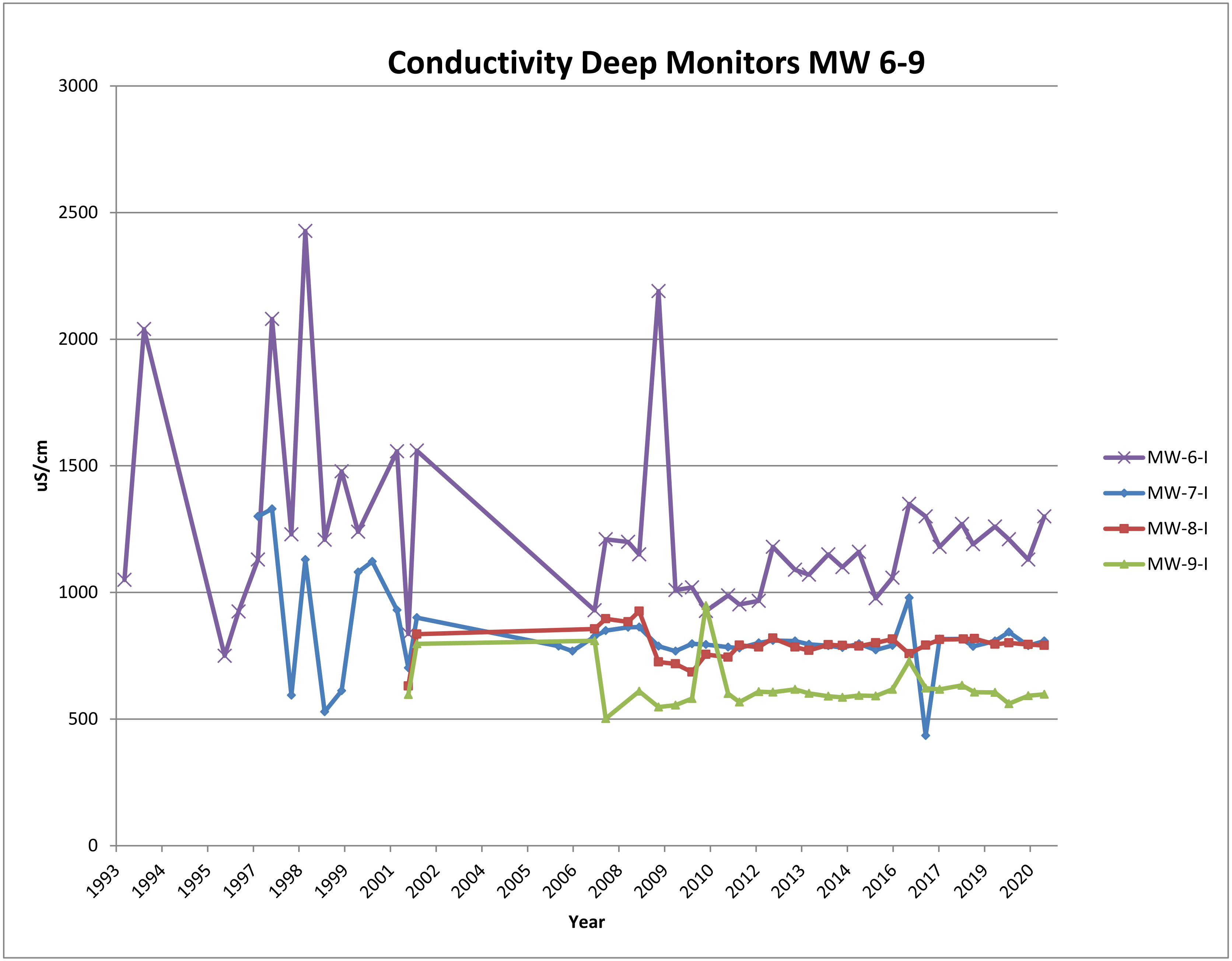
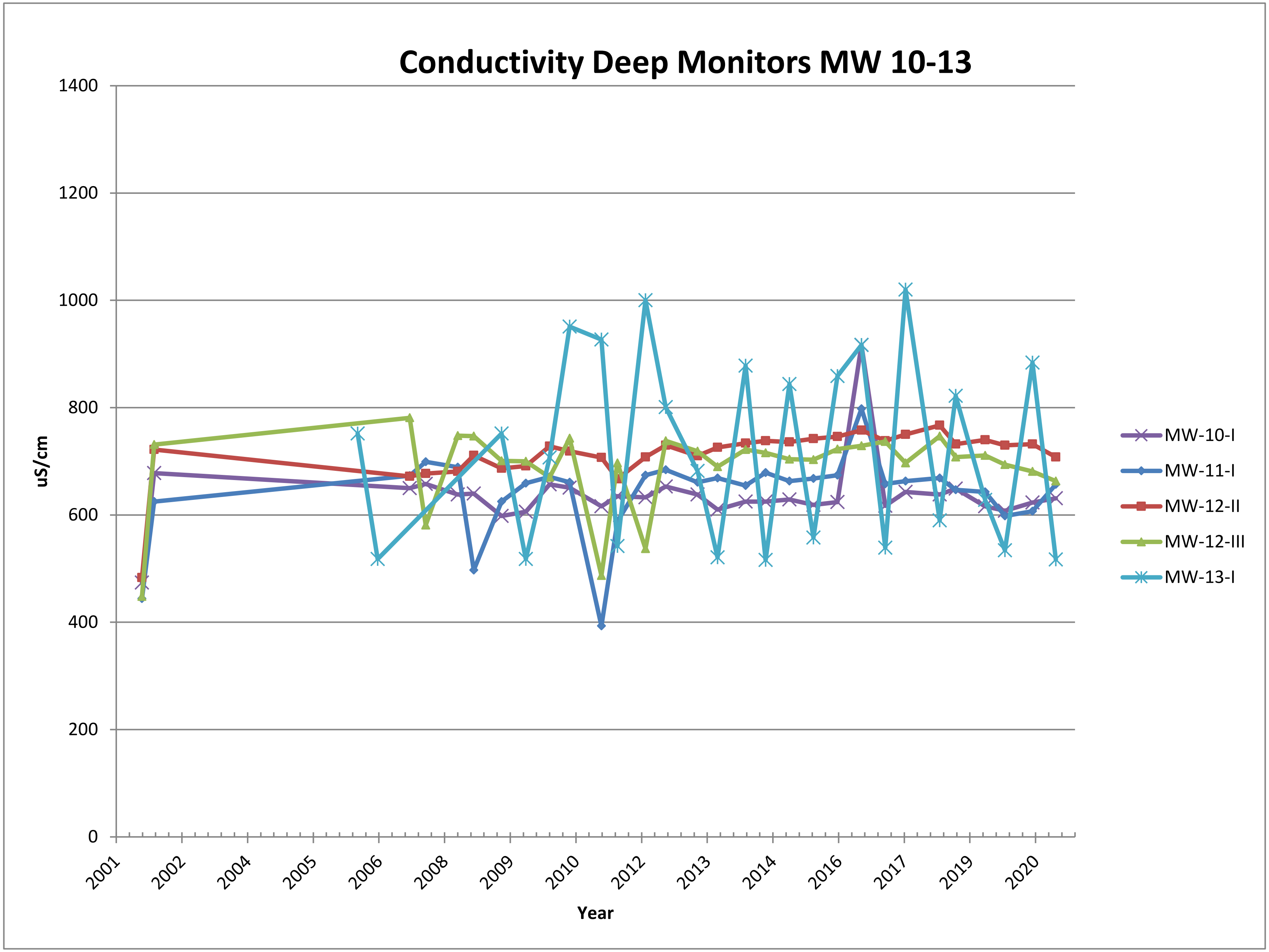
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-6-II
MW-7-II
MW-8-II
MW-9-II

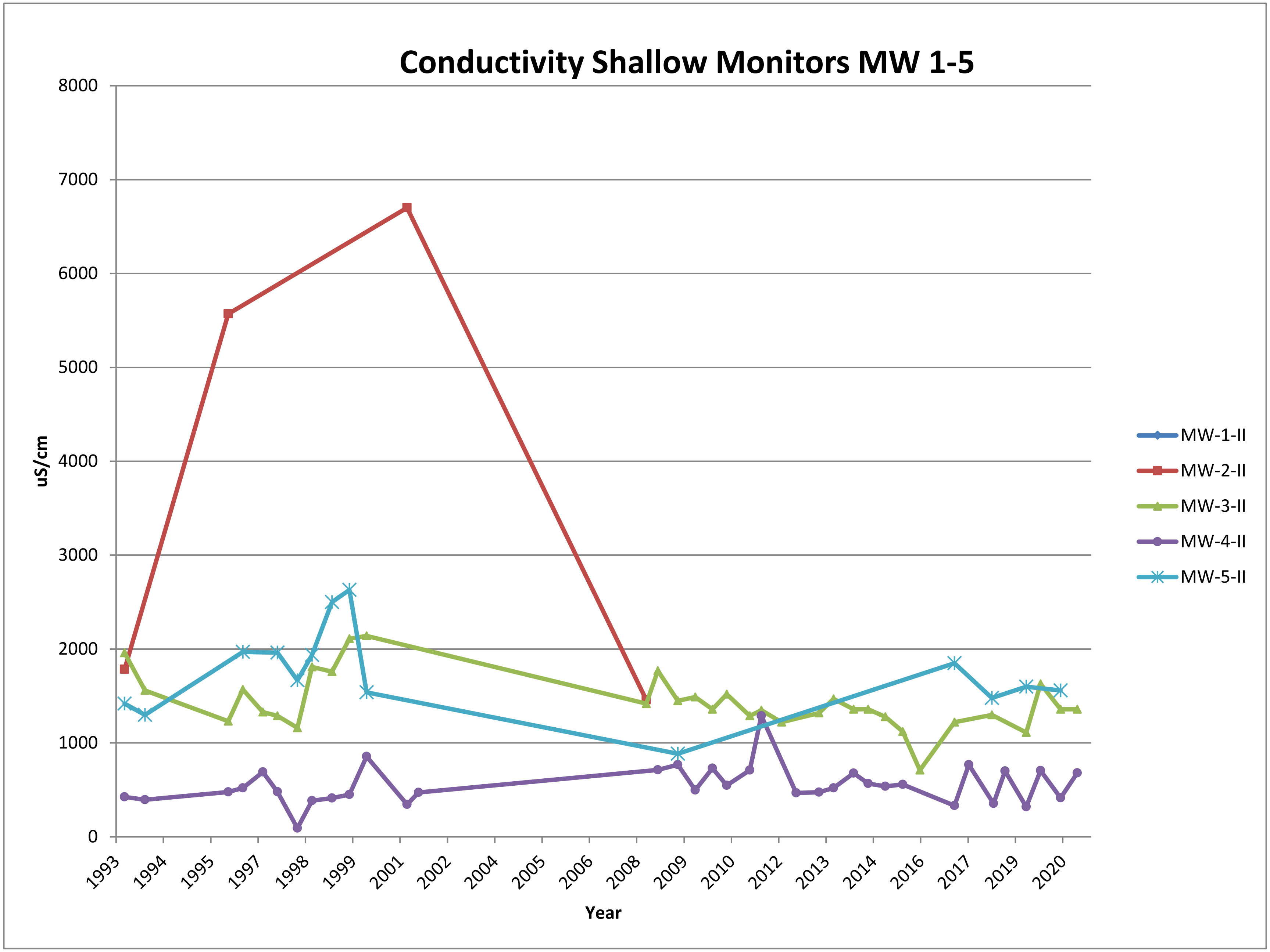

pH Shallow Monitors MW 10-13
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-10-II
MW-11-II
MW-12-I
MW-13-II


Conductivity Deep Monitors MW 1-5
3000
2500
2000
1500
1000
500
0
uS/cm
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-1-I
MW-2-I
MW-3-I
MW-4-I
MW-5-I

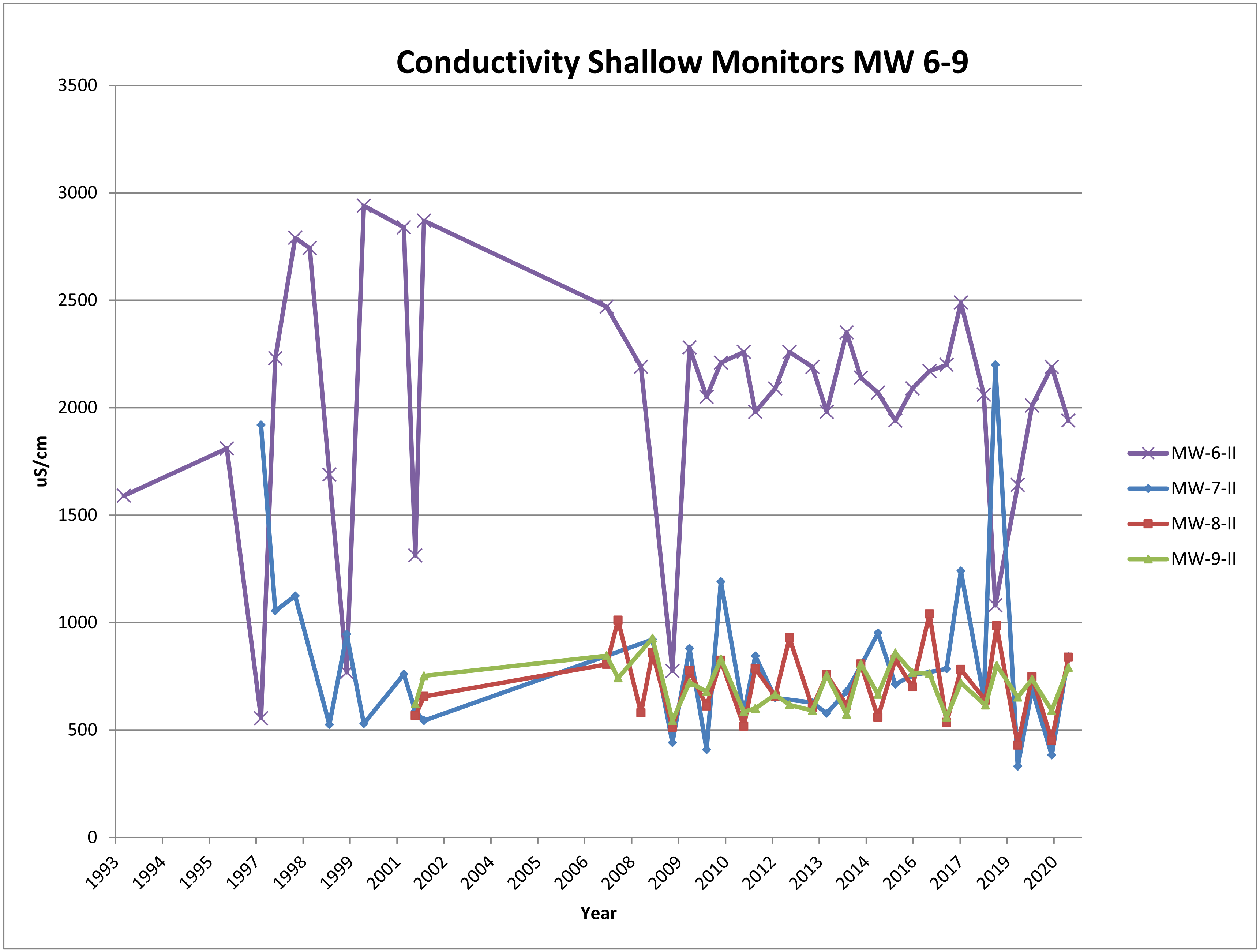

Conductivity Deep Monitors MW 6-9
3000
2500
2000
1500
1000
500
0
uS/cm
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-6-I
MW-7-I
MW-8-I
MW-9-I



Conductivity Deep Monitors MW 10-13
1400
1200
1000
800
600
400
200
0
uS/cm
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-10-I
MW-11-I
MW-12-II
MW-12-III
MW-13-I



Conductivity Shallow Monitors MW 1-5
8000
7000
6000
5000
4000
3000
2000
1000
0
uS/cm
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-1-II
MW-2-II
MW-3-II
MW-4-II
MW-5-II



Conductivity Shallow Monitors MW 6-9
3500
3000
2500
2000
1500
1000
500
0
uS/cm
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
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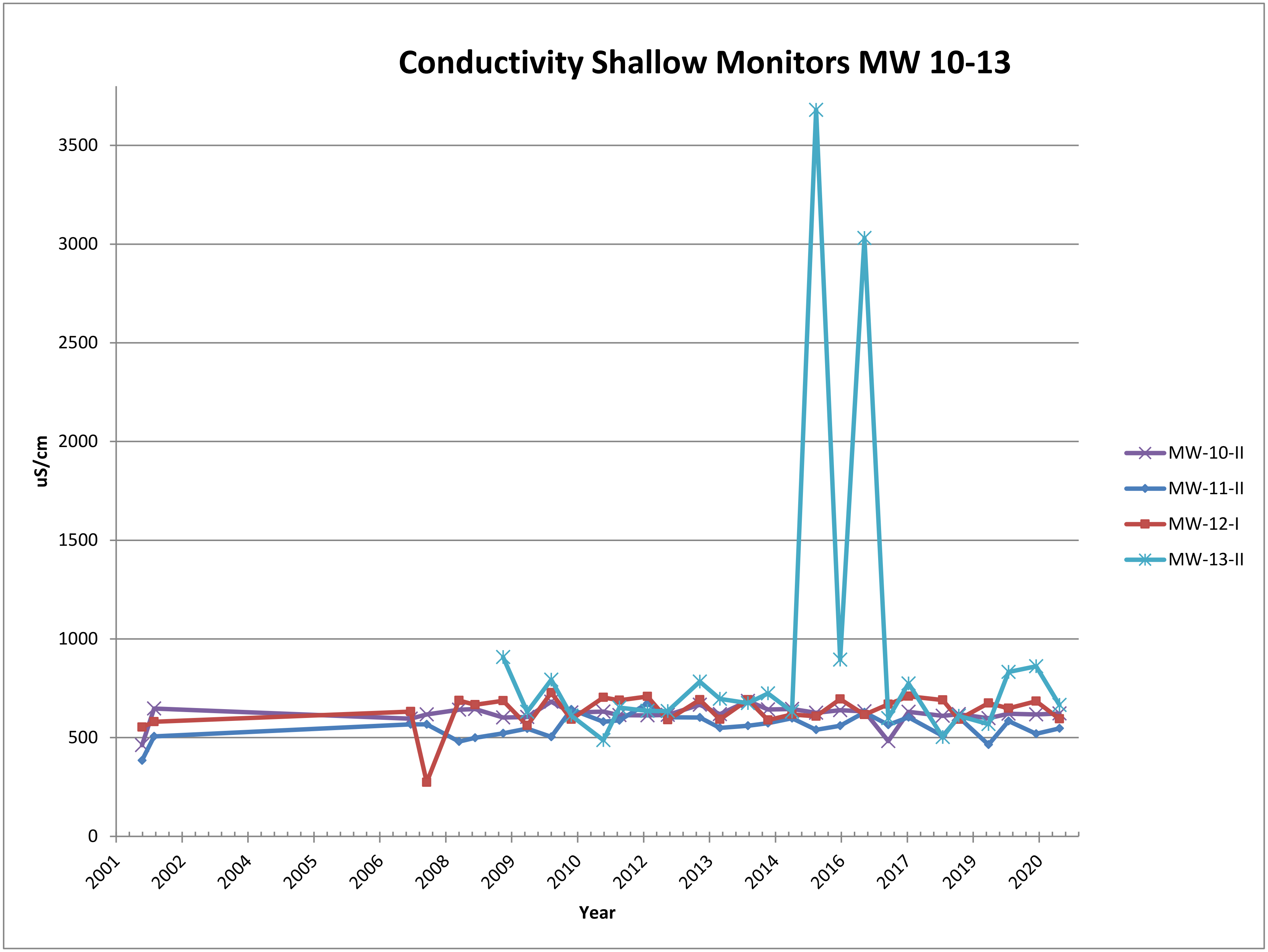
MW-8-II
MW-9-II



Conductivity Shallow Monitors MW 10-13
uS/cm
3500
3000
2500
2000
1500
1000
500
0
2001
2002
2004
2005
2006
2008
2009
2010
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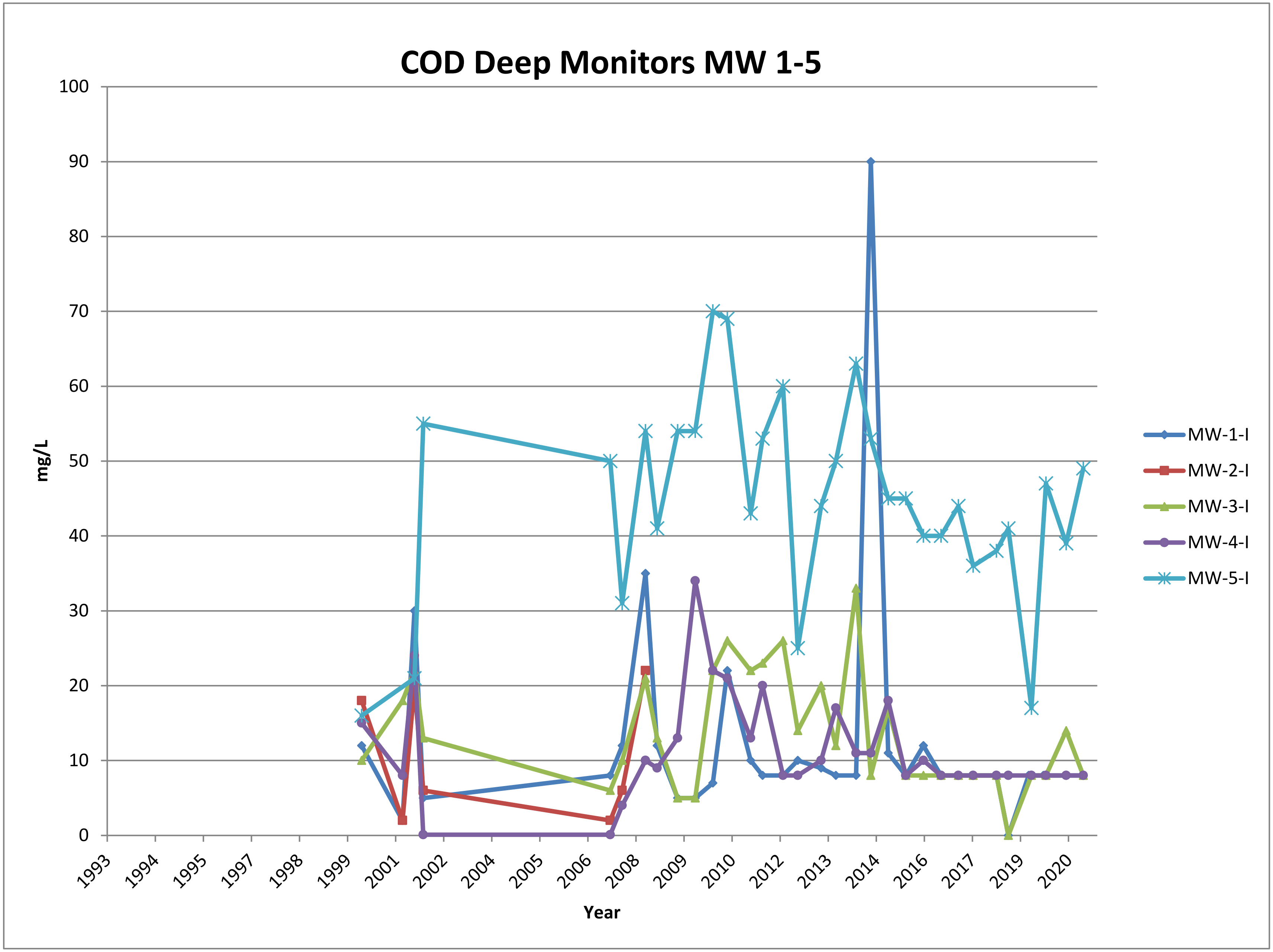
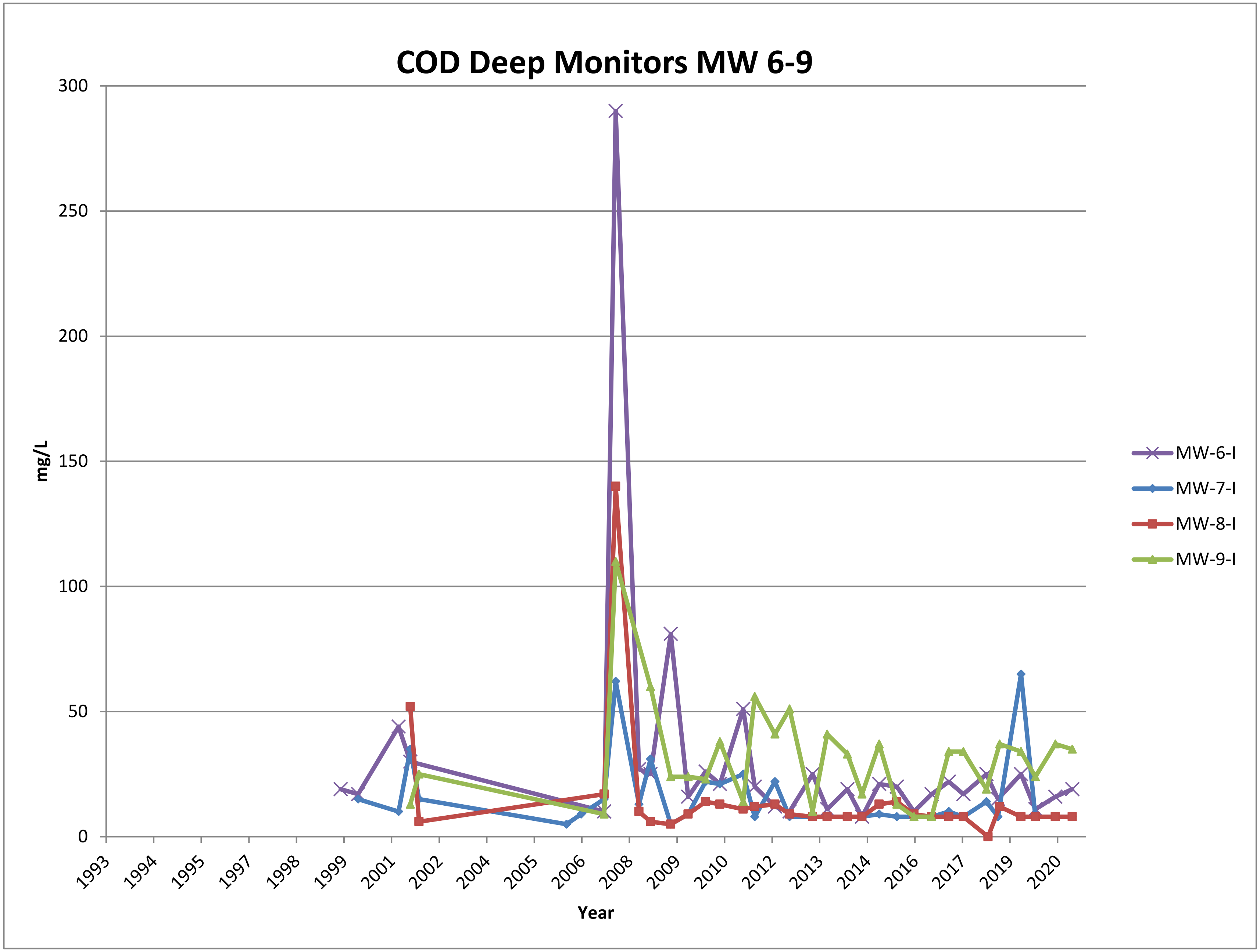
MW-12-I
MW-13-II


COD Deep Monitors MW 1-5
mg/L
100
90
80
70
60
50
40
30
20
10
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-1-I
MW-2-I
MW-3-I
MW-4-I
MW-5-I



COD Deep Monitors MW 6-9
300
250
200
150
100
50
0
mg/L
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
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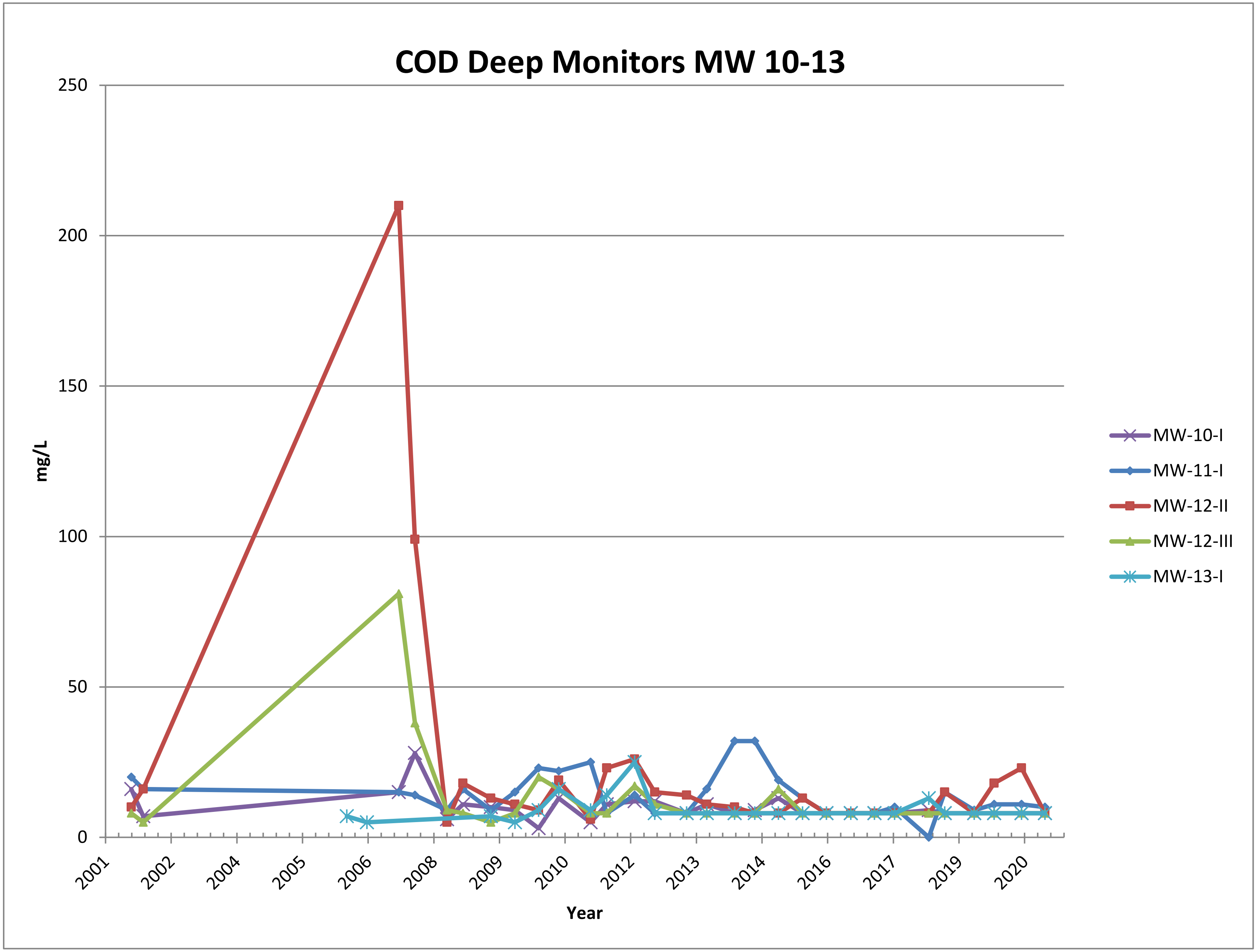
MW-8-I
MW-9-I



COD Deep Monitors MW 10-13
250
200
150
100
50
0
mg/L
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
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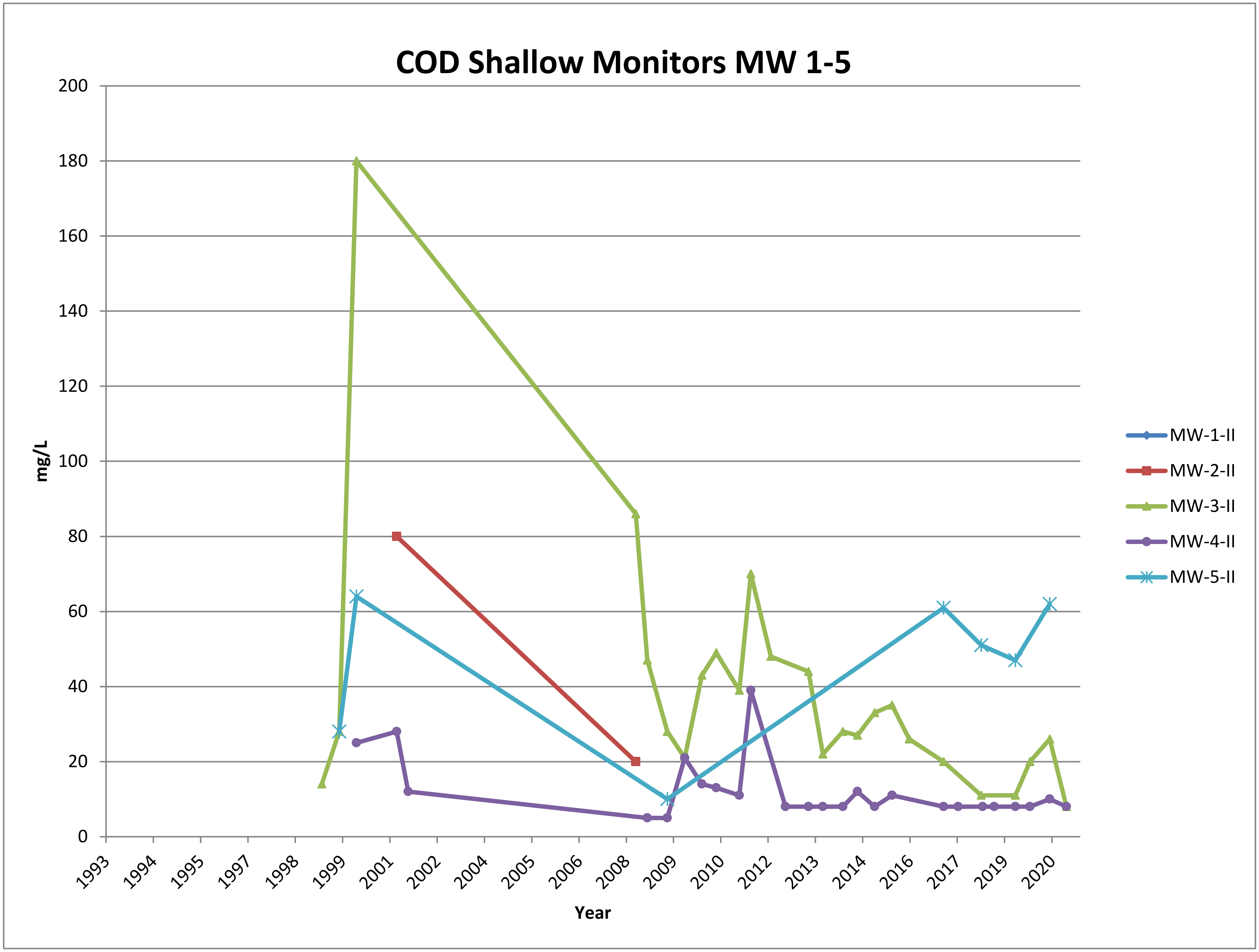
MW-12-III
MW-13-I


COD Shallow Monitors MW 1-5
mg/L
200
180
160
140
120
100
80
60
40
20
0
1993
1994
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1998
1999
2001
2002
2004
2005
2006
2008
2009
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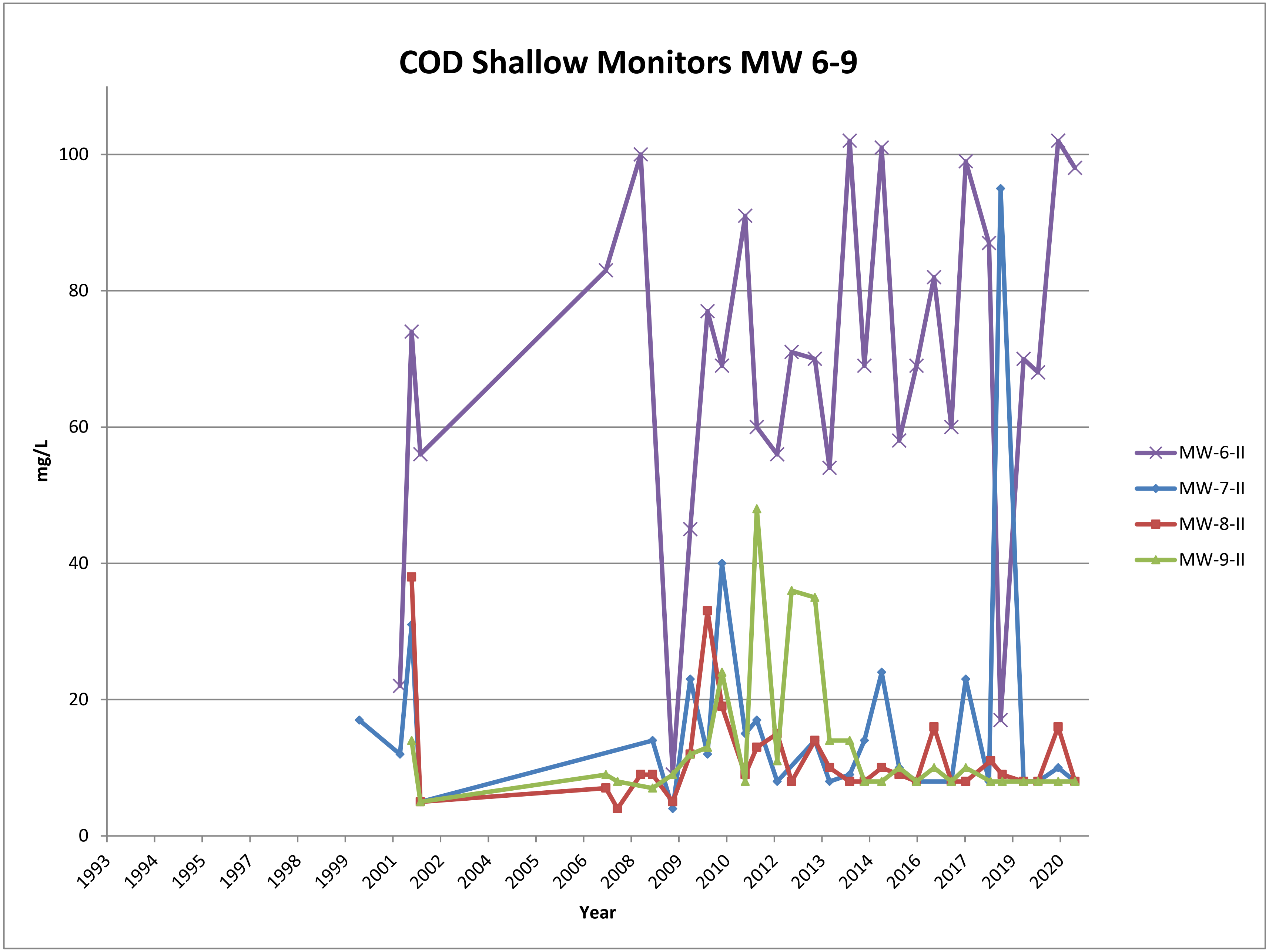
MW-2-II
MW-3-II
MW-4-II
MW-5-II


COD Shallow Monitors MW 6-9
mg/L
100
80
60
40
20
0
1993
1994
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2005
2006
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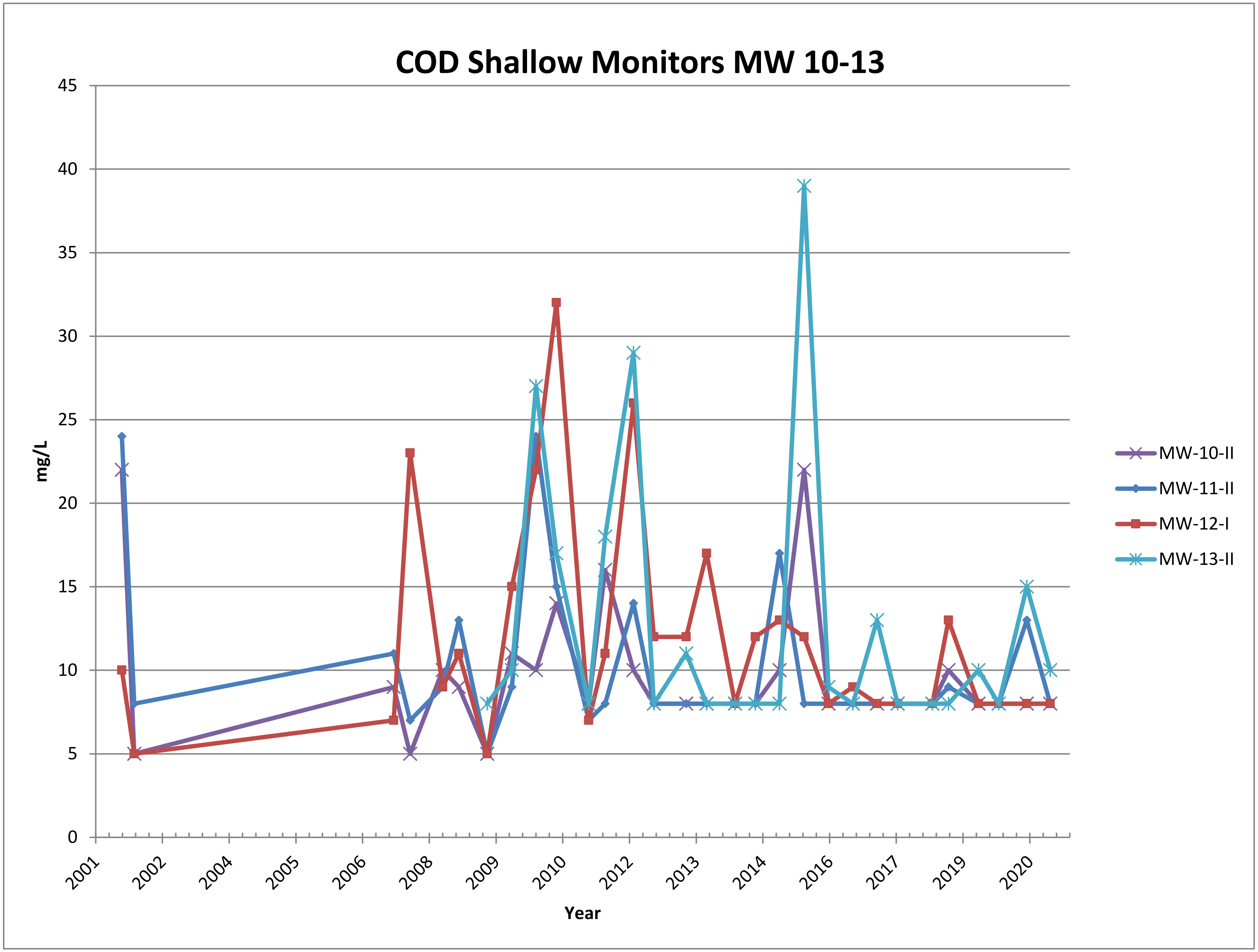
MW-9-II



COD Shallow Monitors MW 10-13
mg/L
0
5
10
15
20
25
30
35
40
45
Year
2001
2002
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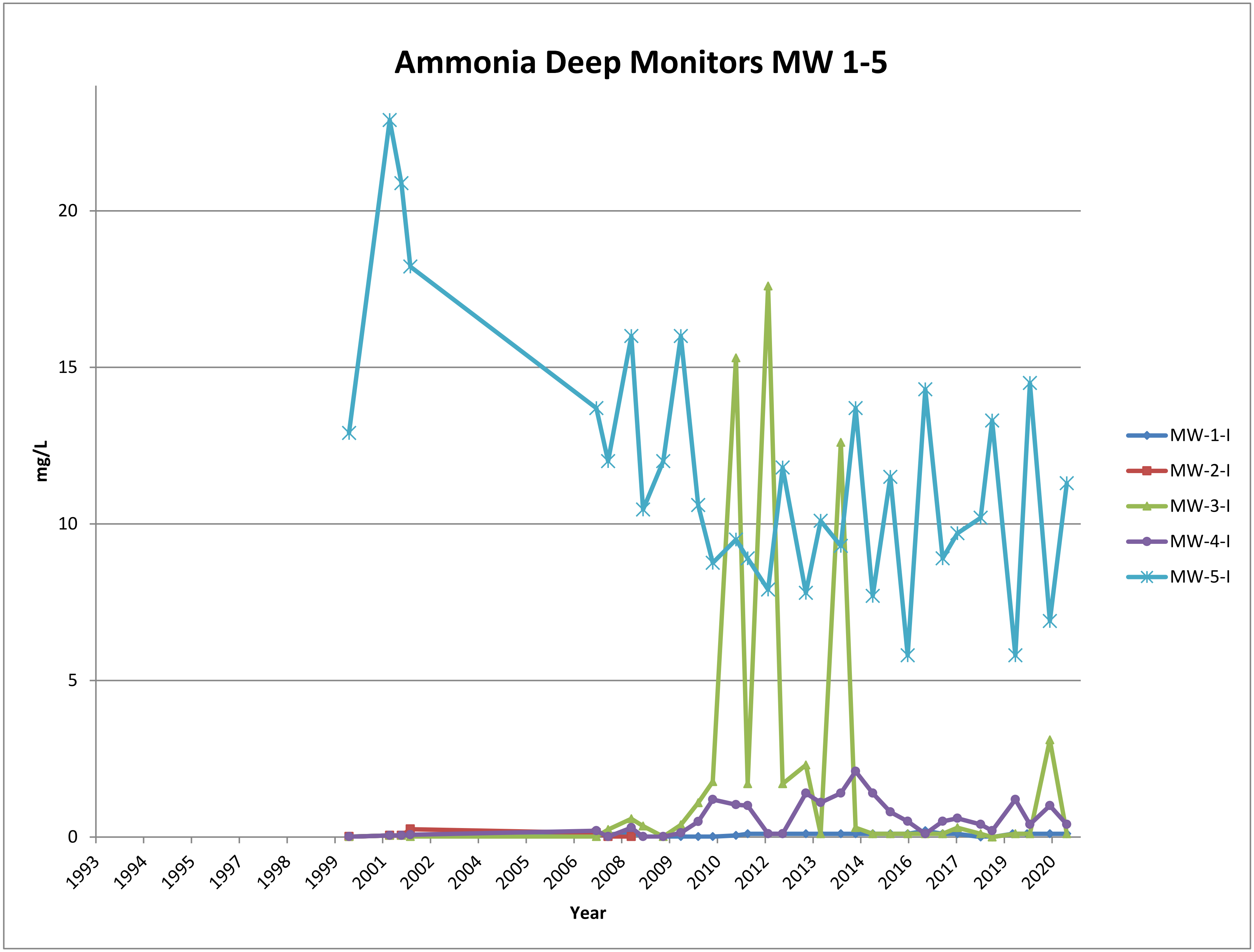

Ammonia Deep Monitors MW 1-5
mg/L
0
5
10
15
20
1993
1994
1995
1997
1998
1999
2001
2002
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2005
2006
2008
2009
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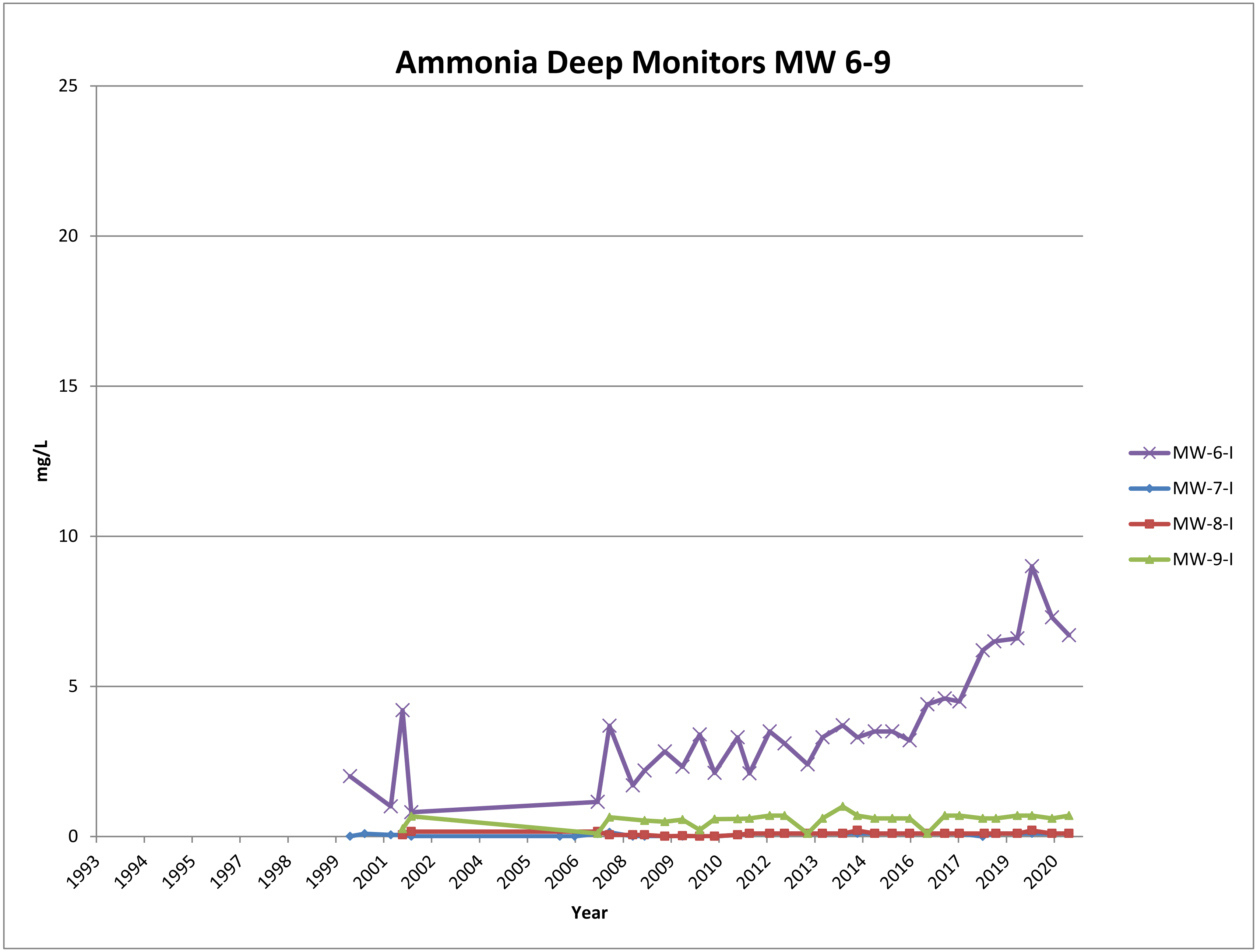
Ammonia Deep Monitors MW 6-9
25
20
15
10
5
0
mg/L
1993
1994
1995
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1998
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2006
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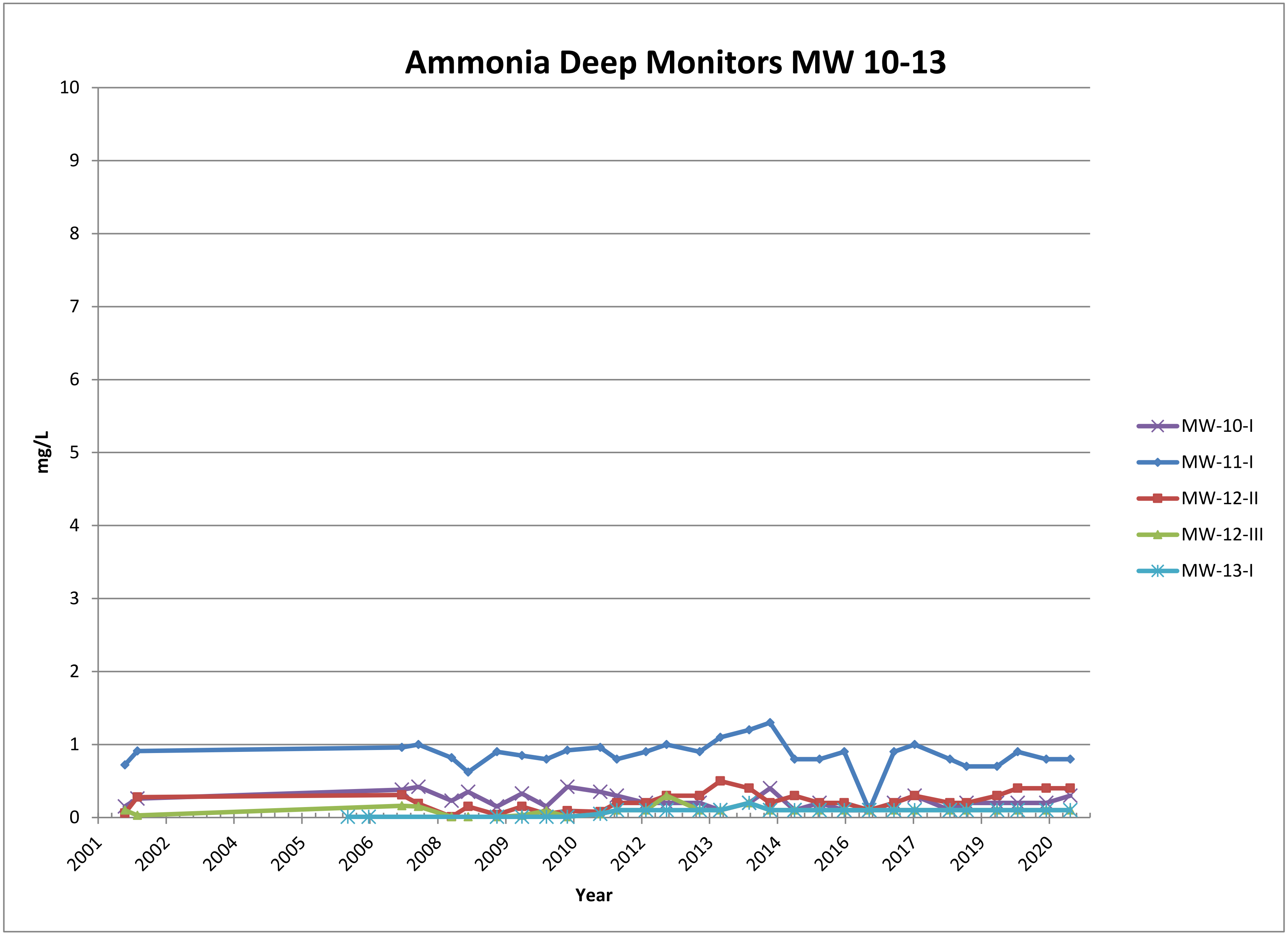
MW-9-I



Ammonia Deep Monitors MW 10-13
10
9
8
7
6
5
4
3
2
1
0
mg/L
2001
2002
2004
2005
2006
2008
2009
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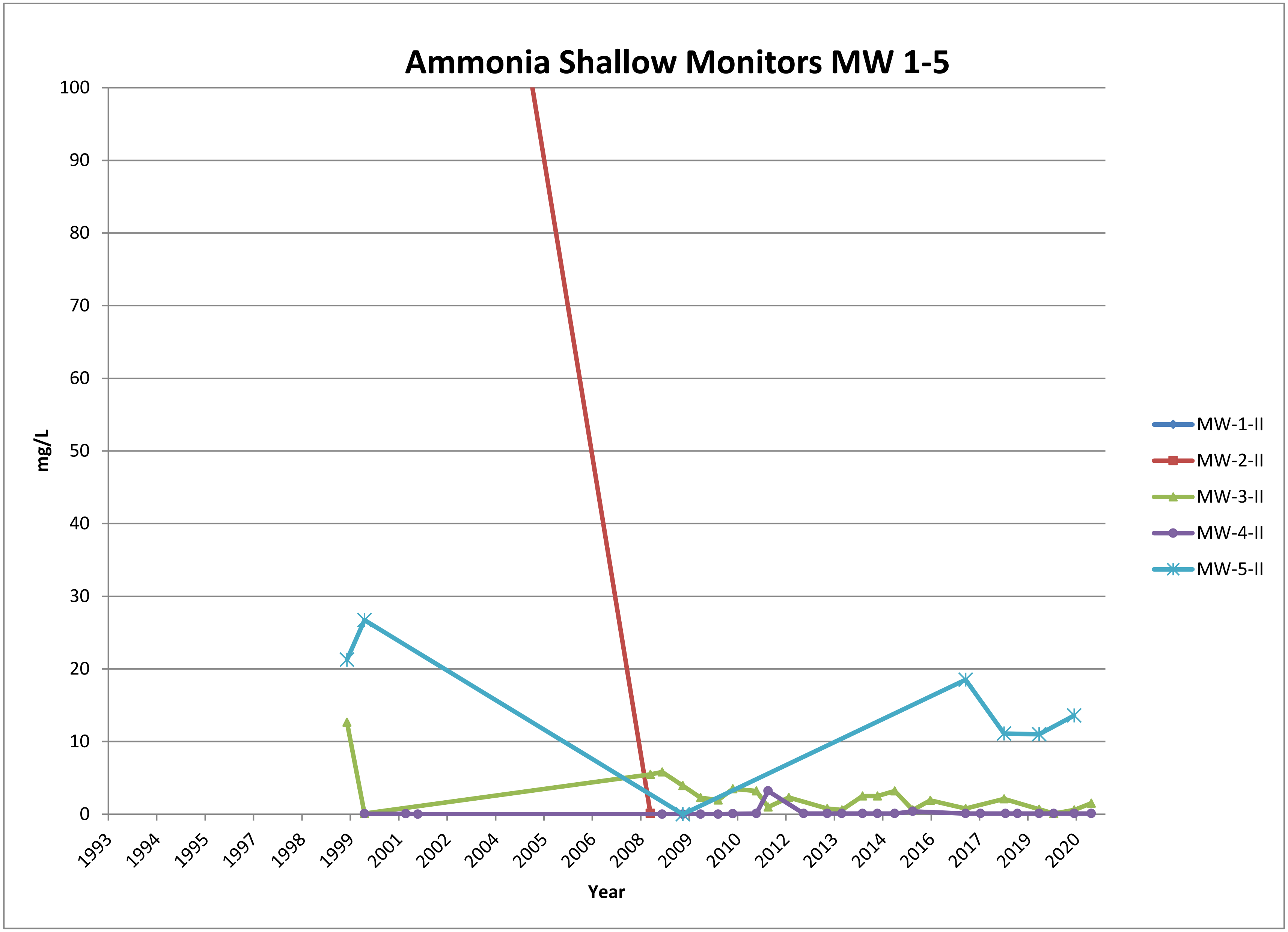
MW-13-I



Ammonia Shallow Monitors MW 1-5
100
90
80
70
60
50
40
30
20
10
0
mg/L
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
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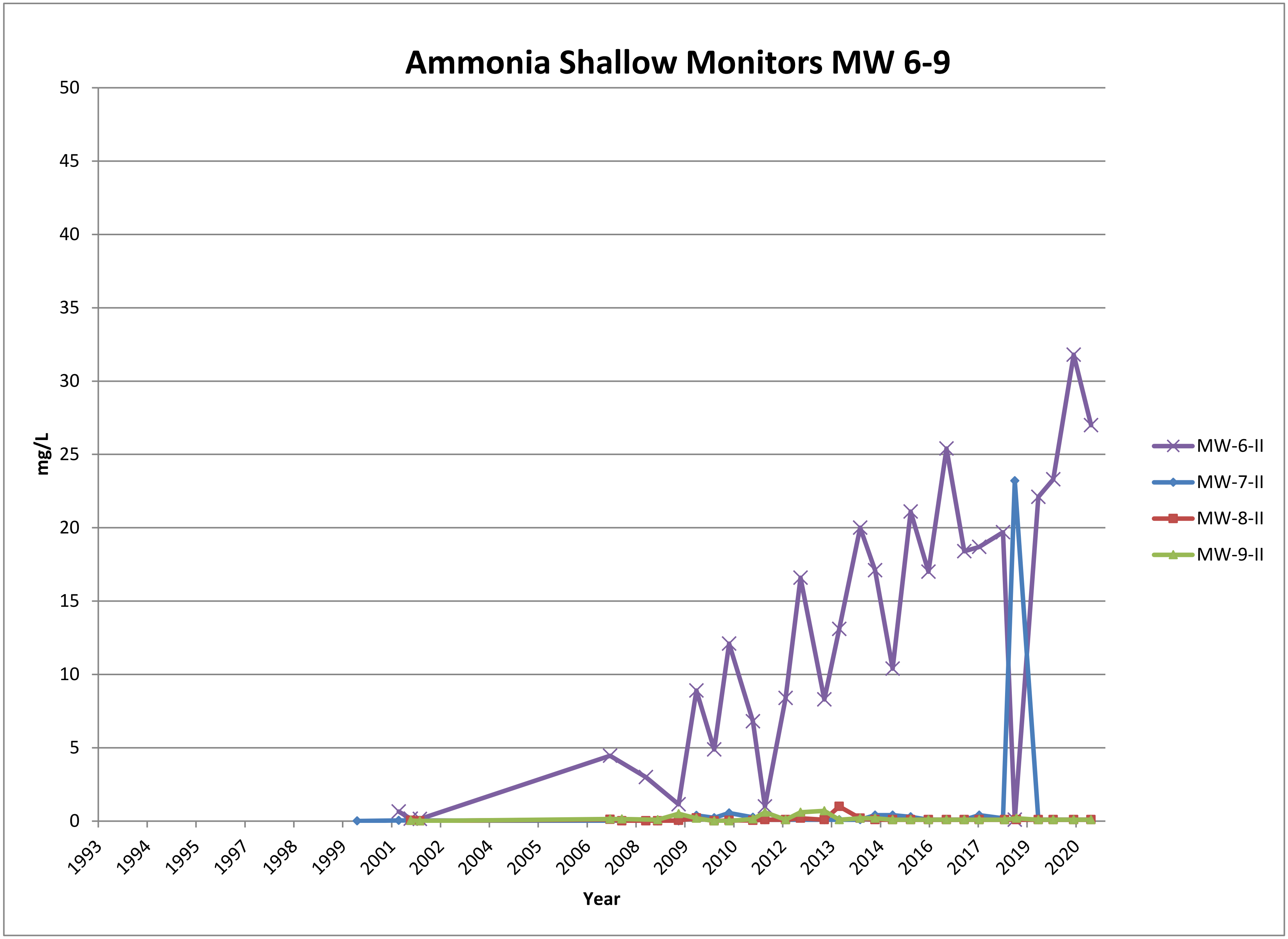
Ammonia Shallow Monitors MW 6-9
mg/L
50
45
40
35
30
25
20
15
10
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0
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1994
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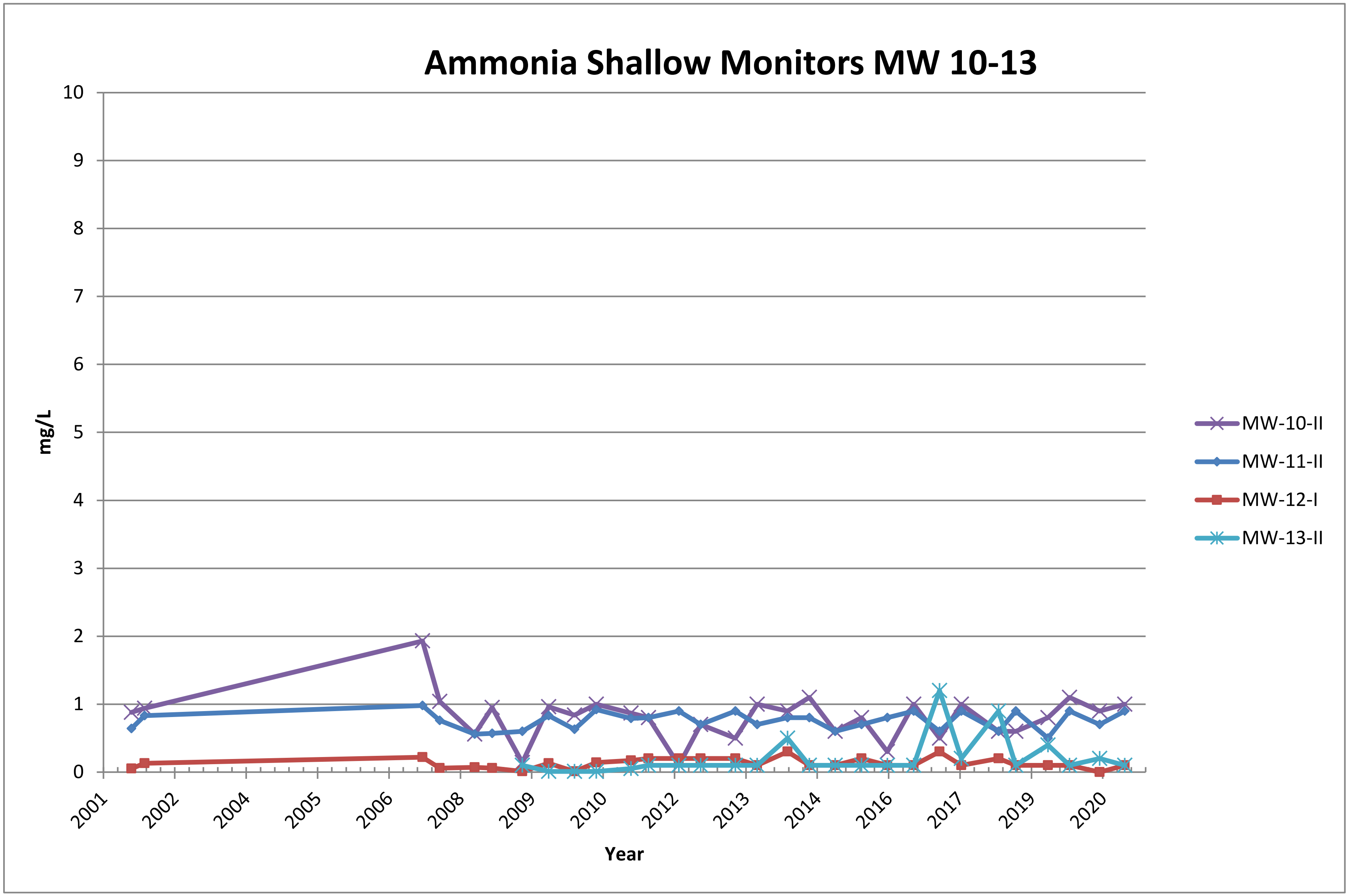

Ammonia Shallow Monitors MW 10-13
10
9
8
7
6
5
4
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2
1
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mg/L
2001
2002
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2006
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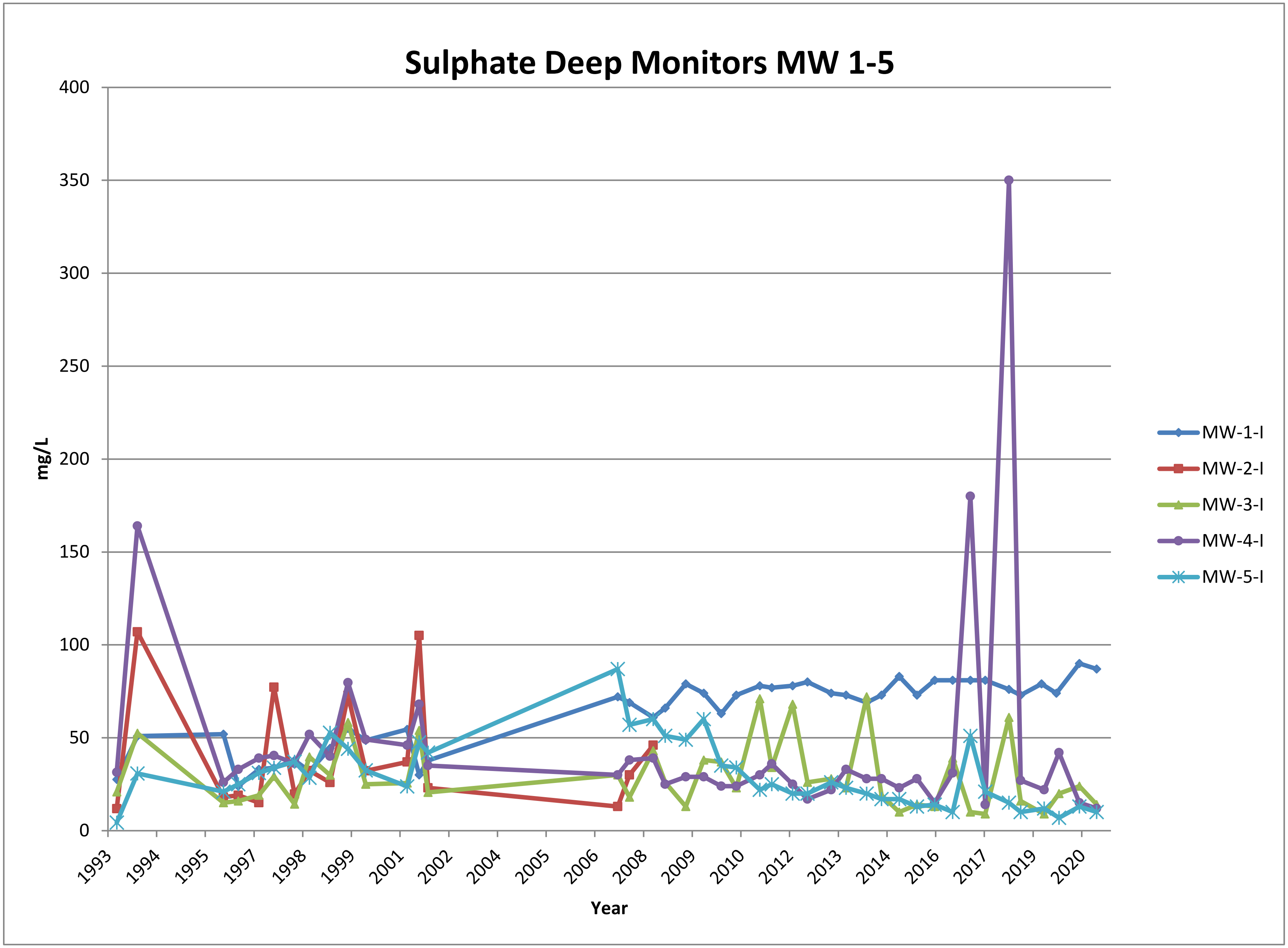
MW-13-II



Sulphate Deep Monitors MW 1-5
400
350
300
250
200
150
100
50
0
mg/L
1993
1994
1995
1997
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1999
2001
2002
2004
2005
2006
2008
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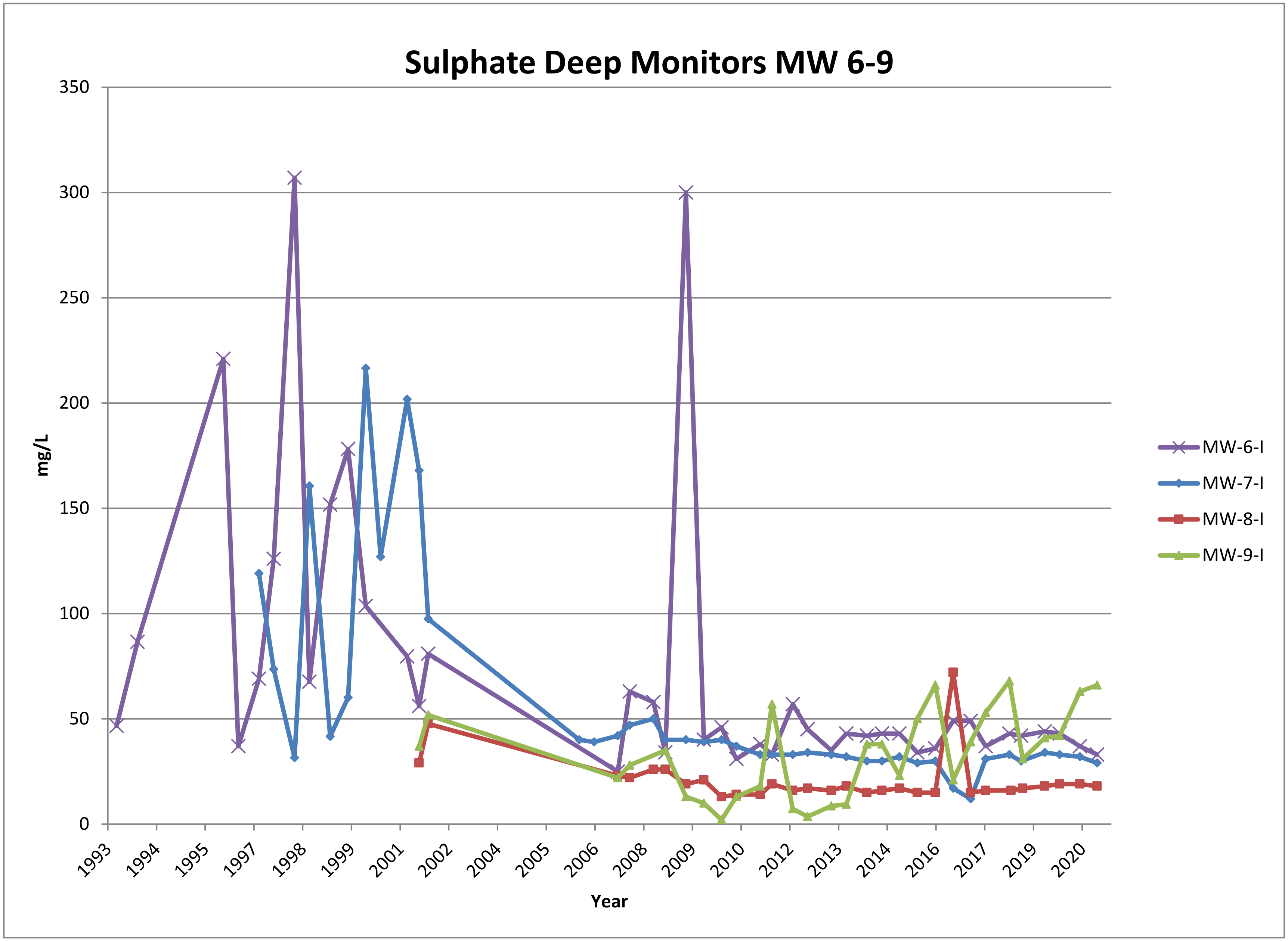
MW-5-I



Sulphate Deep Monitors MW 6-9
350
300
250
200
150
100
50
0
mg/L
1993
1994
1995
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2001
2002
2004
2005
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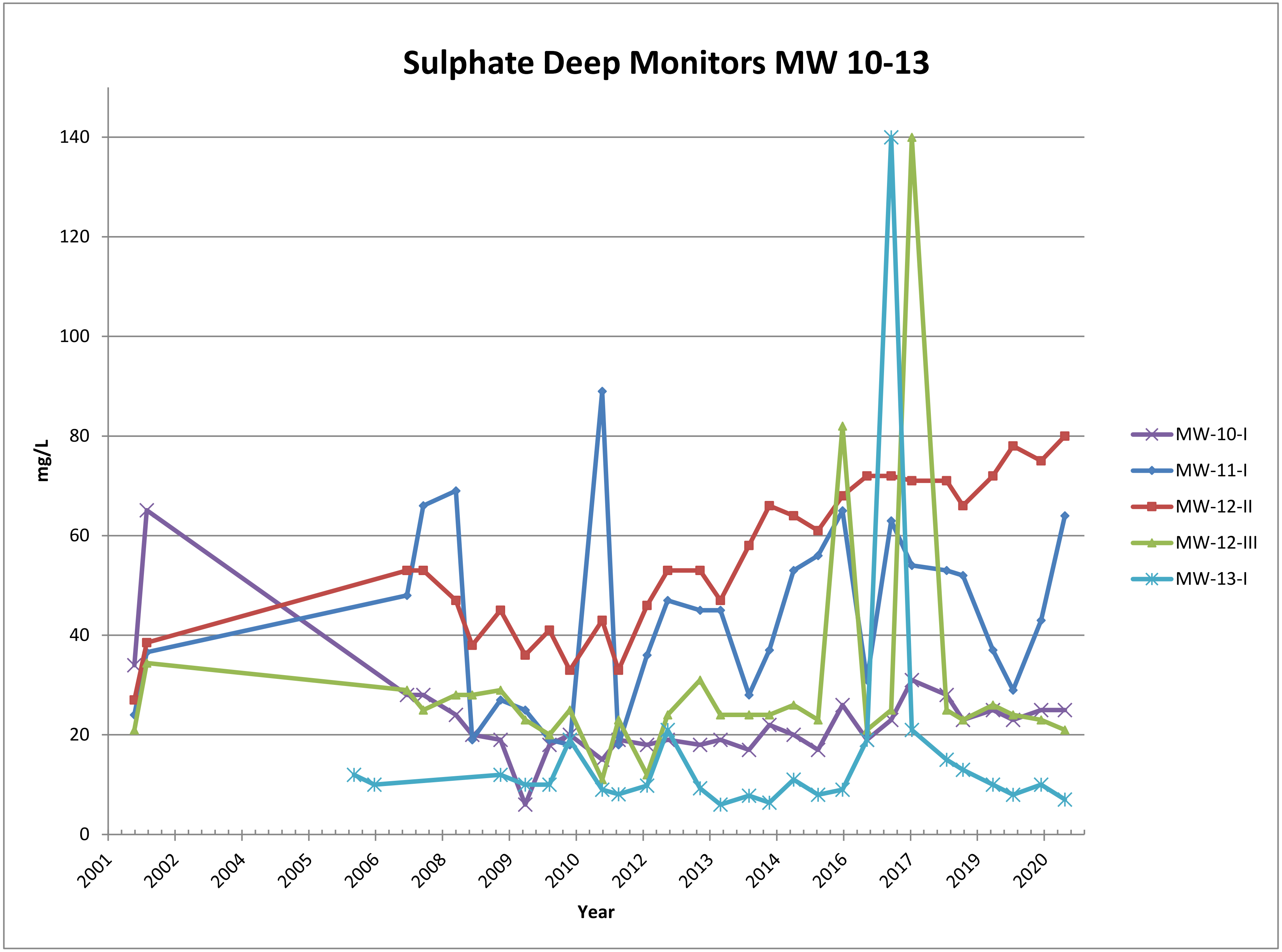
MW-8-I
MW-9-I


Sulphate Deep Monitors MW 10-13
mg/L
0
20
40
60
80
100
120
140
2001
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2004
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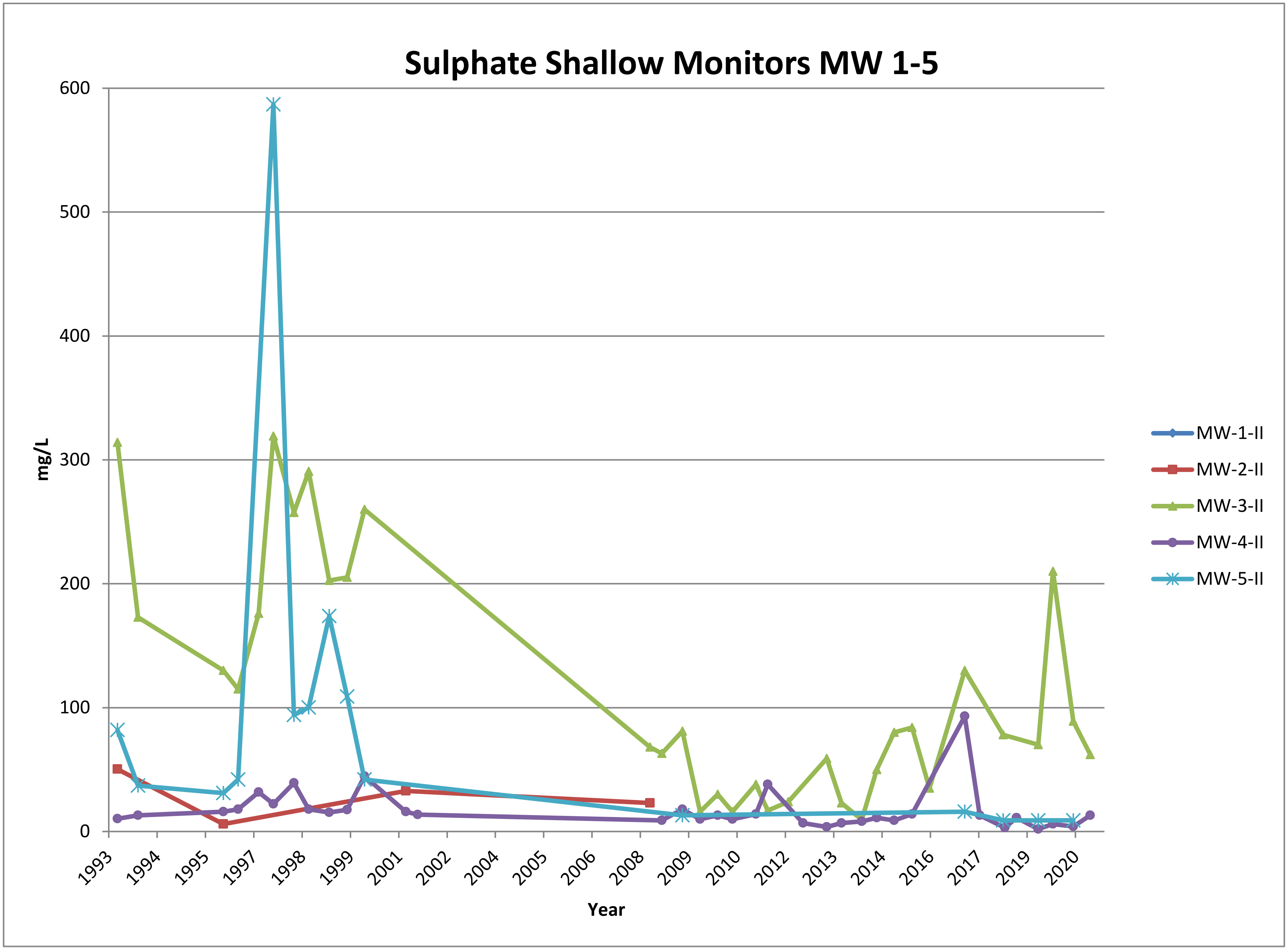
MW-12-III
MW-13-I



Sulphate Shallow Monitors MW 1-5
mg/L
600
500
400
300
200
100
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1993
1994
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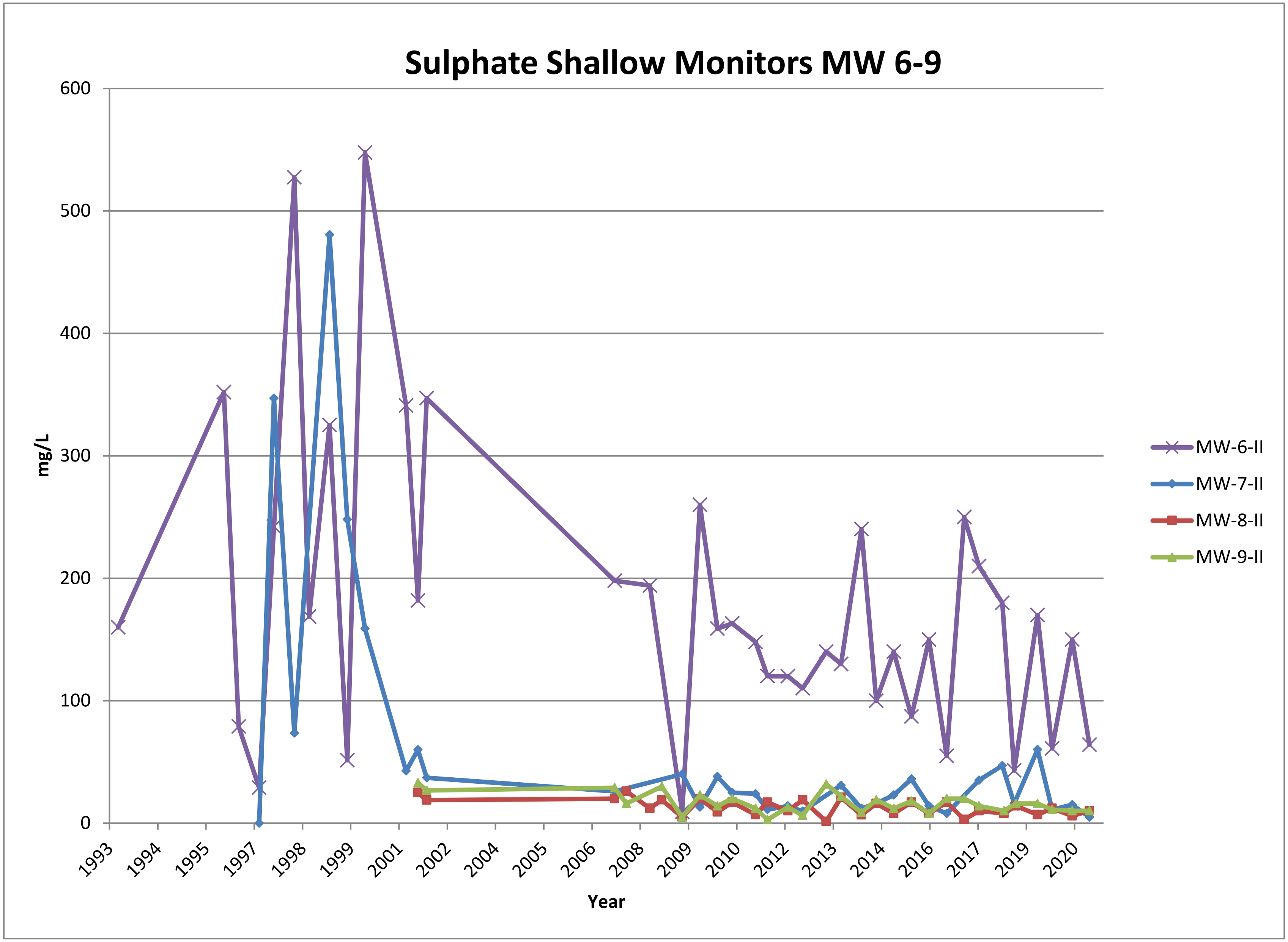

Sulphate Shallow Monitors MW 6-9
600
500
400
300
200
100
0
mg/L
1993
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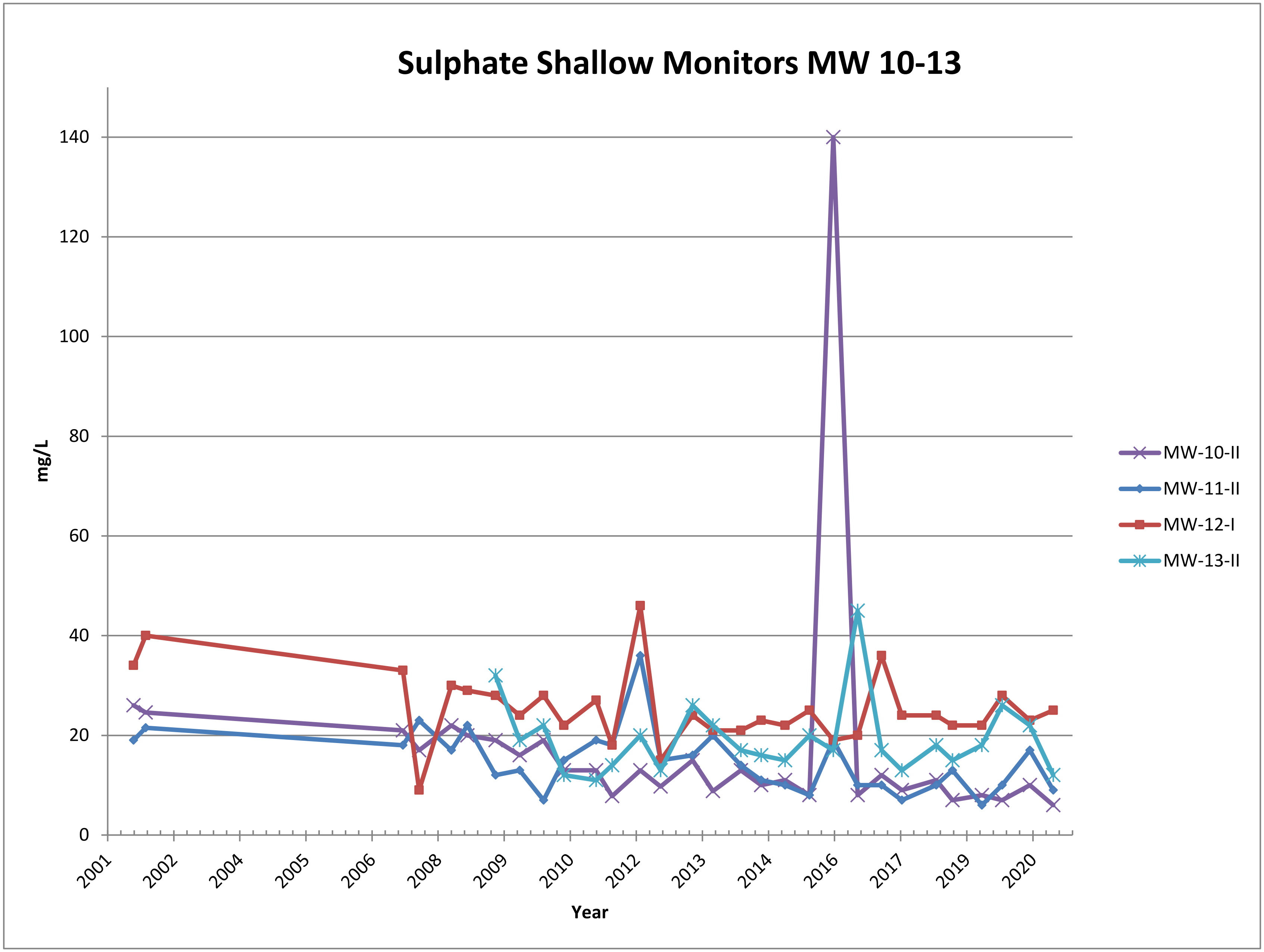

Sulphate Shallow Monitors MW 10-13
mg/L
140
120
100
80
60
40
20
0
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2002
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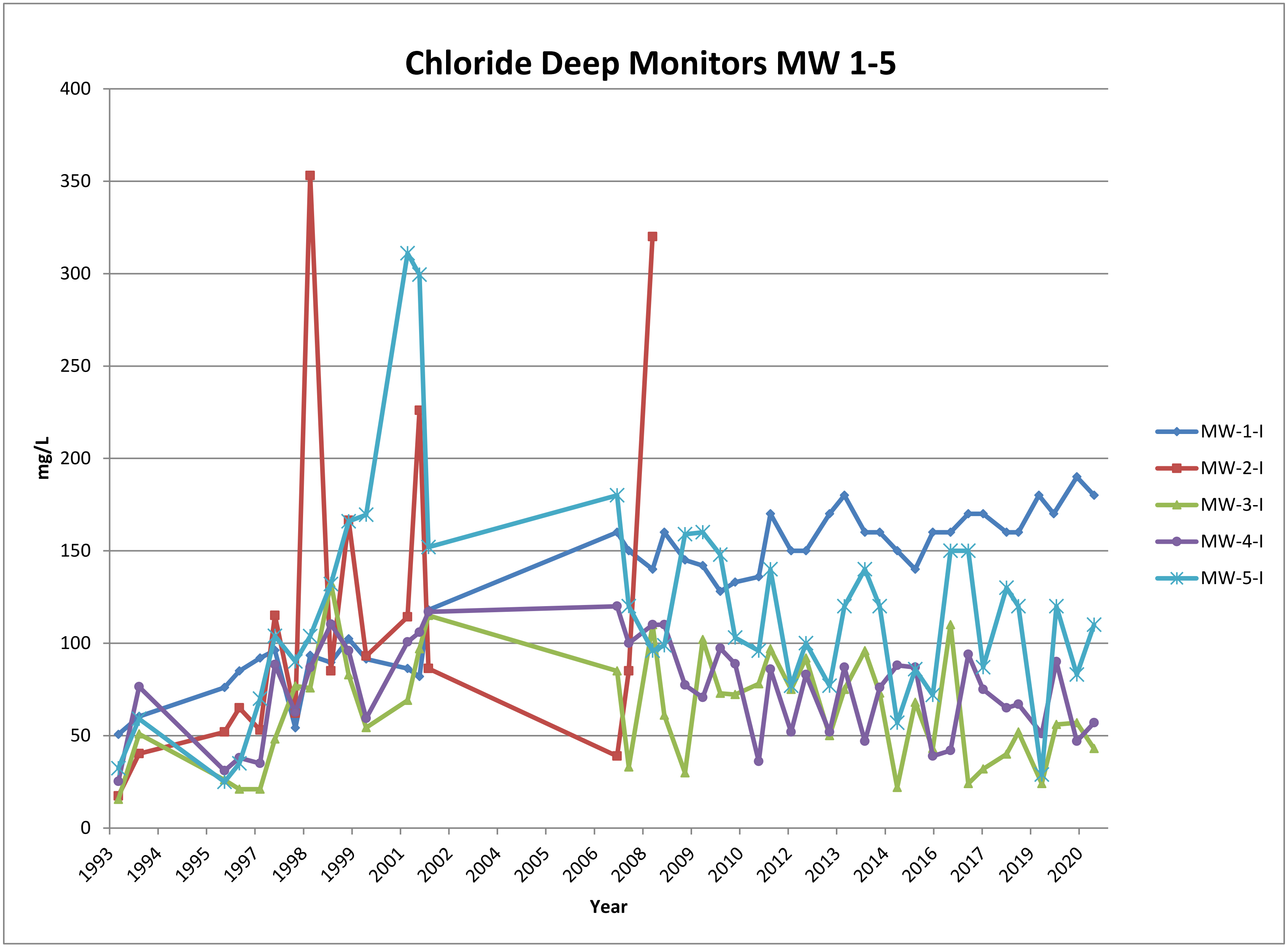

Chloride Deep Monitors MW 1-5
mg/L
400
350
300
250
200
150
100
50
0
1993
1994
1995
1997
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1999
2001
2002
2004
2005
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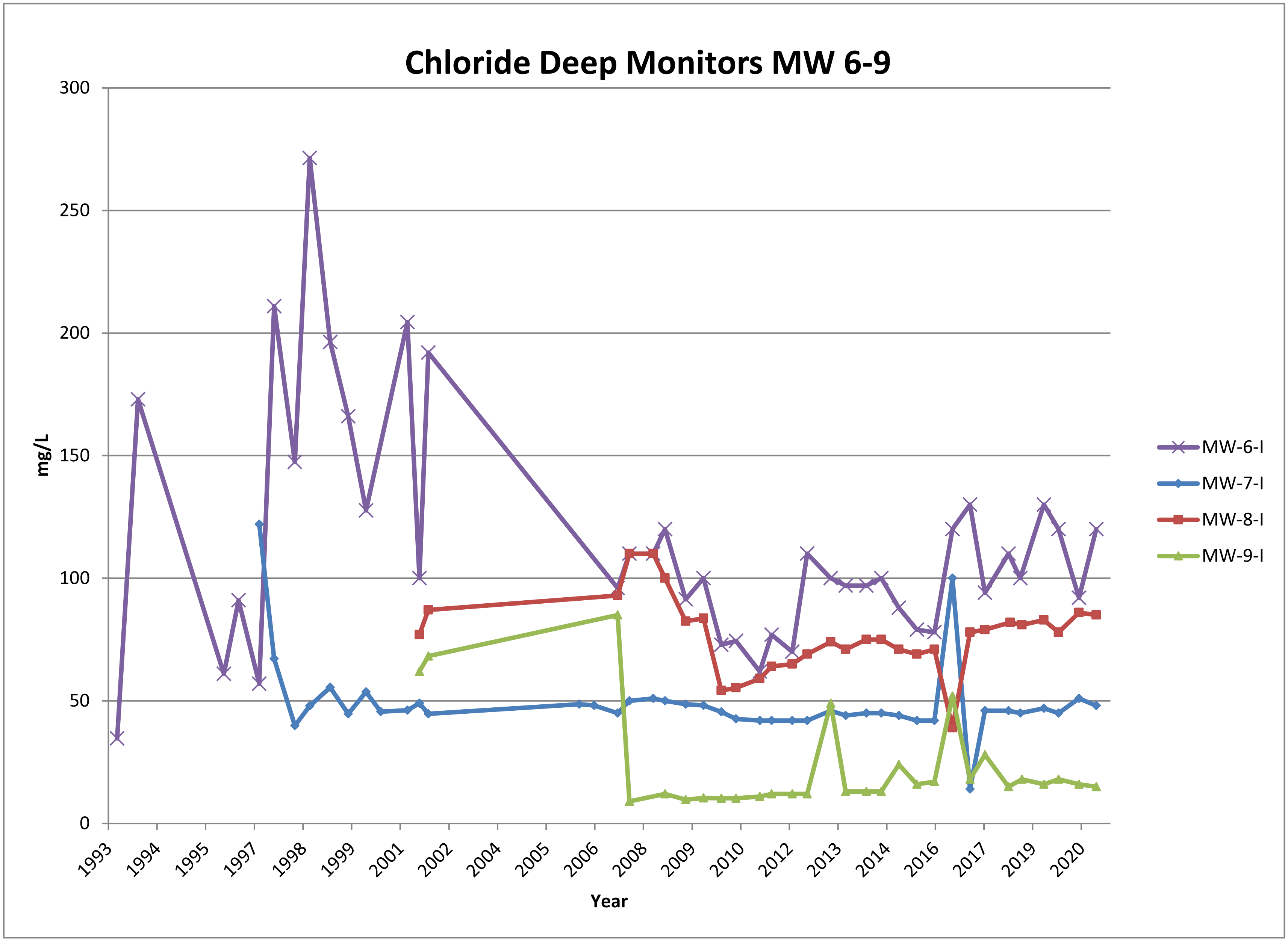

Chloride Deep Monitors MW 6-9
300
250
200
150
100
50
0
mg/L
1993
1994
1995
1997
1998
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2004
2005
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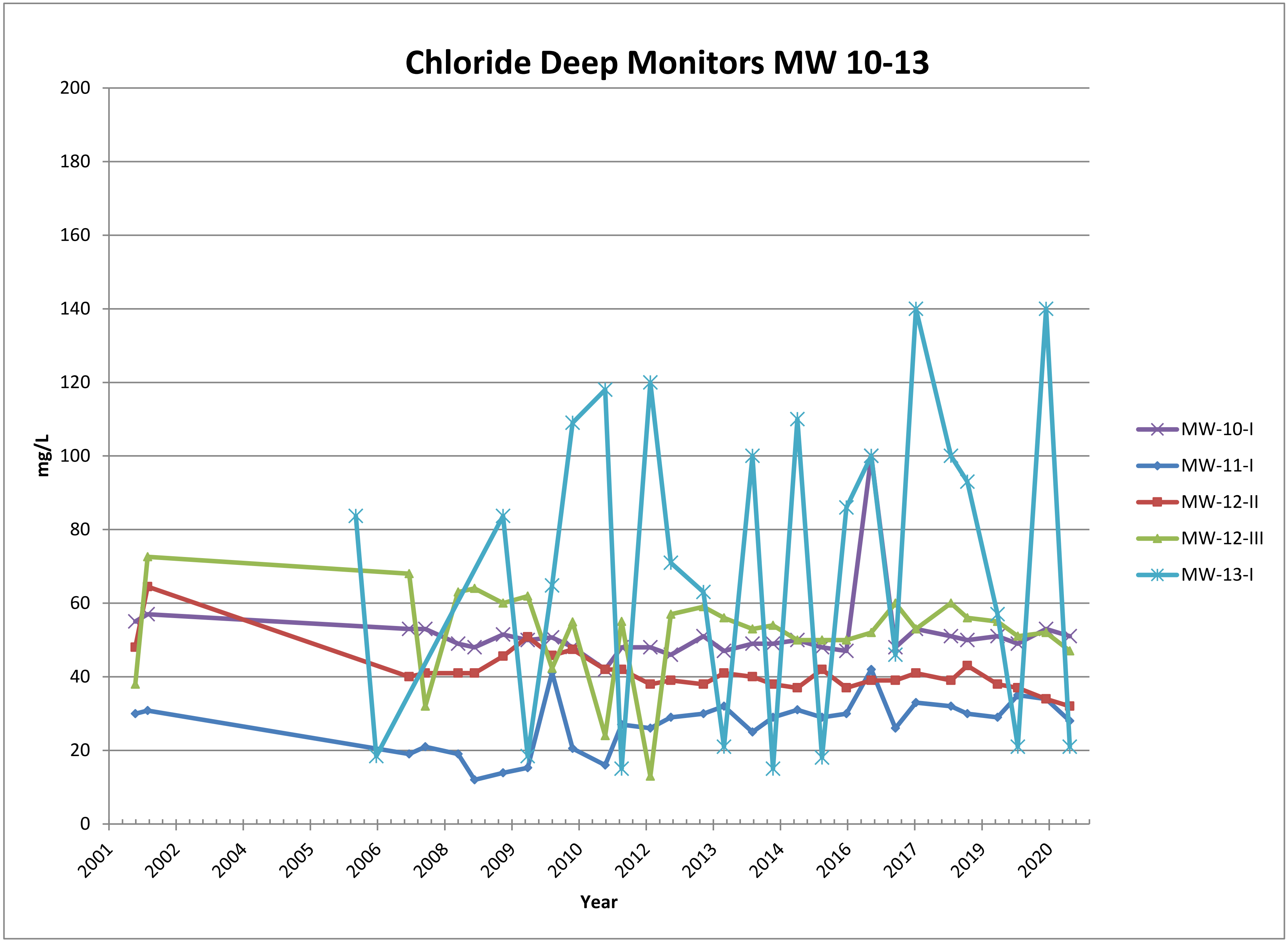
MW-9-I



Chloride Deep Monitors MW 10-13
mg/L
200
180
160
140
120
100
80
60
40
20
0
2001
2002
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2008
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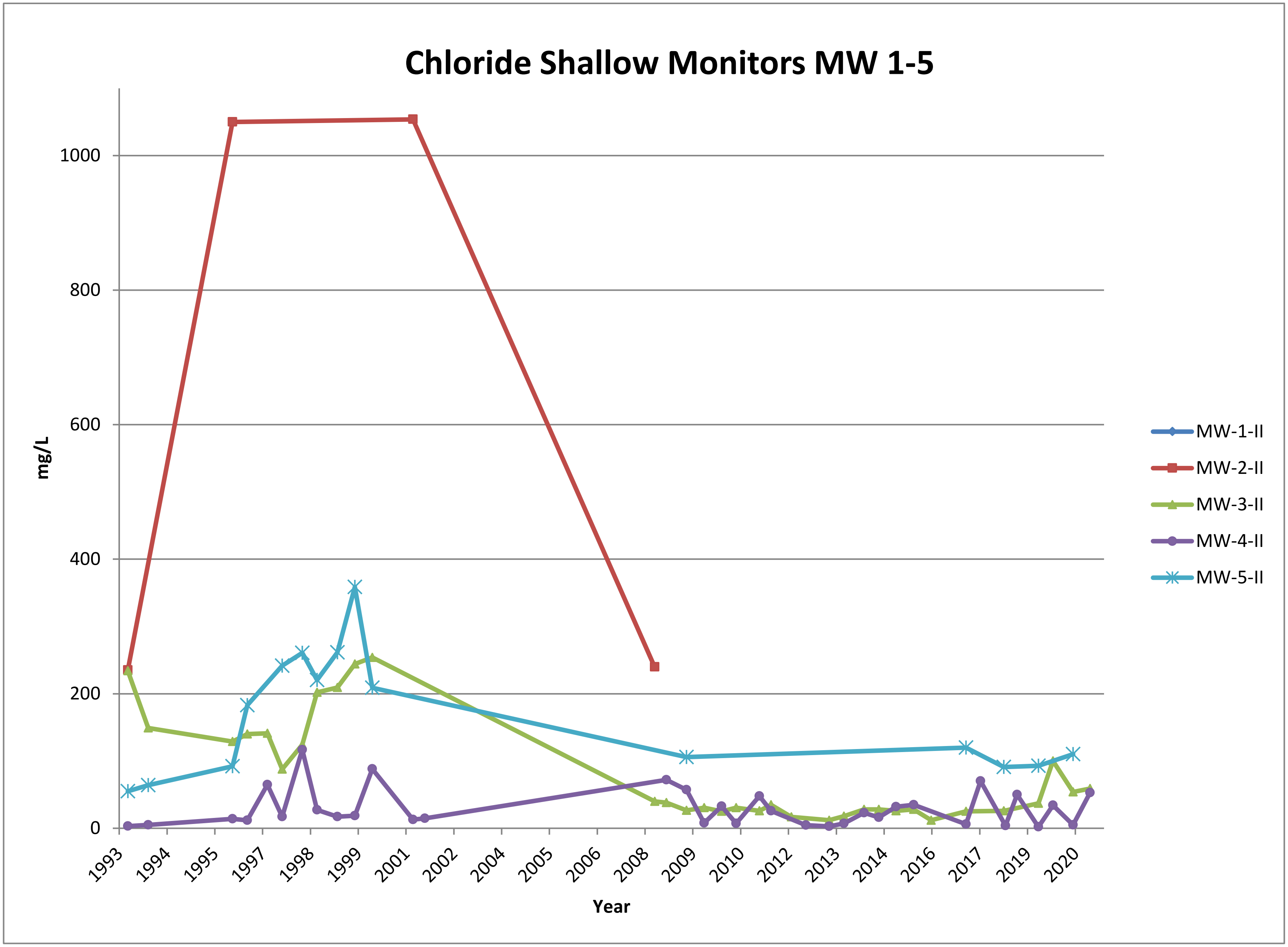

Chloride Shallow Monitors MW 1-5
mg/L
0
200
400
600
800
1000
1993
1994
1995
1997
1998
1999
2001
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2004
2005
2006
2008
2009
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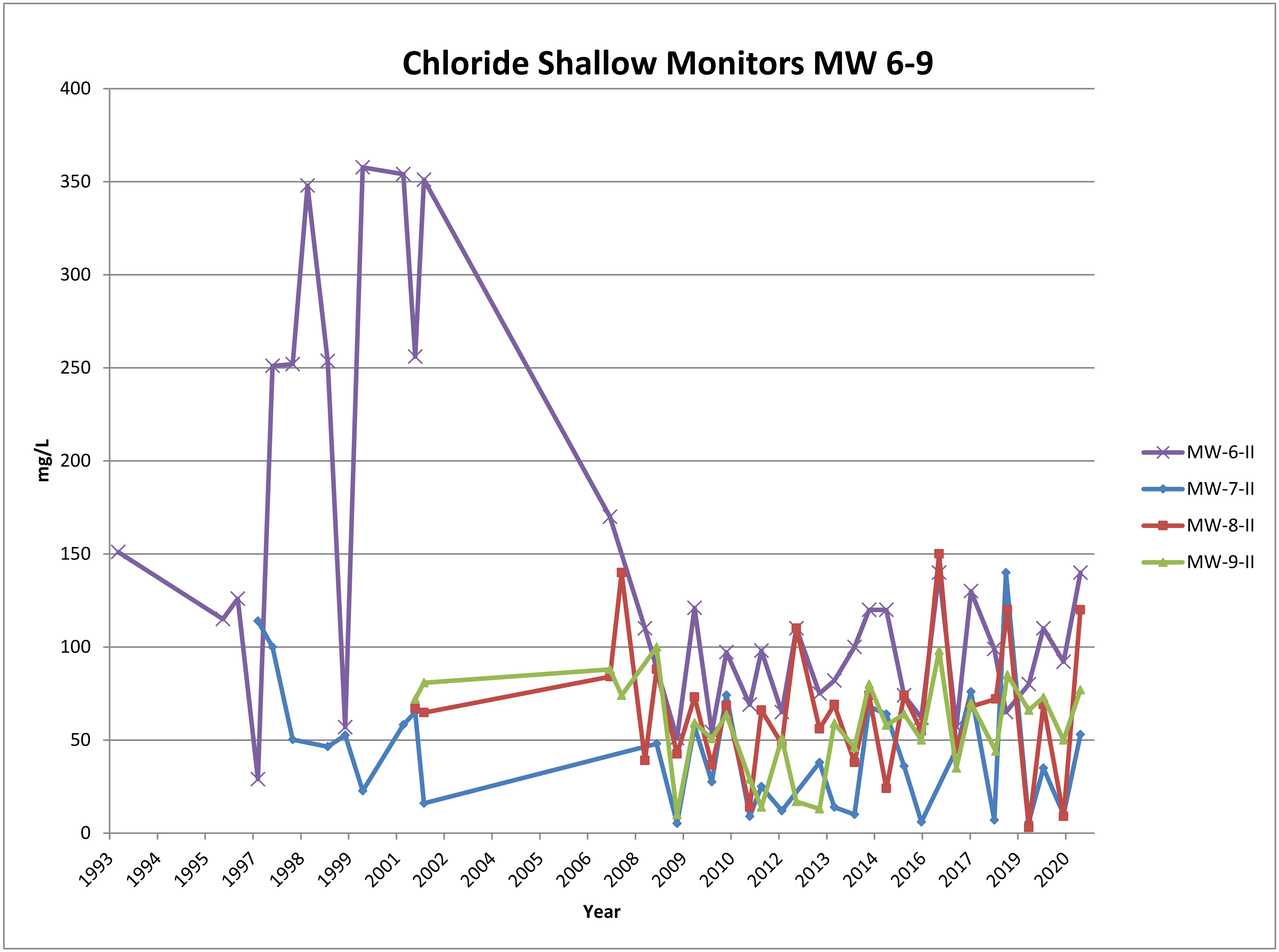
Chloride Shallow Monitors MW 6-9
mg/L
Year
400
350
300
250
200
150
100
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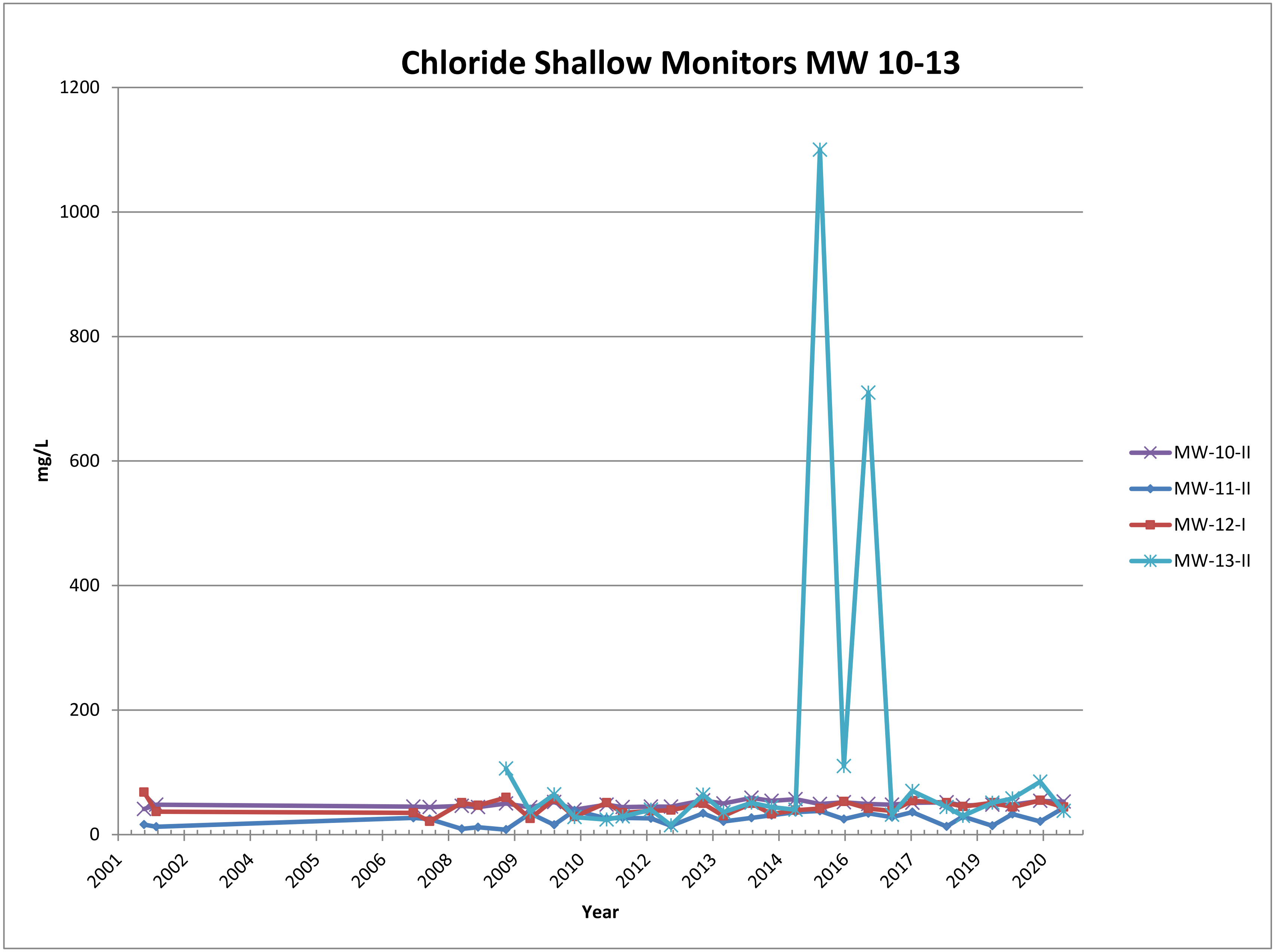
Chloride Shallow Monitors MW 10-13
mg/L
Year
0
200
400
600
800
1000
1200
2001
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2004
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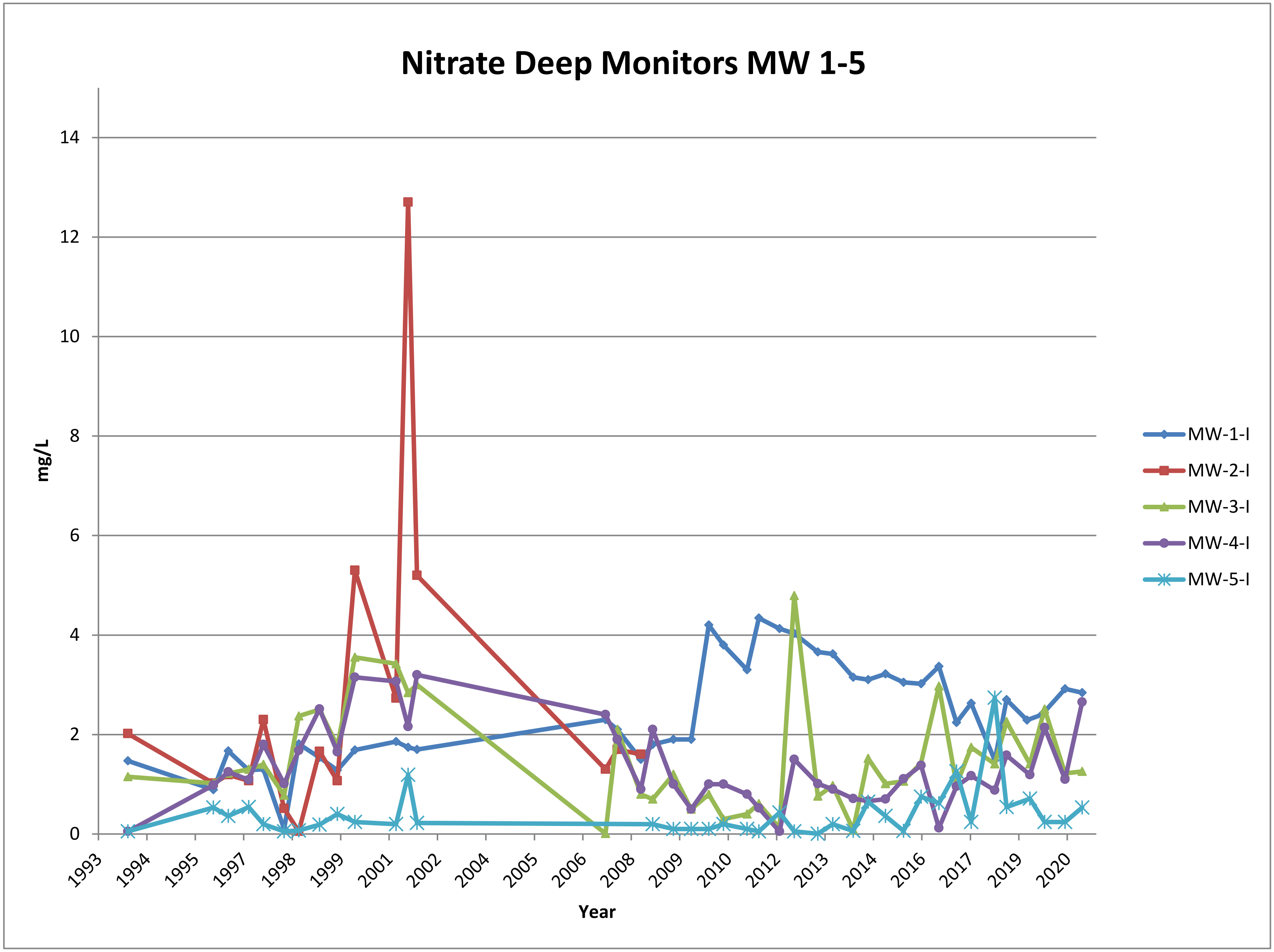

Nitrate Deep Monitors MW 1-5
mg/L
14
12
10
8
6
4
2
0
1993
1994
1995
1997
1998
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2002
2004
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2006
2008
2009
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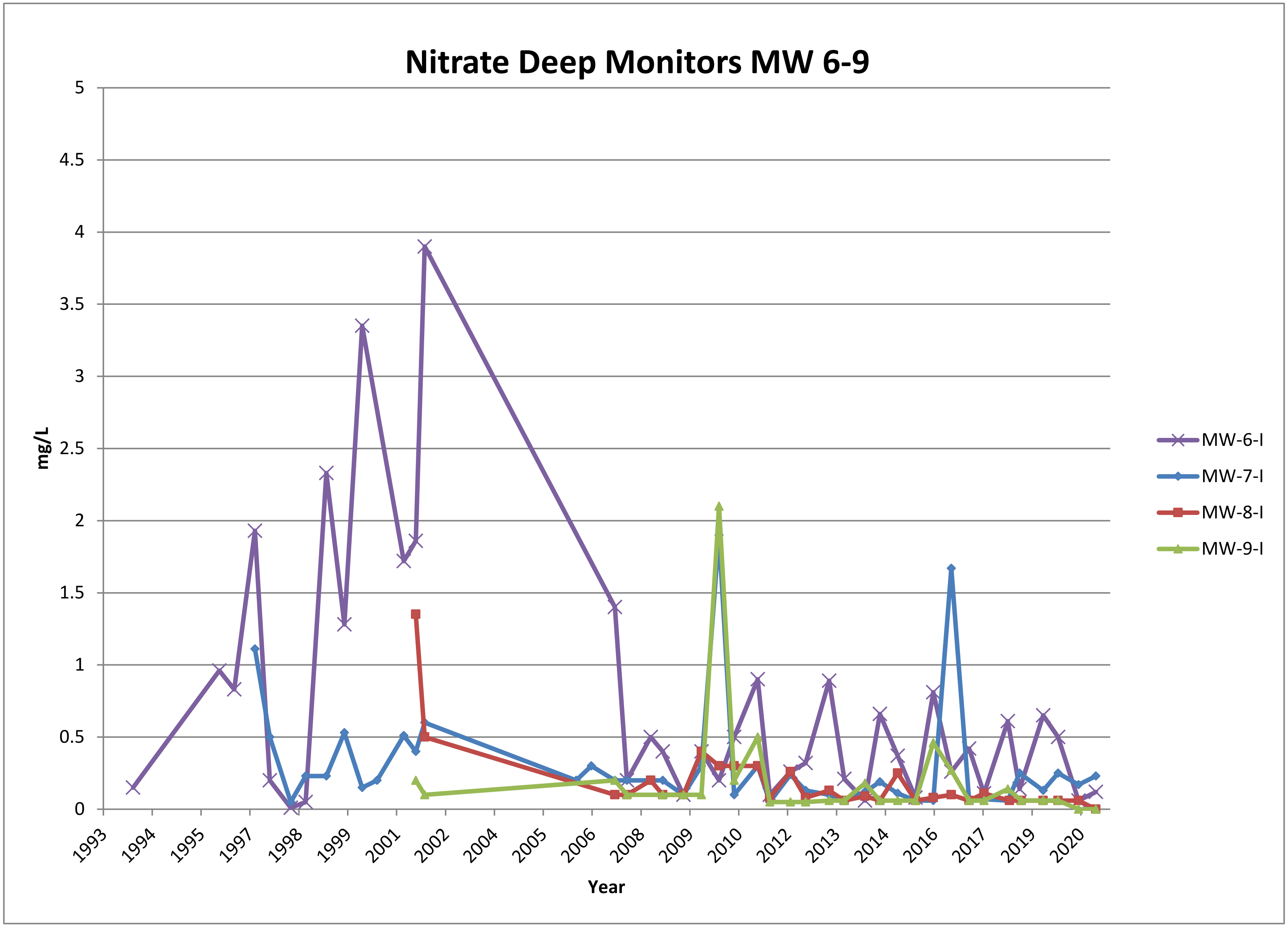
MW-4-I
MW-5-I



Nitrate Deep Monitors MW 6-9
mg/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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1993
1994
1995
1997
1998
1999
2001
2002
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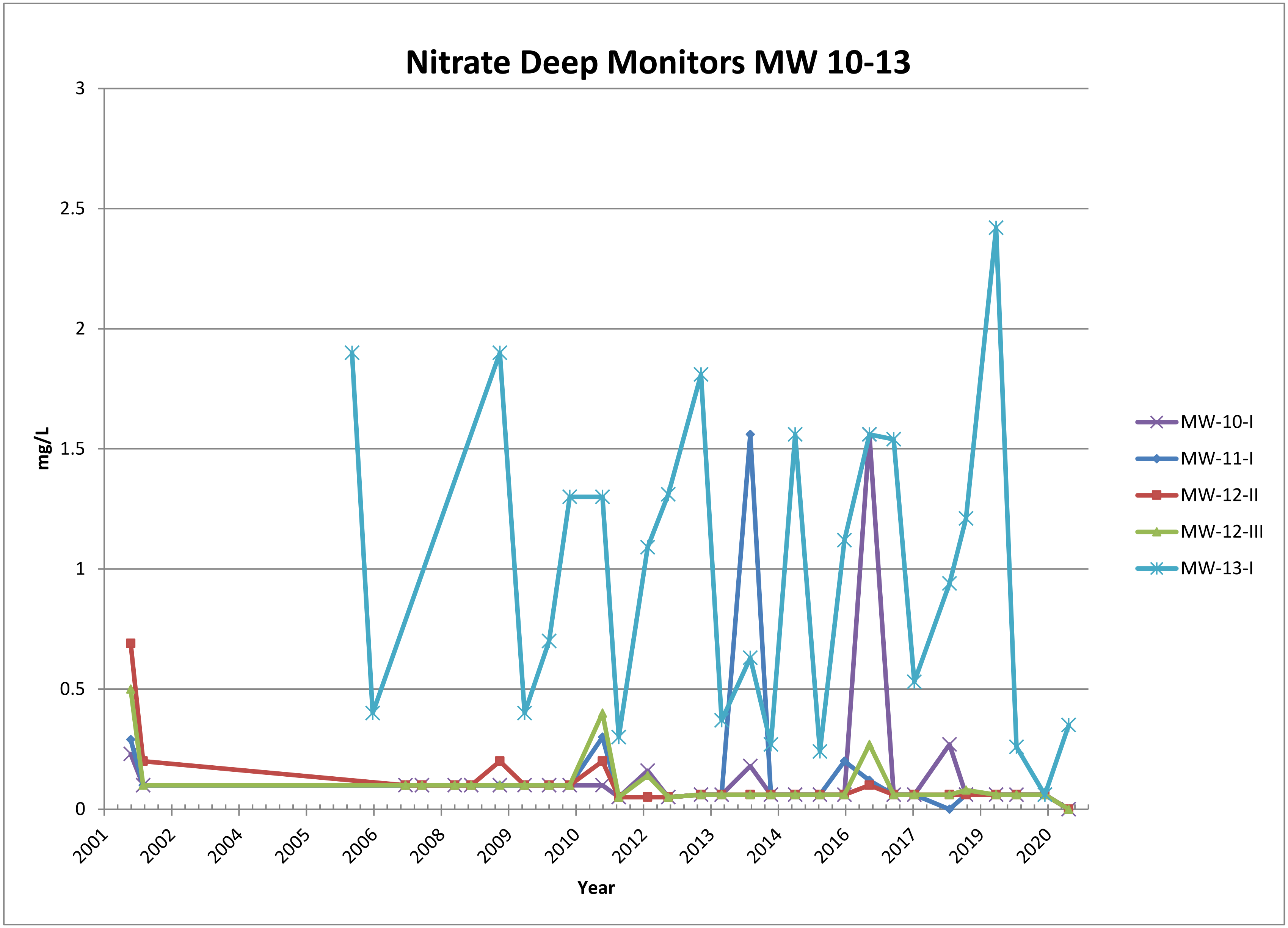

Nitrate Deep Monitors MW 10-13
mg/L
Year
3
2.5
2
1.5
1
0.5
0
2001
2002
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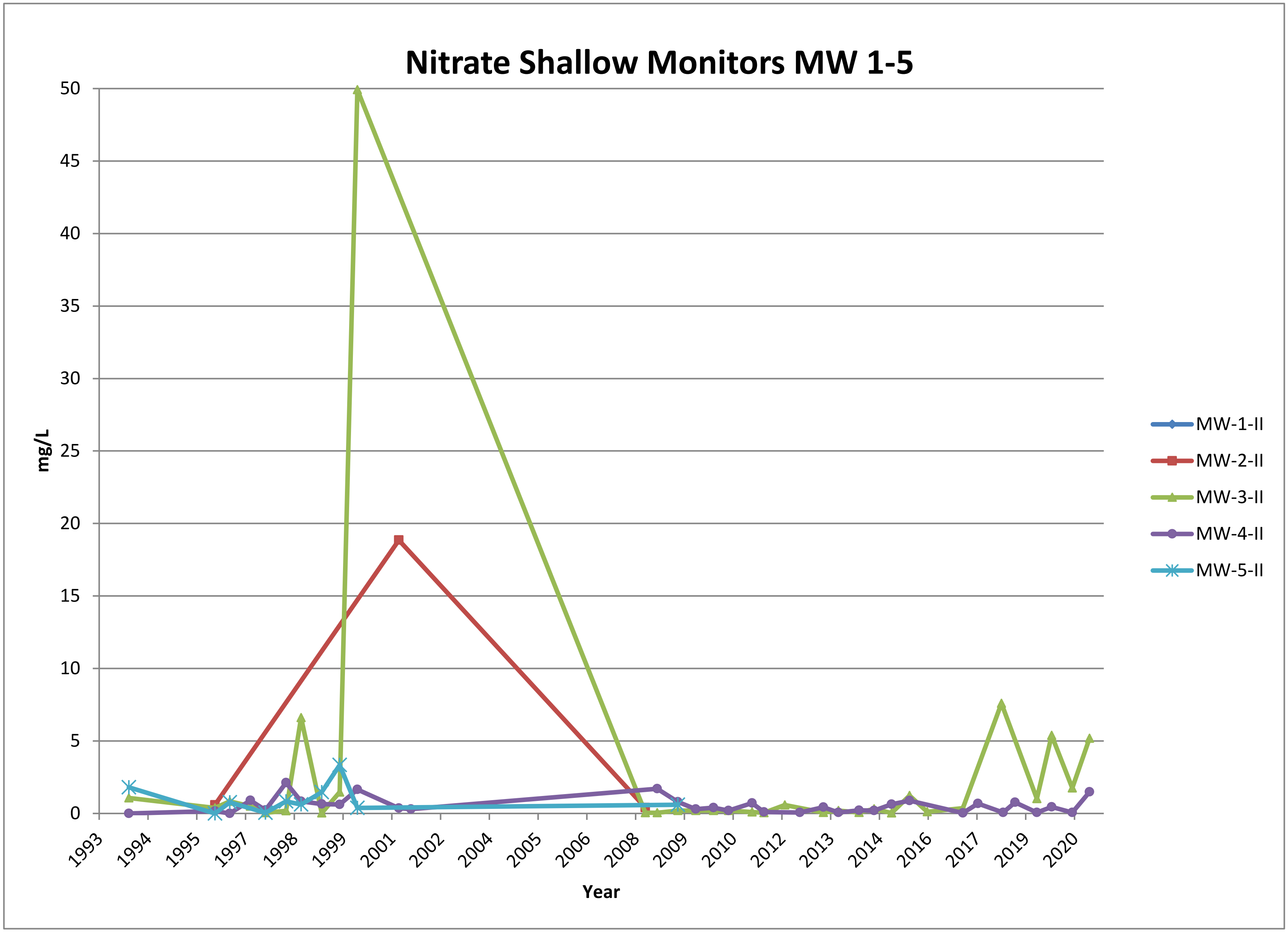

Nitrate Shallow Monitors MW 1-5
mg/L
50
45
40
35
30
25
20
15
10
5
0
1993
1994
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1997
1998
1999
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2002
2004
2005
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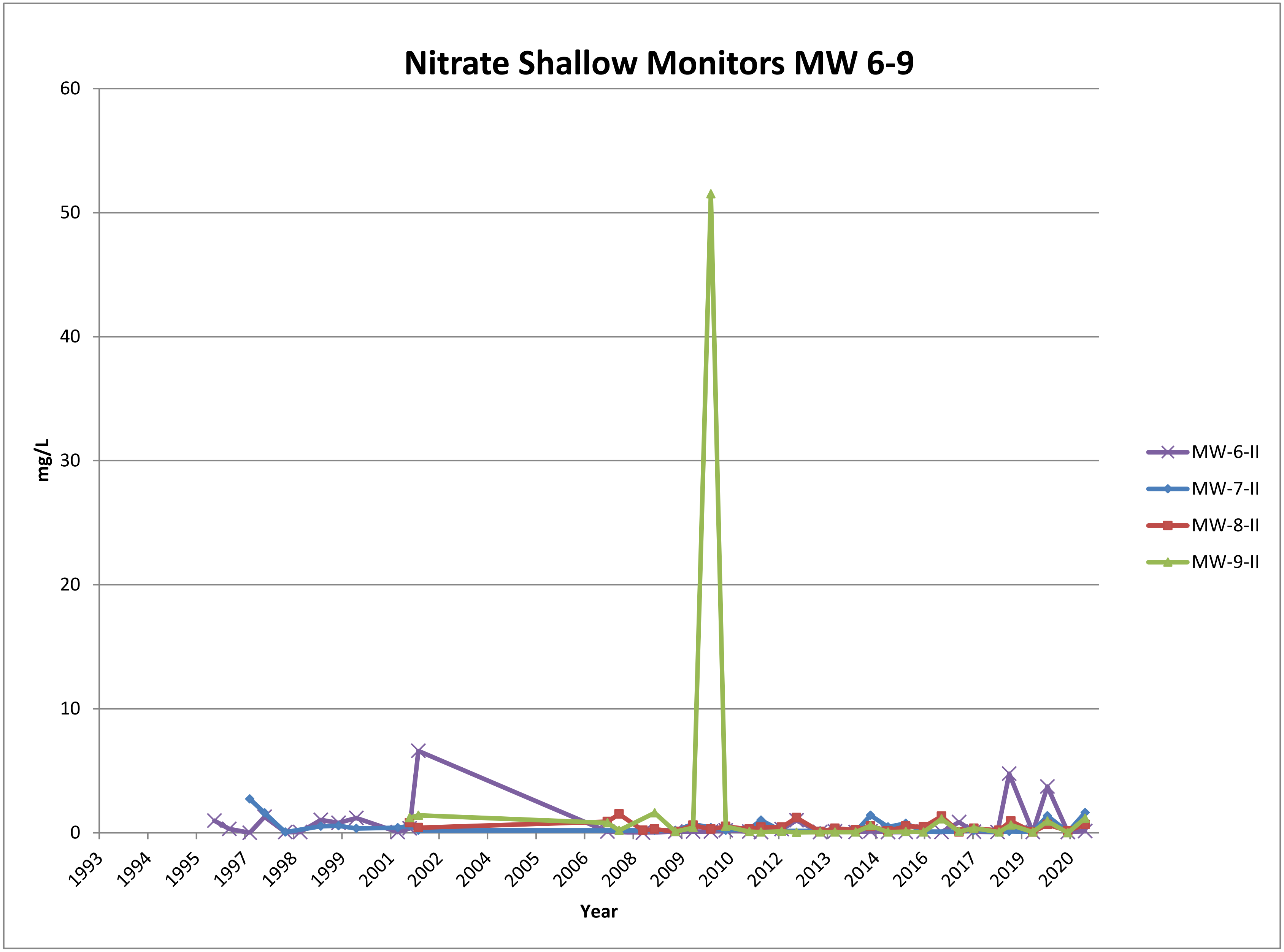

Nitrate Shallow Monitors MW 6-9
60
50
40
30
20
10
0
mg/L
1993
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2004
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2006
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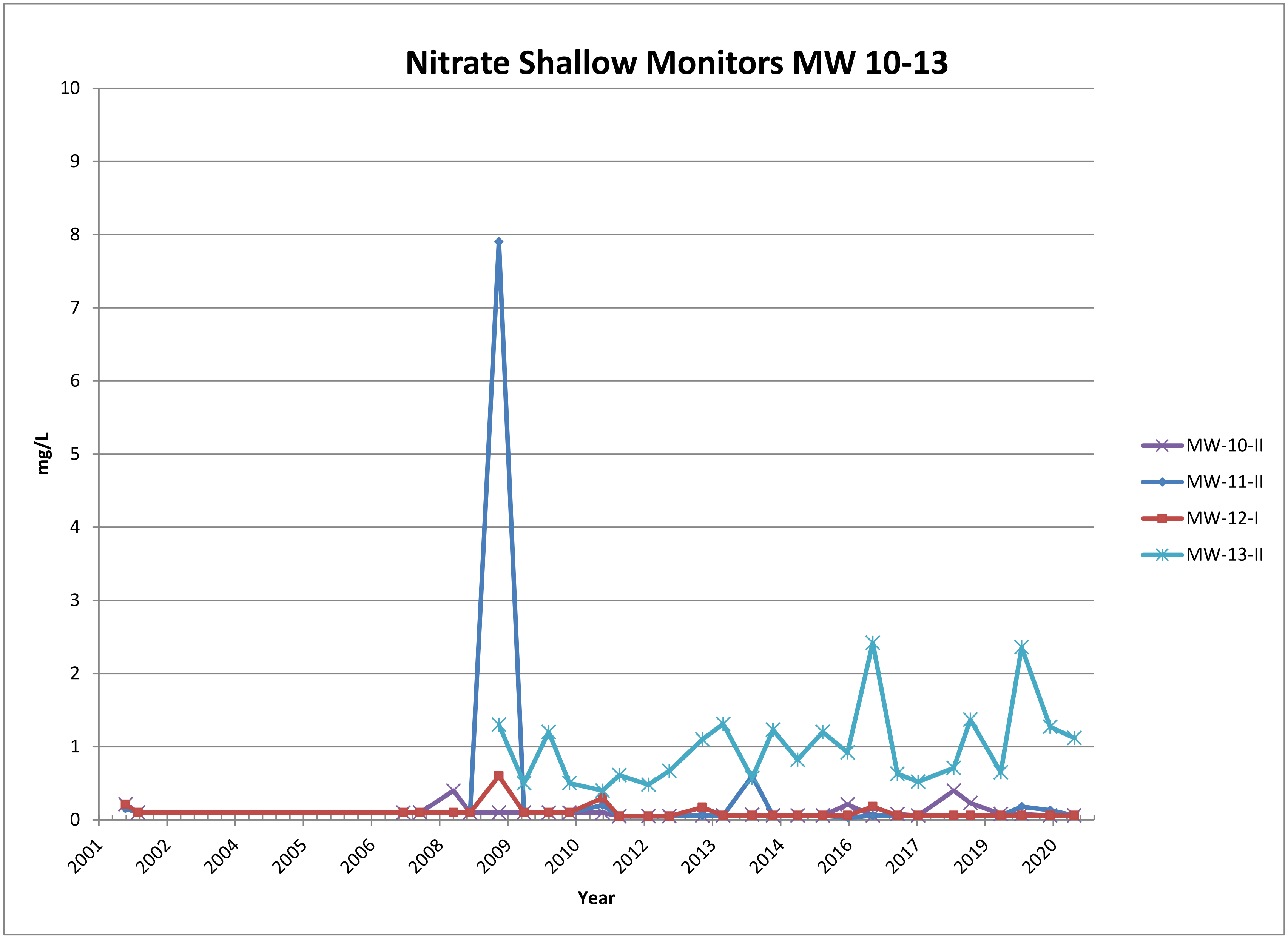

Nitrate Shallow Monitors MW 10-13
mg/L
10
9
8
7
6
5
4
3
2
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0
2001
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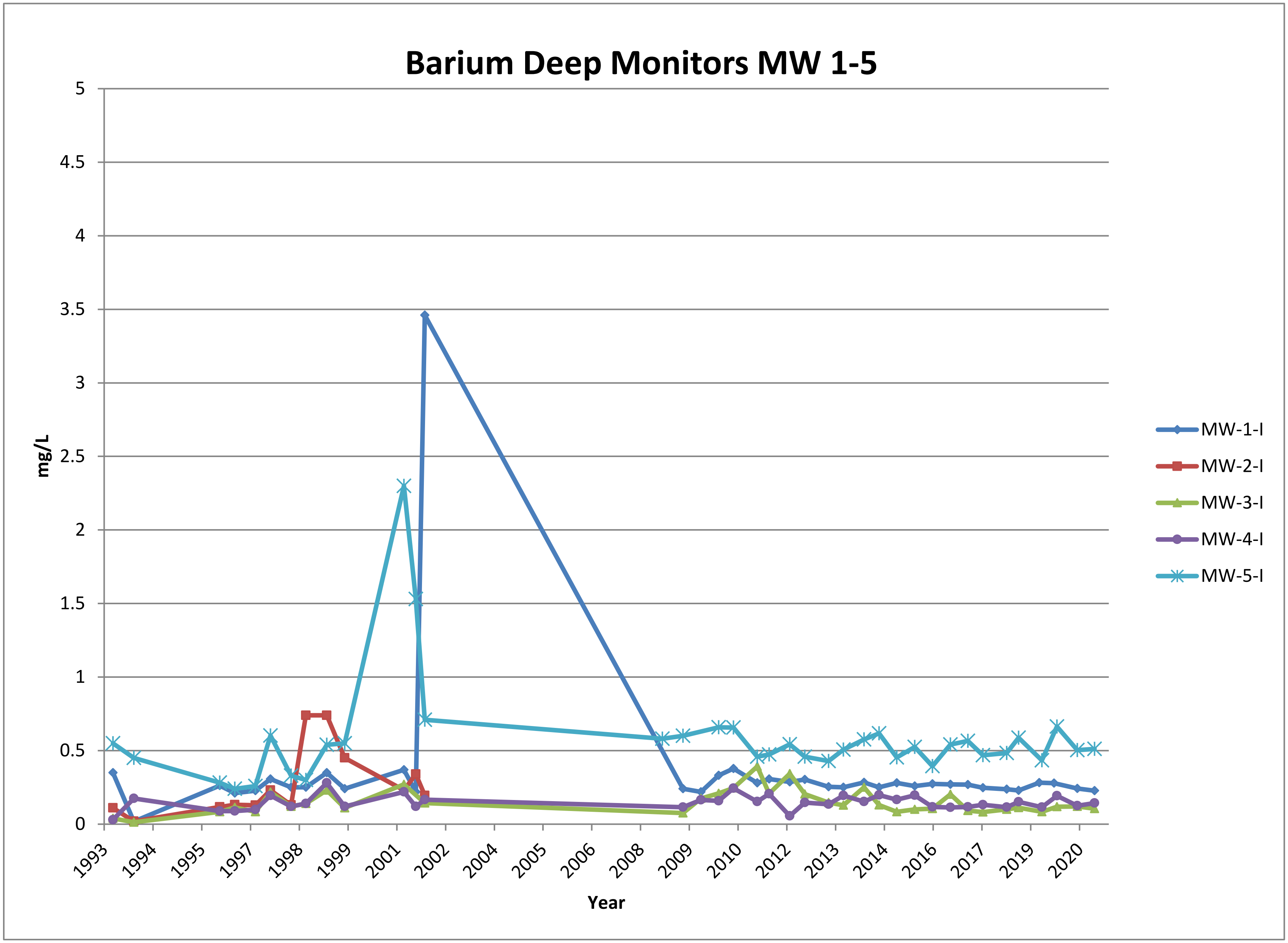
Barium Deep Monitors MW 1-5
mg/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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1994
1995
1997
1998
1999
2001
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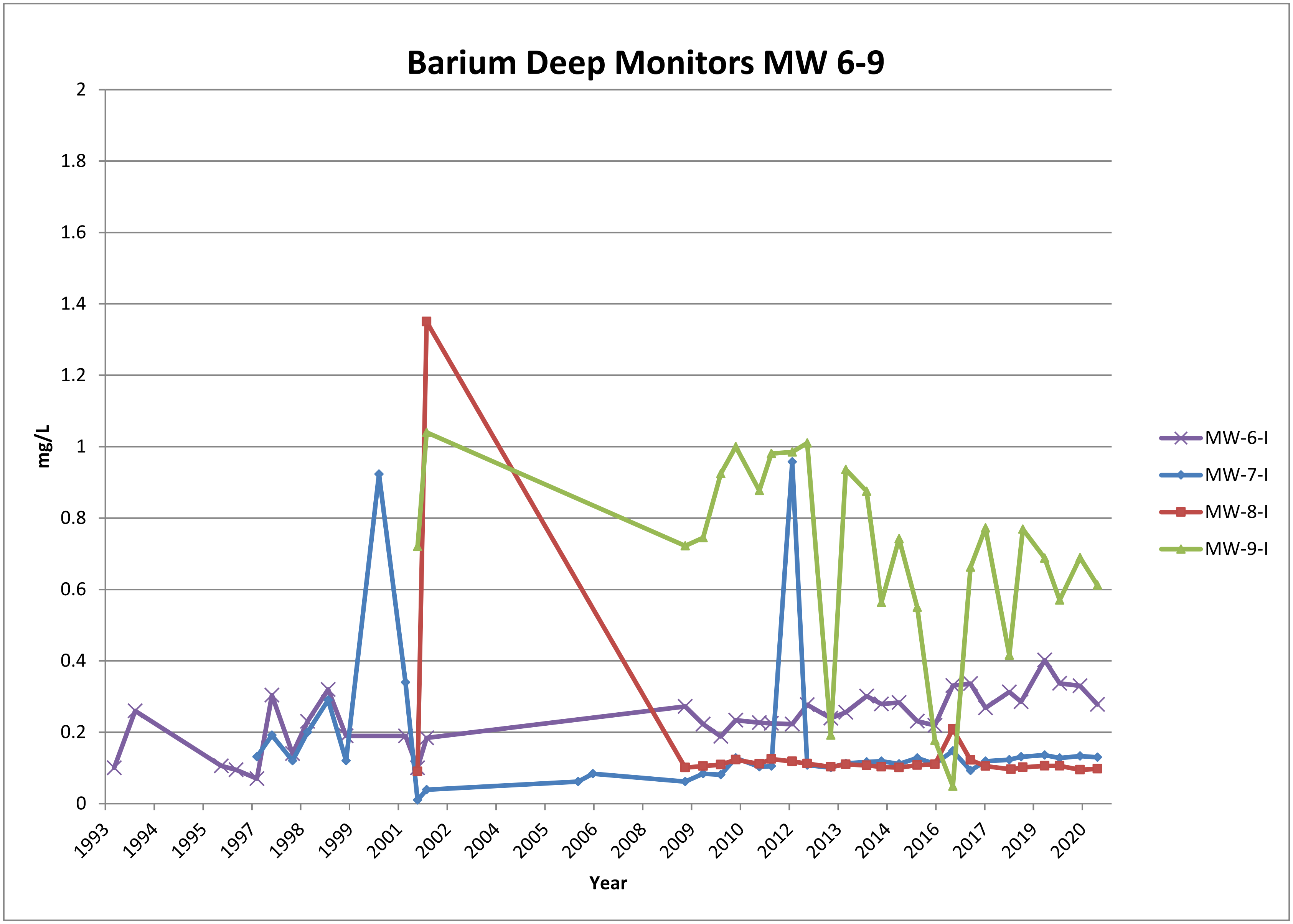

Barium Deep Monitors MW 6-9
mg/L
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
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0
1993
1994
1995
1997
1998
1999
2001
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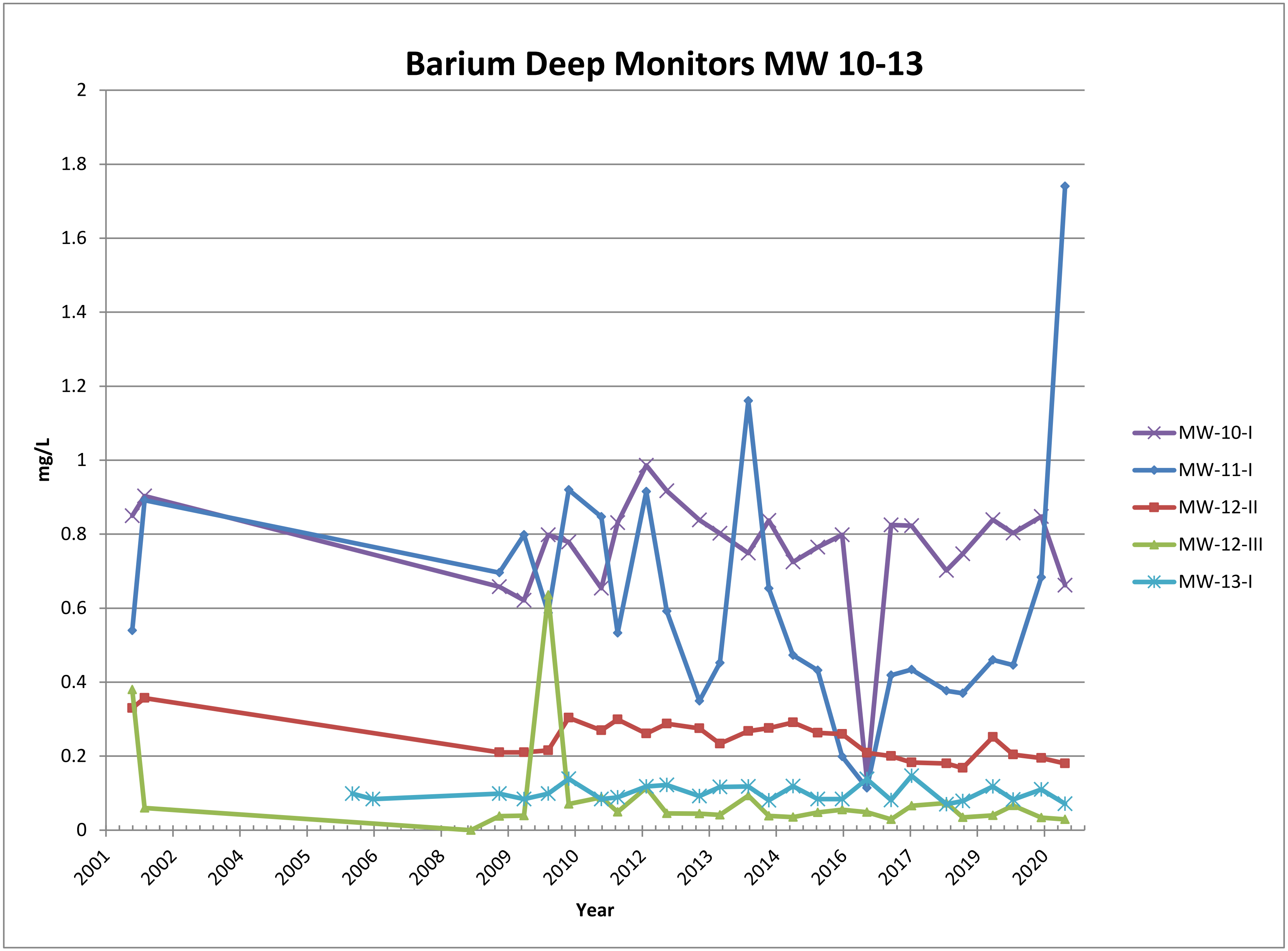
MW-9-I



Barium Deep Monitors MW 10-13
mg/L
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
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0
2001
2002
2004
2005
2006
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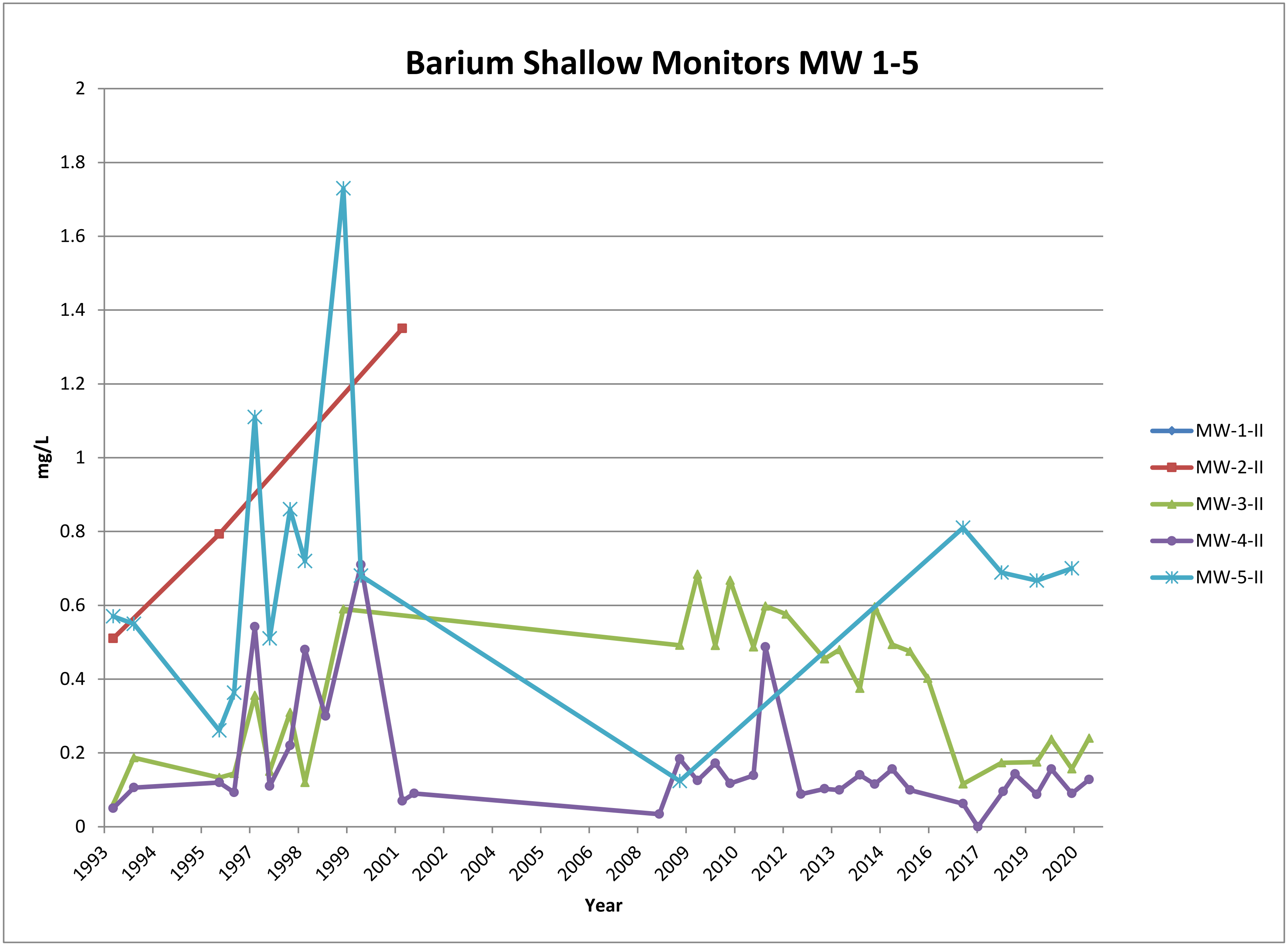
MW-12-III
MW-13-I



Barium Shallow Monitors MW 1-5
mg/L
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1993
1994
1995
1997
1998
1999
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2002
2004
2005
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2009
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Year
MW-1-II
MW-2-II
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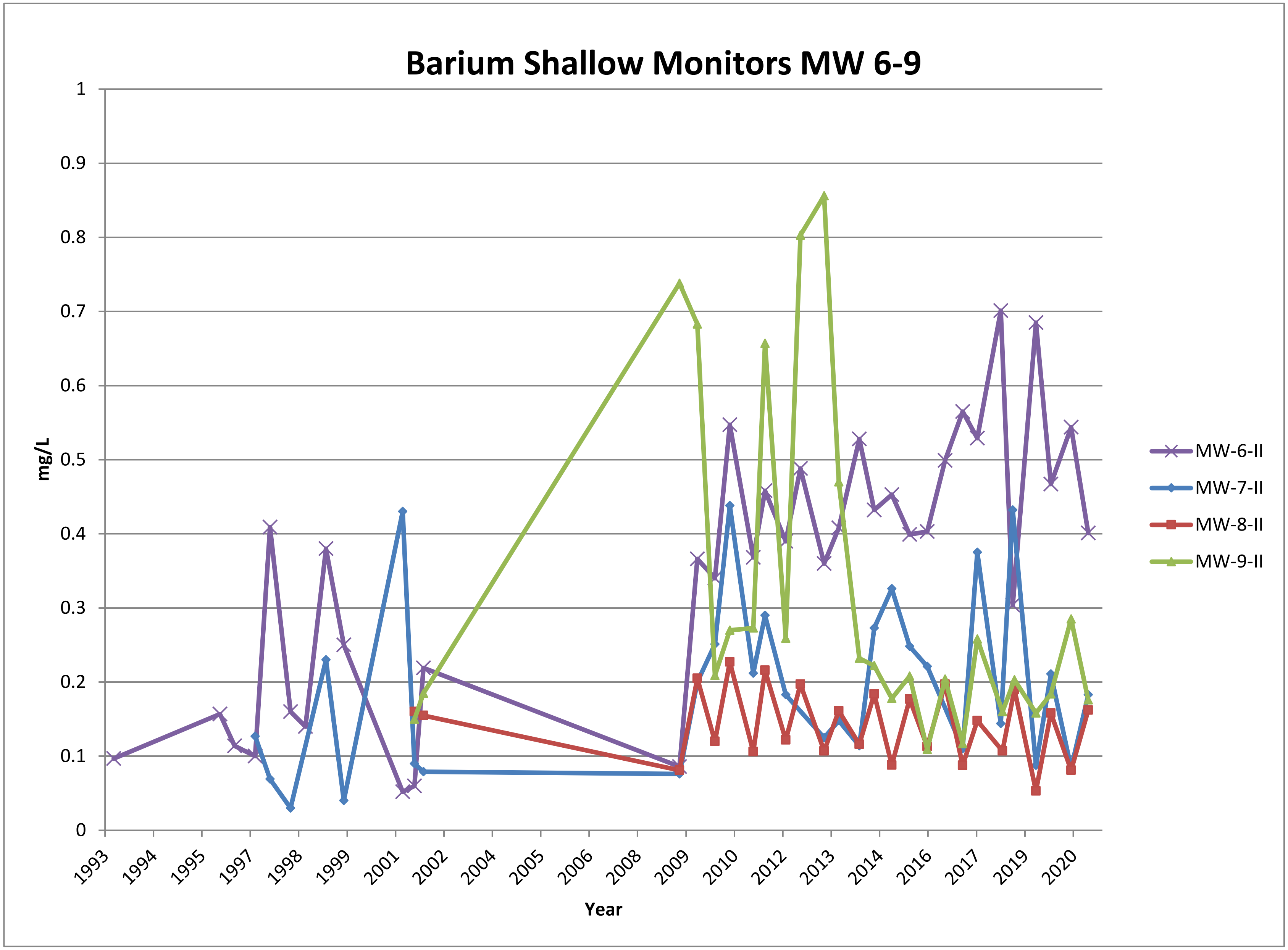
MW-4-II
MW-5-II



Barium Shallow Monitors MW 6-9
mg/L
Year
1
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0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1993
1994
1995
1997
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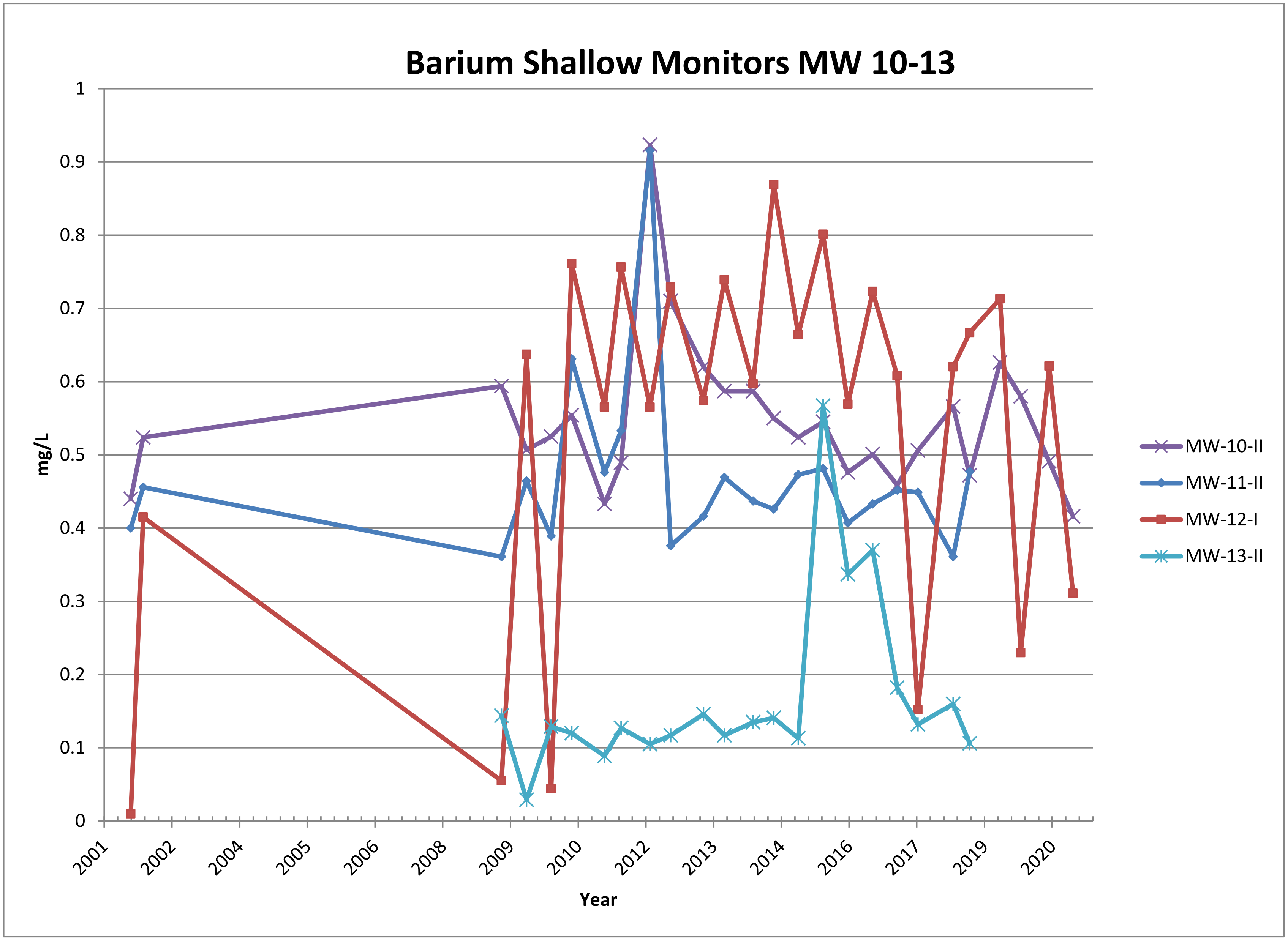
MW-9-II


Barium Shallow Monitors MW 10-13
mg/L
Year
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2001
2002
2004
2005
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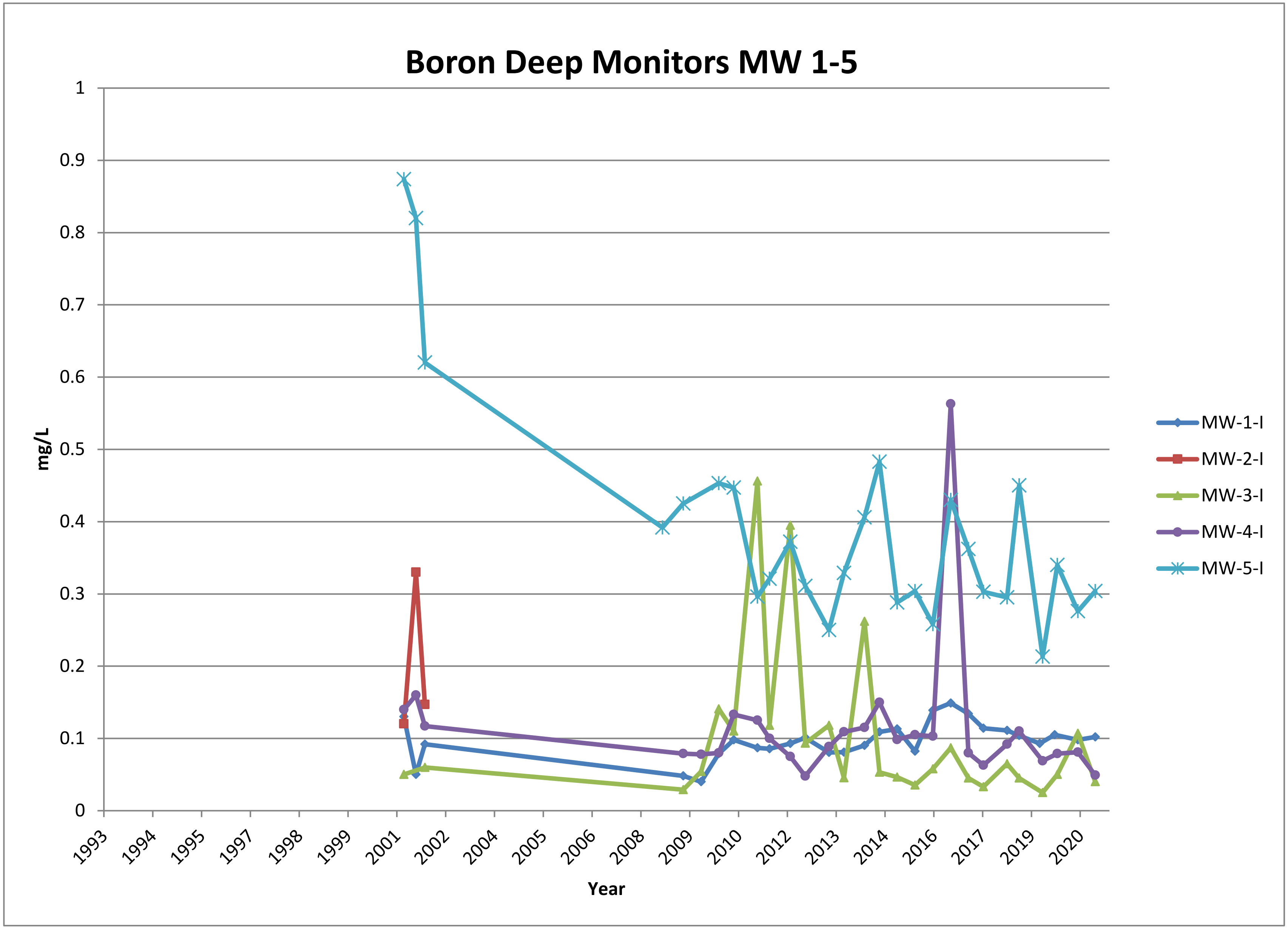
MW-13-II



Boron Deep Monitors MW 1-5
mg/L
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
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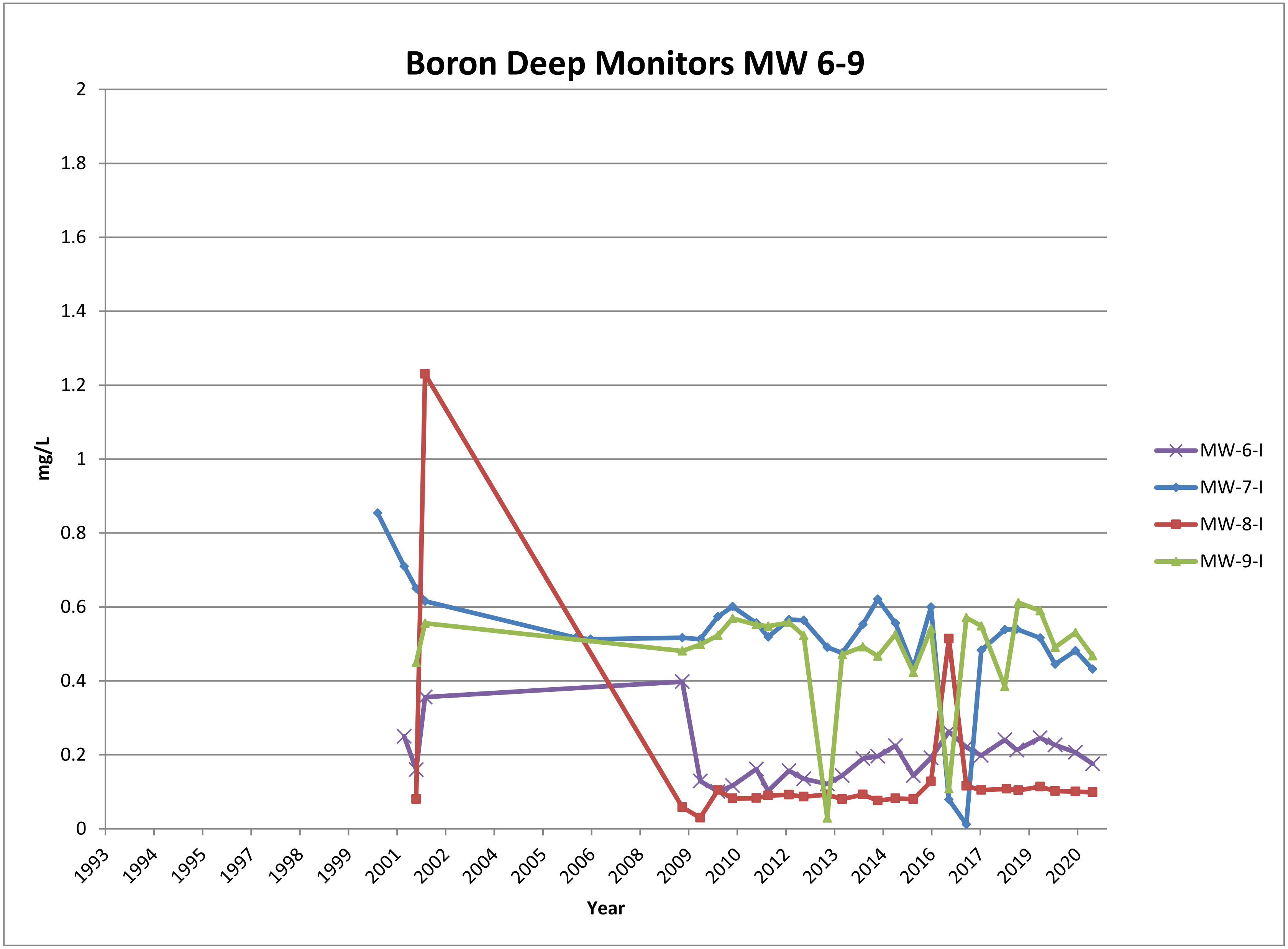
2016
2017
2019
2020
Year
MW-1-I
MW-2-I
MW-3-I
MW-4-I
MW-5-I



Boron Deep Monitors MW 6-9
mg/L
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
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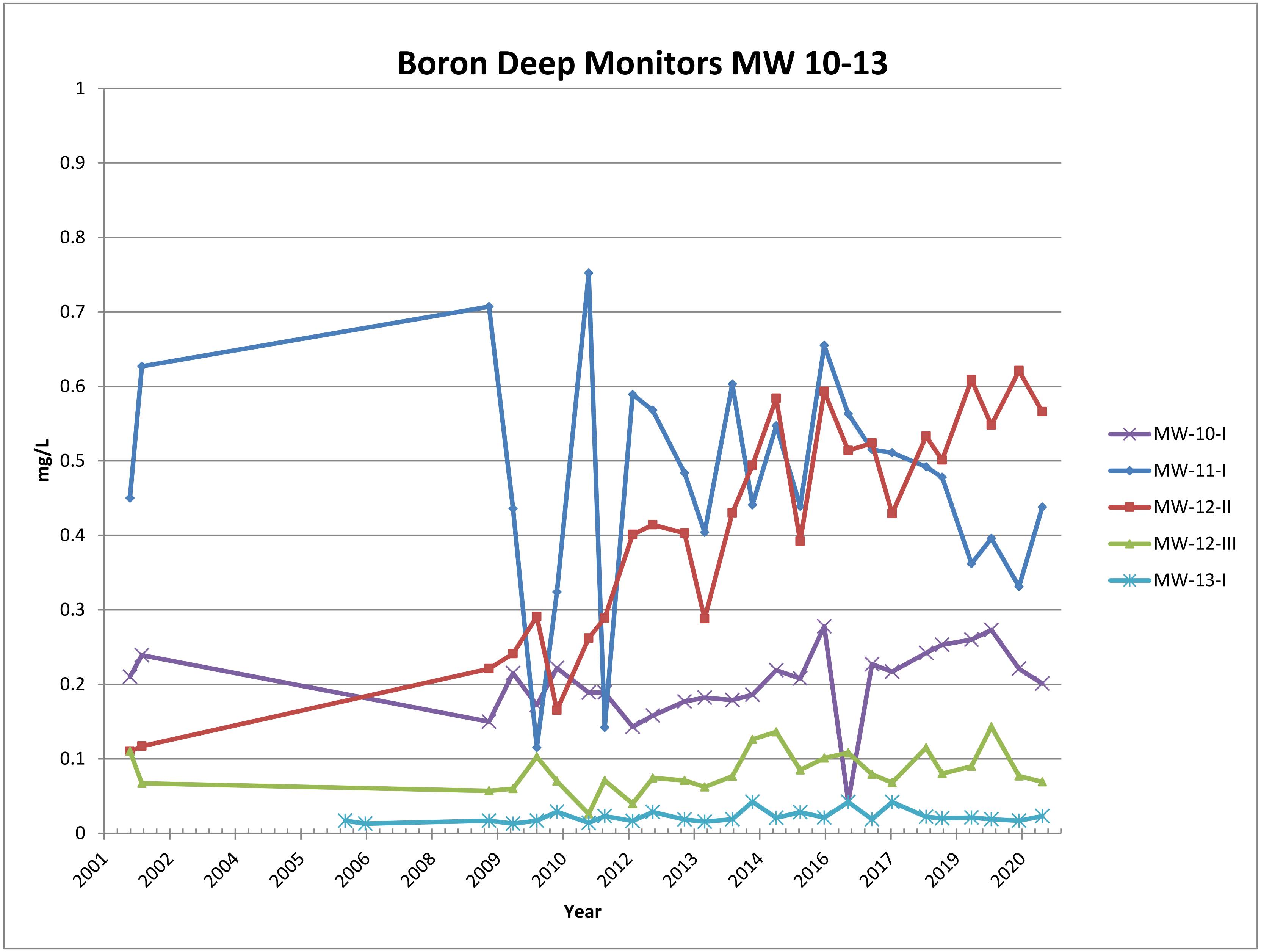
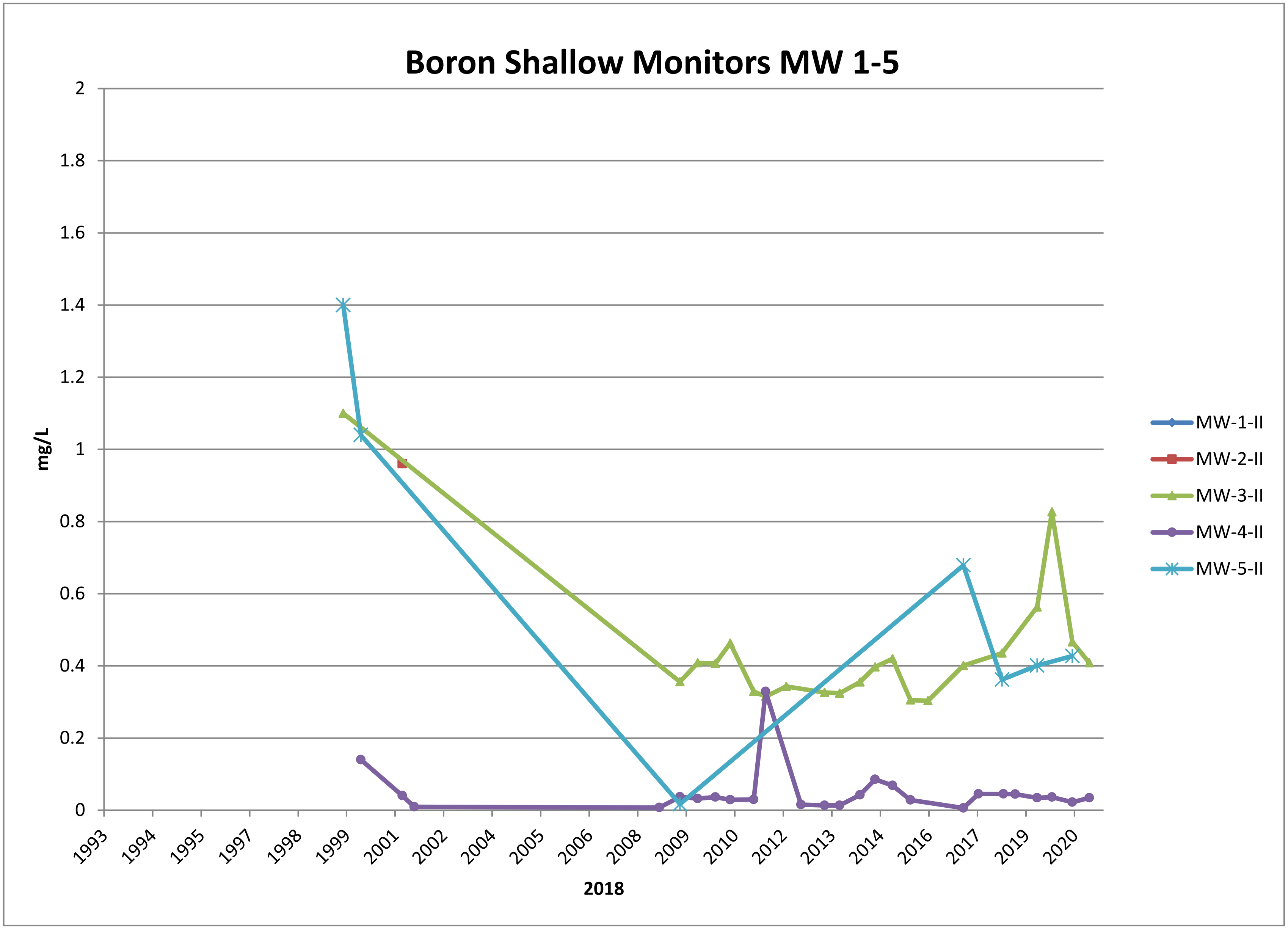
MW-6-I
MW-7-I
MW-8-I
MW-9-I



Boron Deep Monitors MW 10-13
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
mg/L
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-10-I
MW-11-I
MW-12-II
MW-12-III
MW-13-I



Boron Shallow Monitors MW 1-5
mg/L
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
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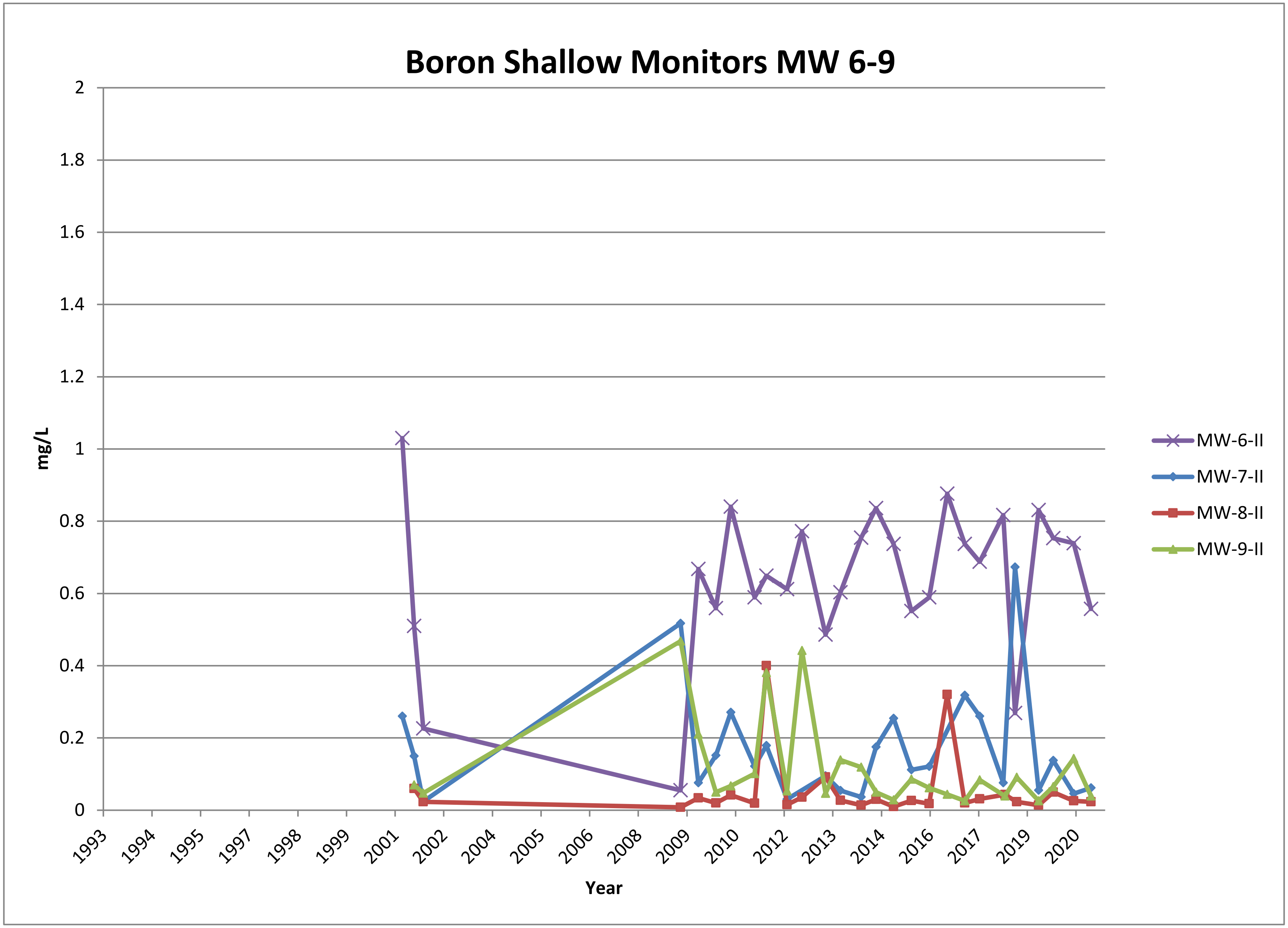
2017
2019
2020
2018
MW-1-II
MW-2-II
MW-3-II
MW-4-II
MW-5-II


Boron Shallow Monitors MW 6-9
mg/L
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
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2006
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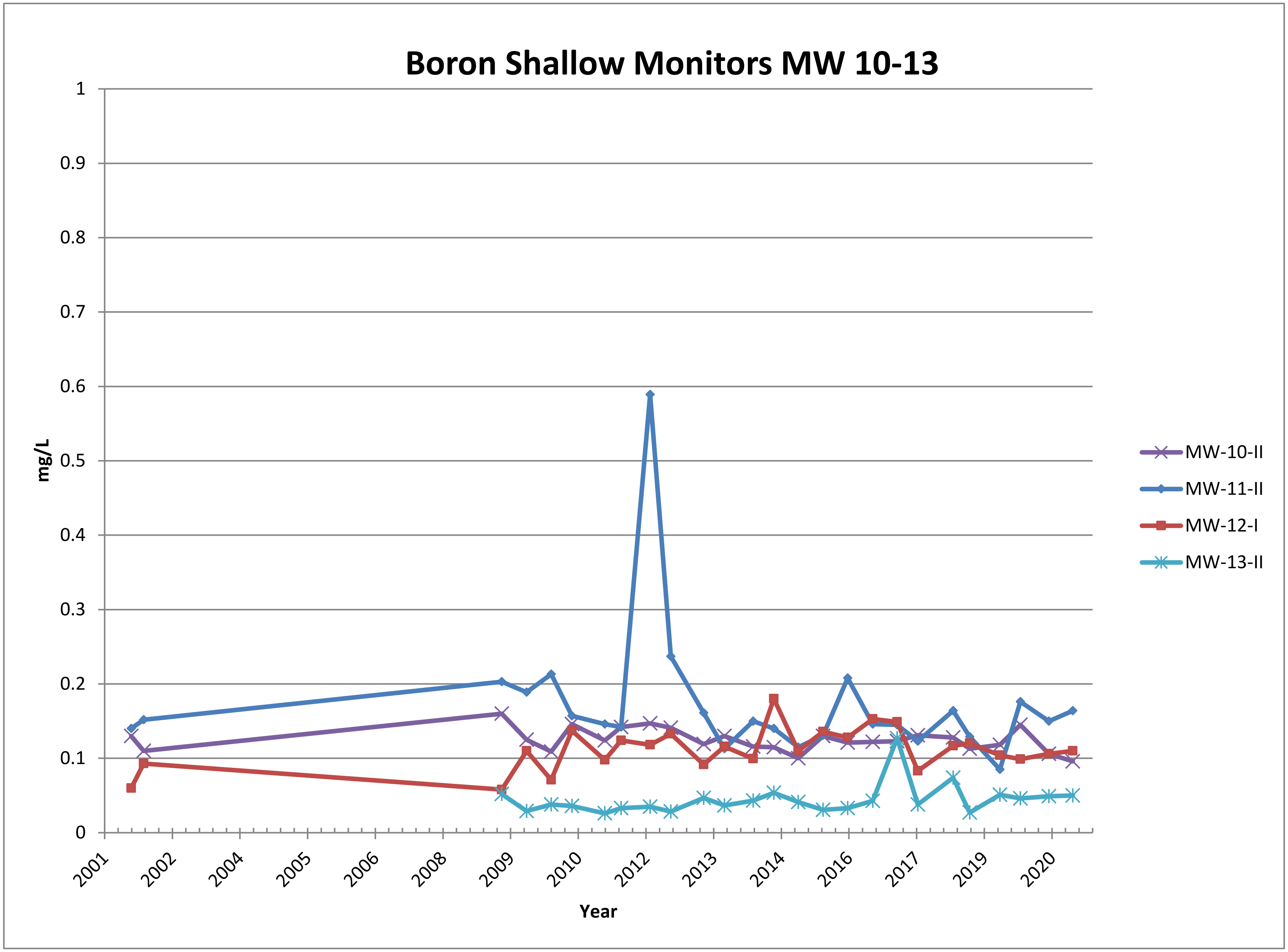
Year
MW-6-II
MW-7-II
MW-8-II
MW-9-II


Boron Shallow Monitors MW 10-13
mg/L
Year
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2001
2002
2004
2005
2006
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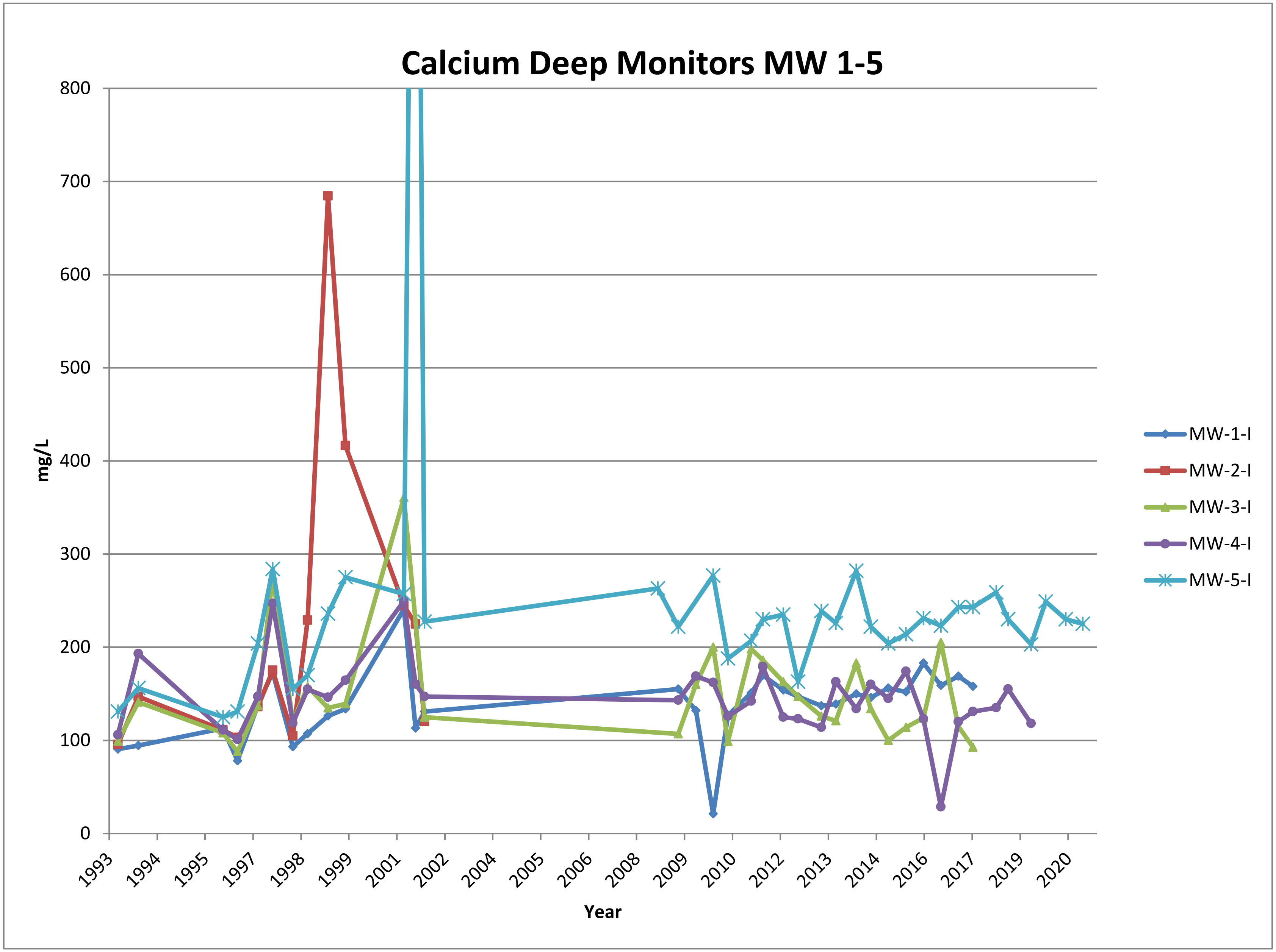
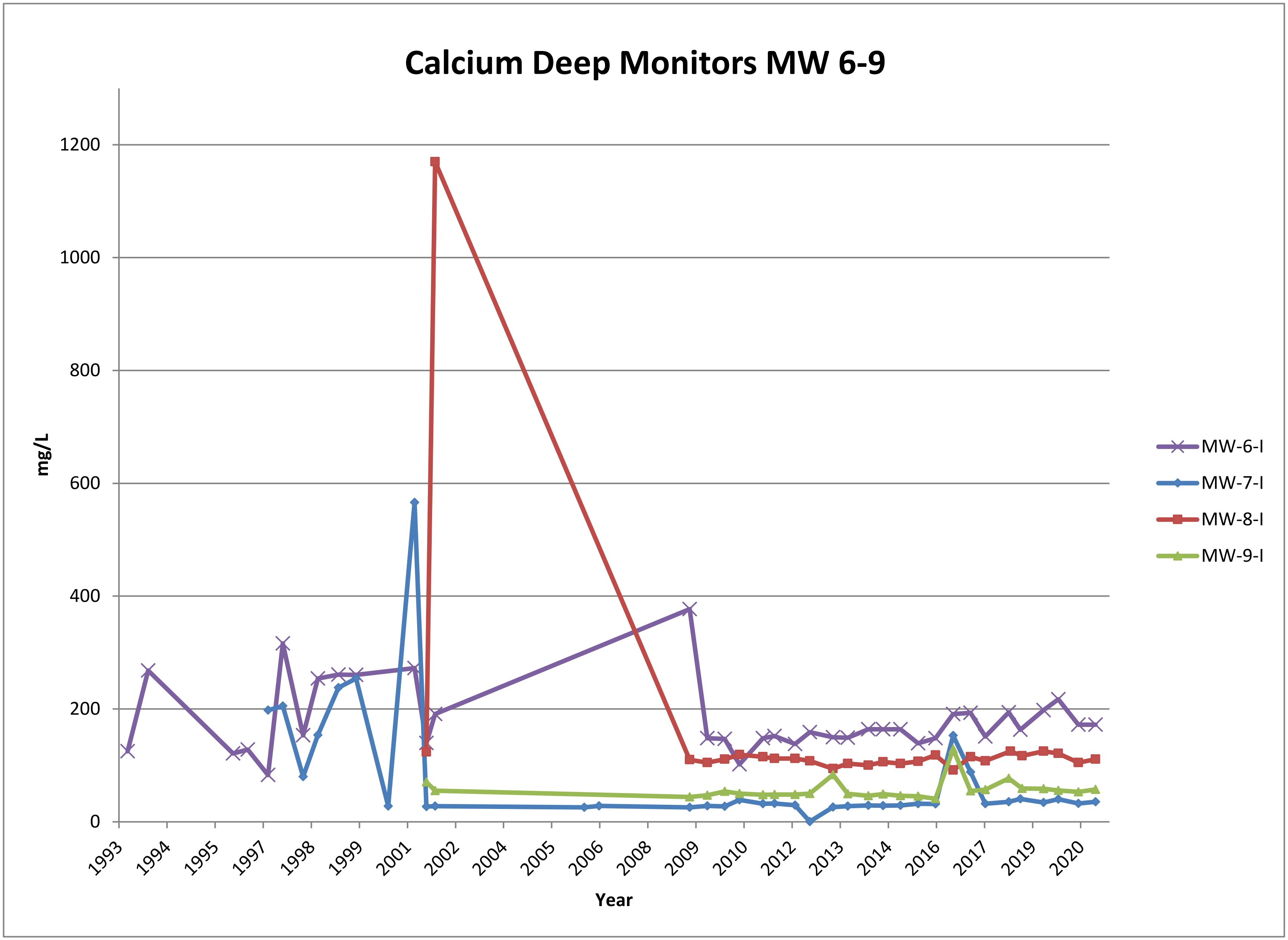
2017
2019
2020
MW-10-II
MW-11-II
MW-12-I
MW-13-II



Calcium Deep Monitors MW 1-5
mg/L
800
700
600
500
400
300
200
100
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-1-I
MW-2-I
MW-3-I
MW-4-I
MW-5-I



Calcium Deep Monitors MW 6-9
mg/L
0
200
400
600
800
1000
1200
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
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Year
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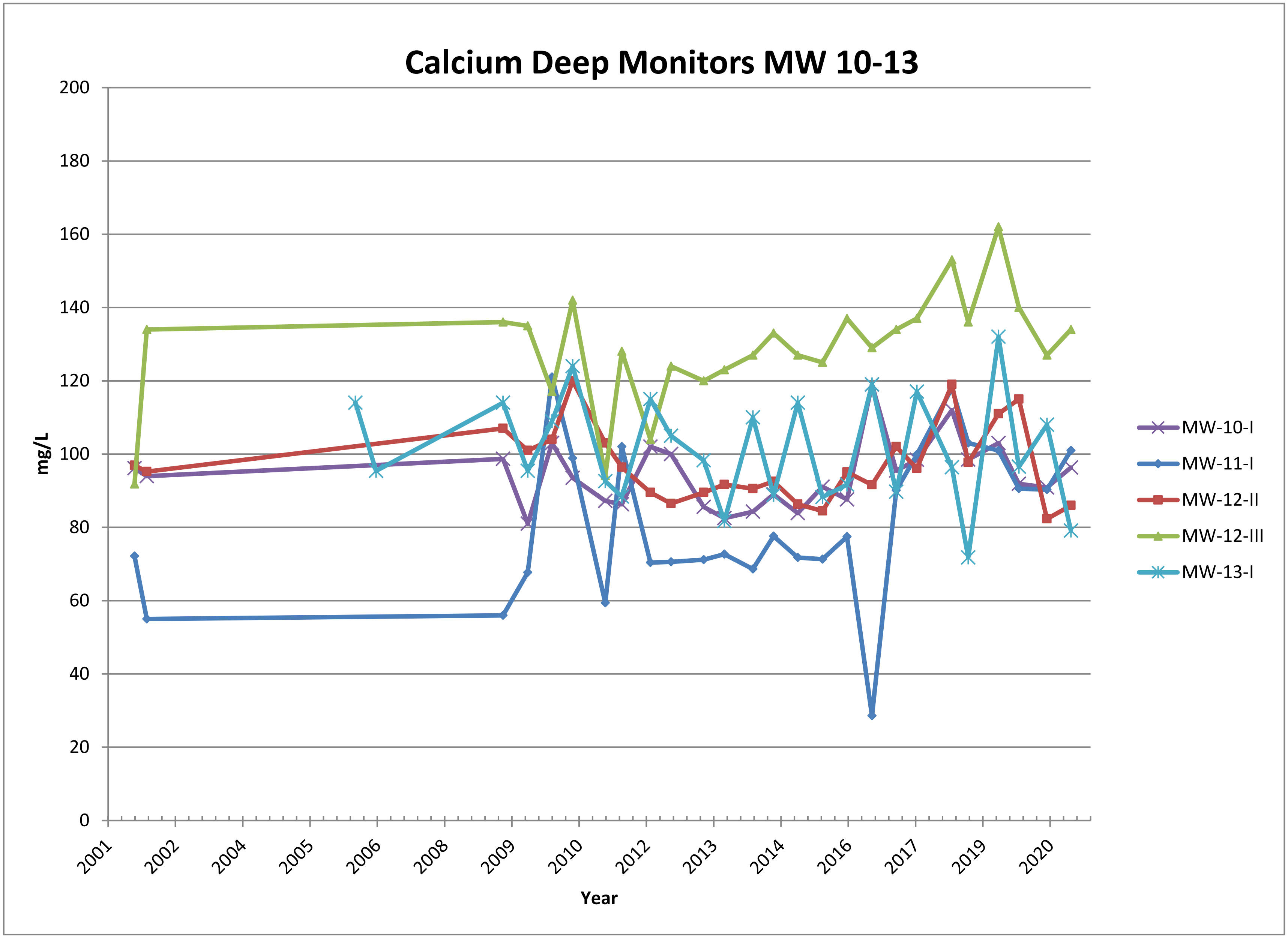
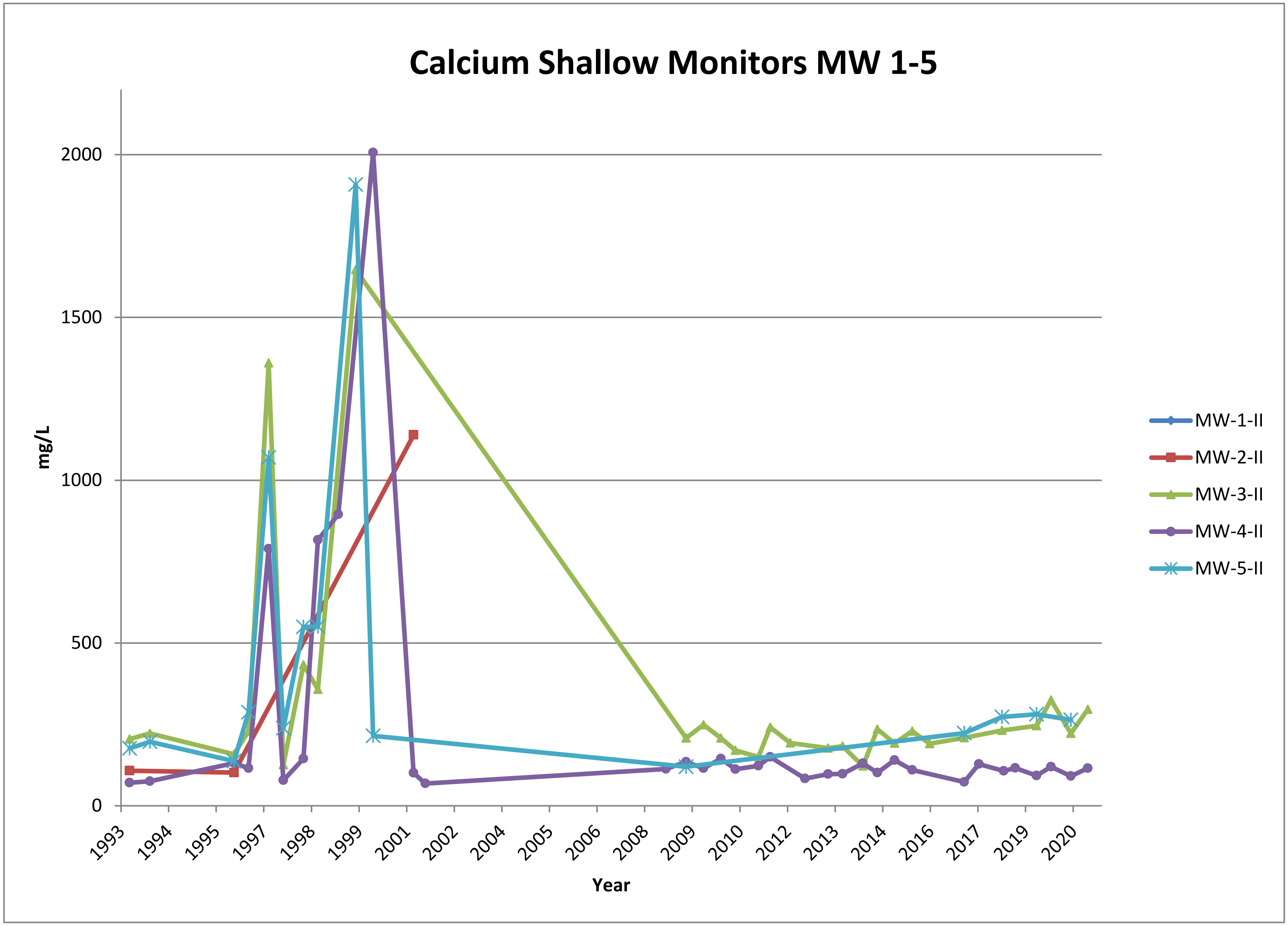
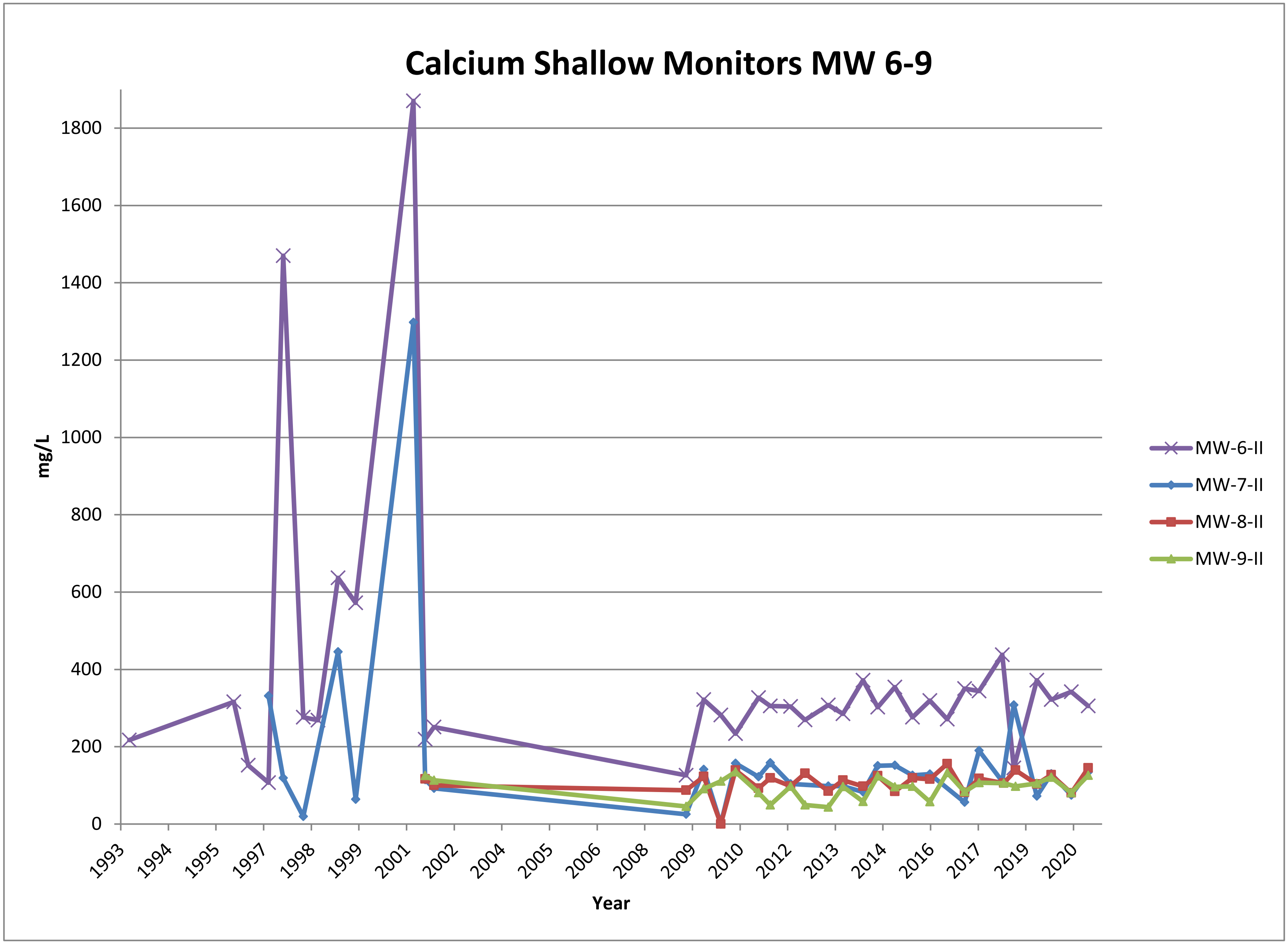
MW-8-I
MW-9-I



Calcium Deep Monitors MW 10-13
200
180
160
140
120
100
80
60
40
20
0
mg/L
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-10-I
MW-11-I
MW-12-II
MW-12-III
MW-13-I


Calcium Shallow Monitors MW 1-5
mg/L
2000
1500
1000
500
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-1-II
MW-2-II
MW-3-II
MW-4-II
MW-5-II



Calcium Shallow Monitors MW 6-9
mg/L
1800
1600
1400
1200
1000
800
600
400
200
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
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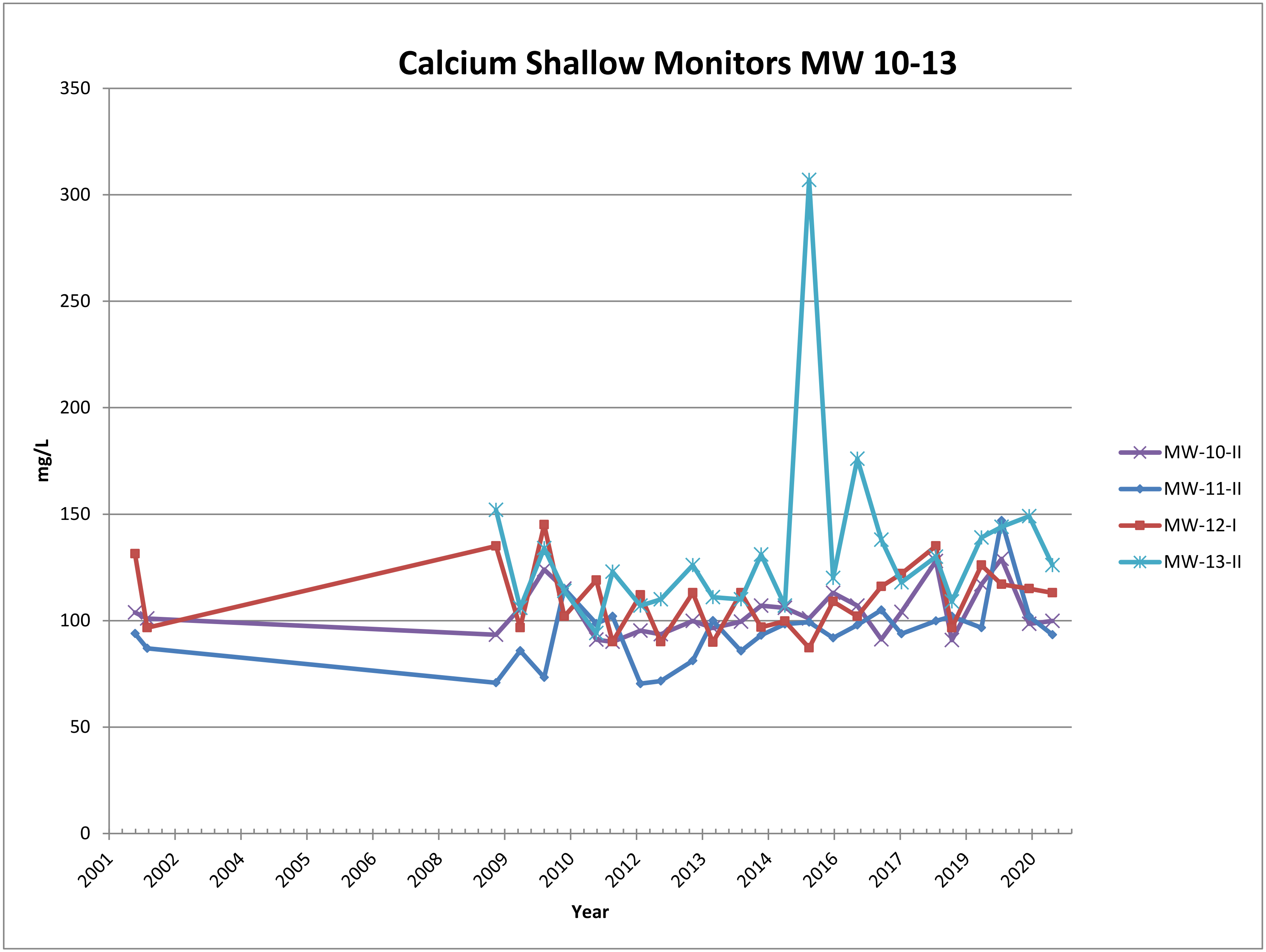
MW-8-II
MW-9-II



Calcium Shallow Monitors MW 10-13
mg/L
350
300
250
200
150
100
50
0
2001
2002
2004
2005
2006
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2009
2010
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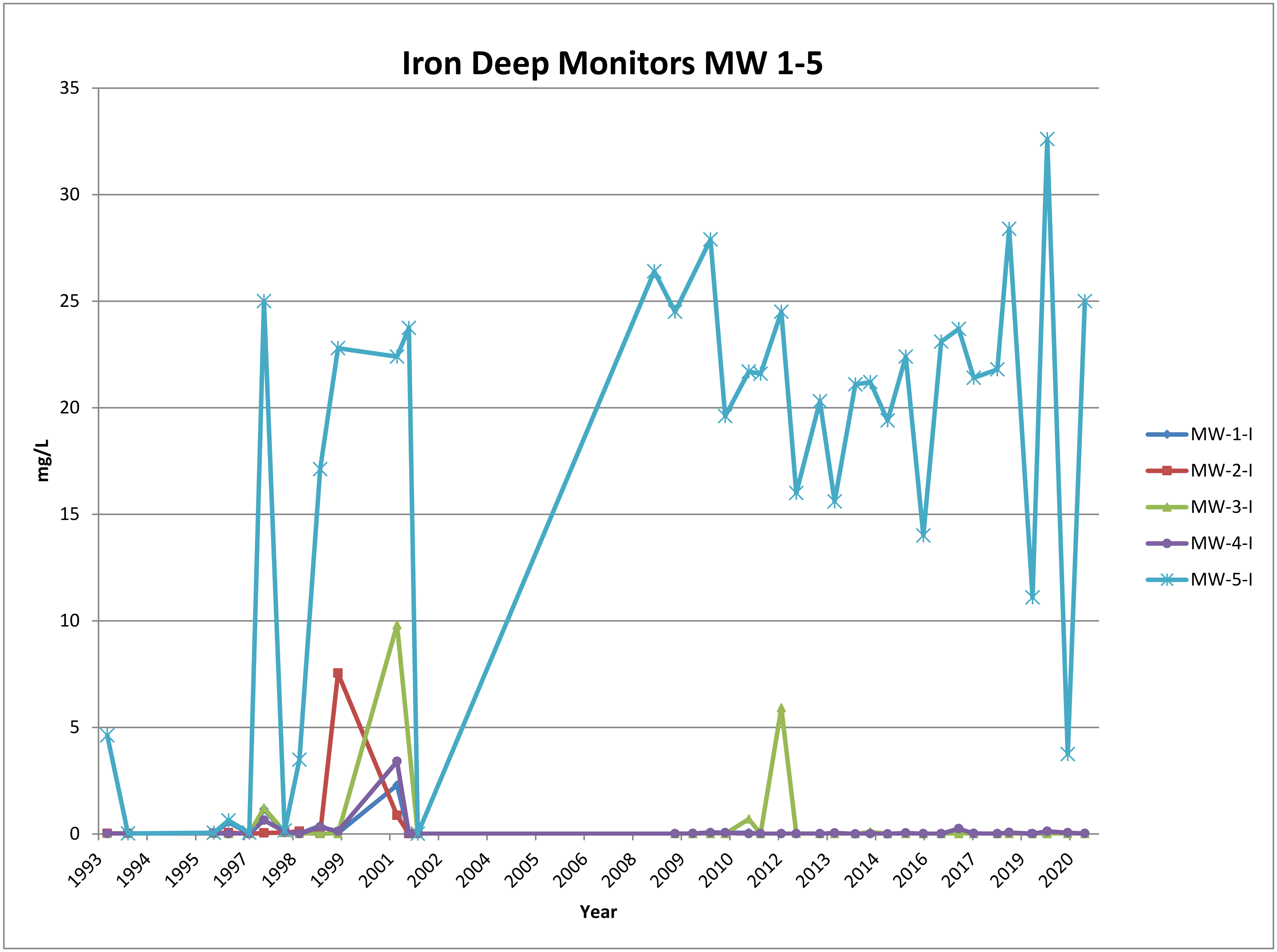
MW-12-I
MW-13-II



Iron Deep Monitors MW 1-5
mg/L
35
30
25
20
15
10
5
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
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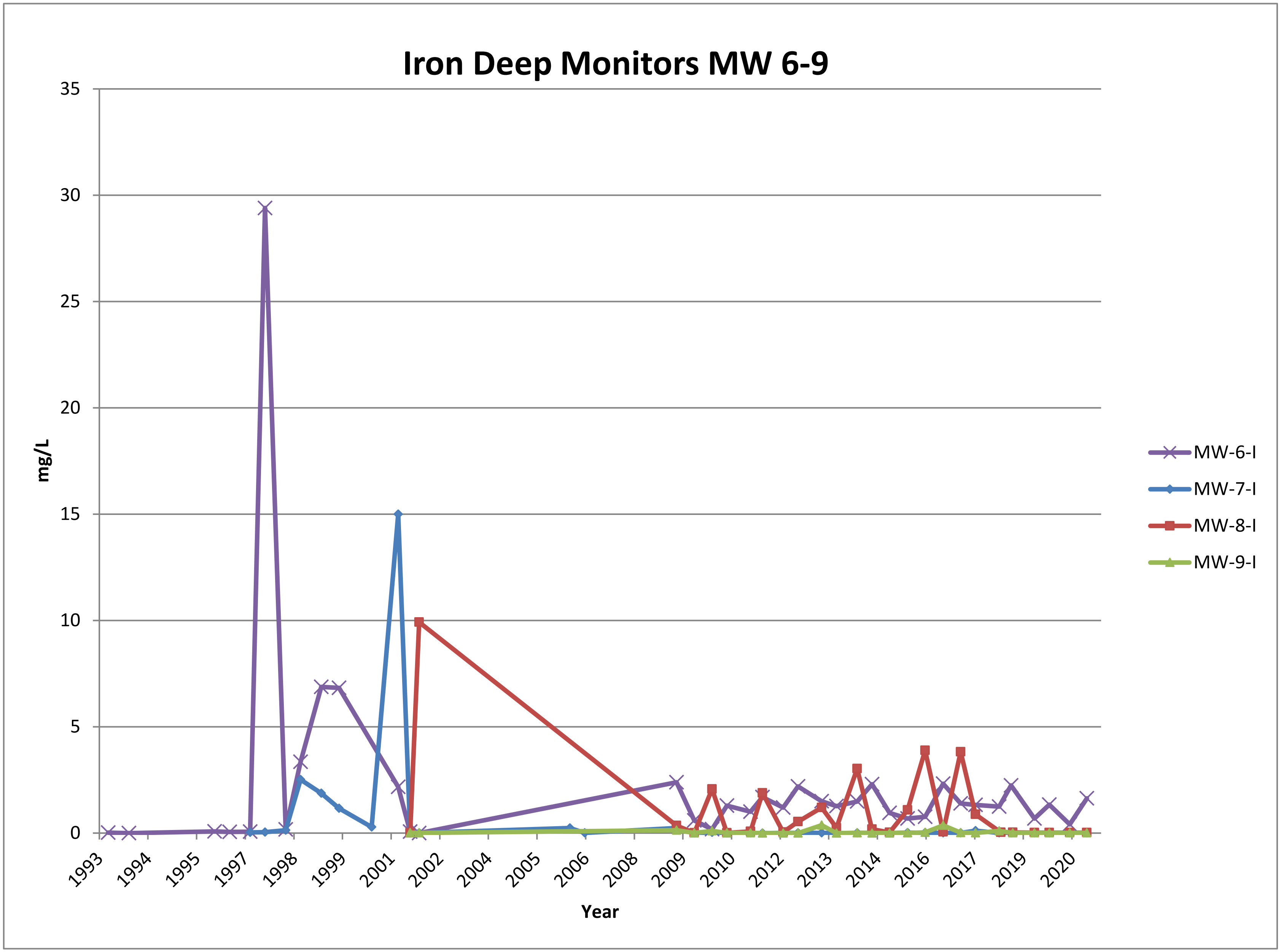
2016
2017
2019
2020
Year
MW-1-I
MW-2-I
MW-3-I
MW-4-I
MW-5-I



Iron Deep Monitors MW 6-9
mg/L
35
30
25
20
15
10
5
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
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Year
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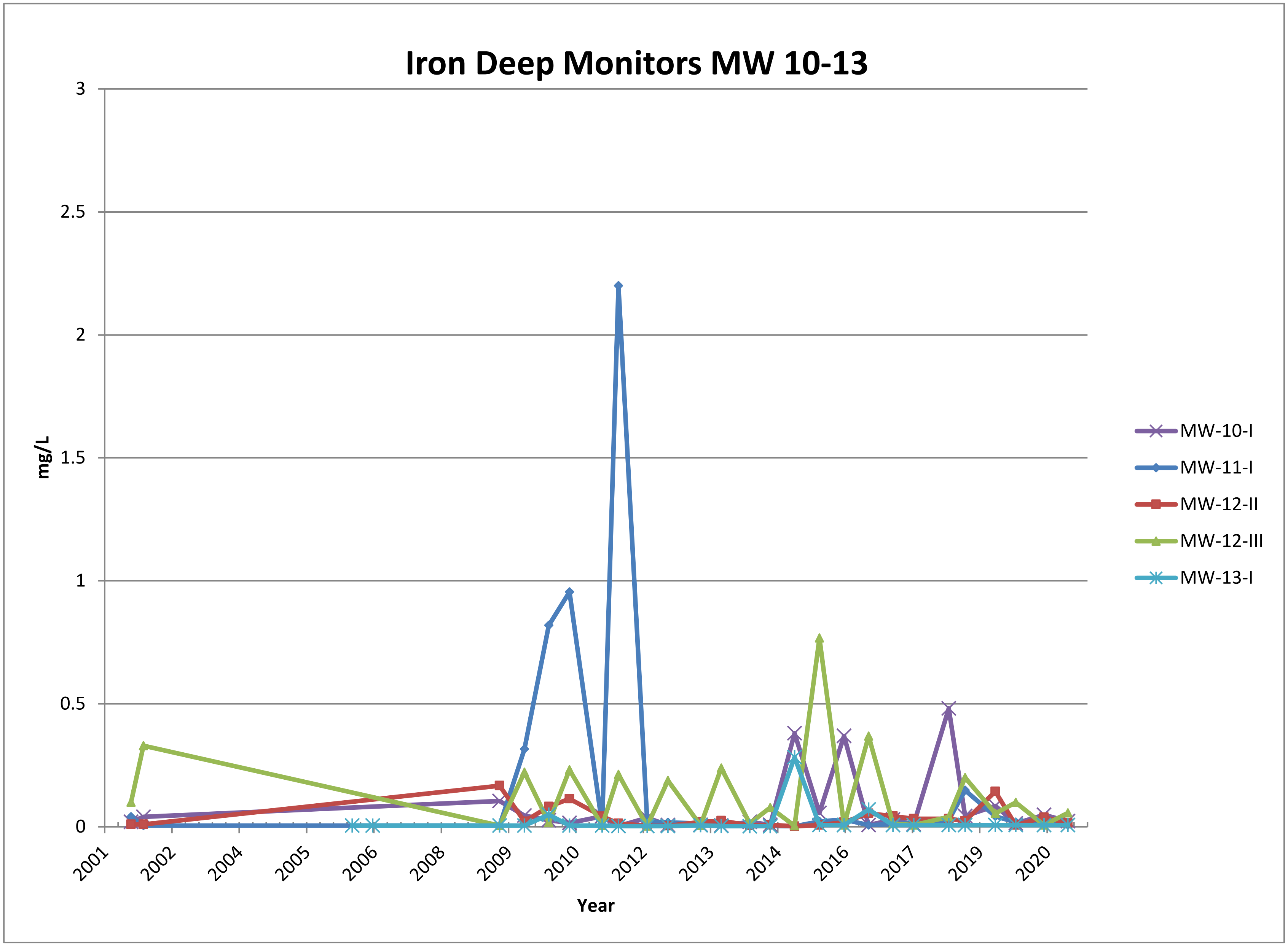
MW-8-I
MW-9-I



Iron Deep Monitors MW 10-13
mg/L
3
2.5
2
1.5
1
0.5
0
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
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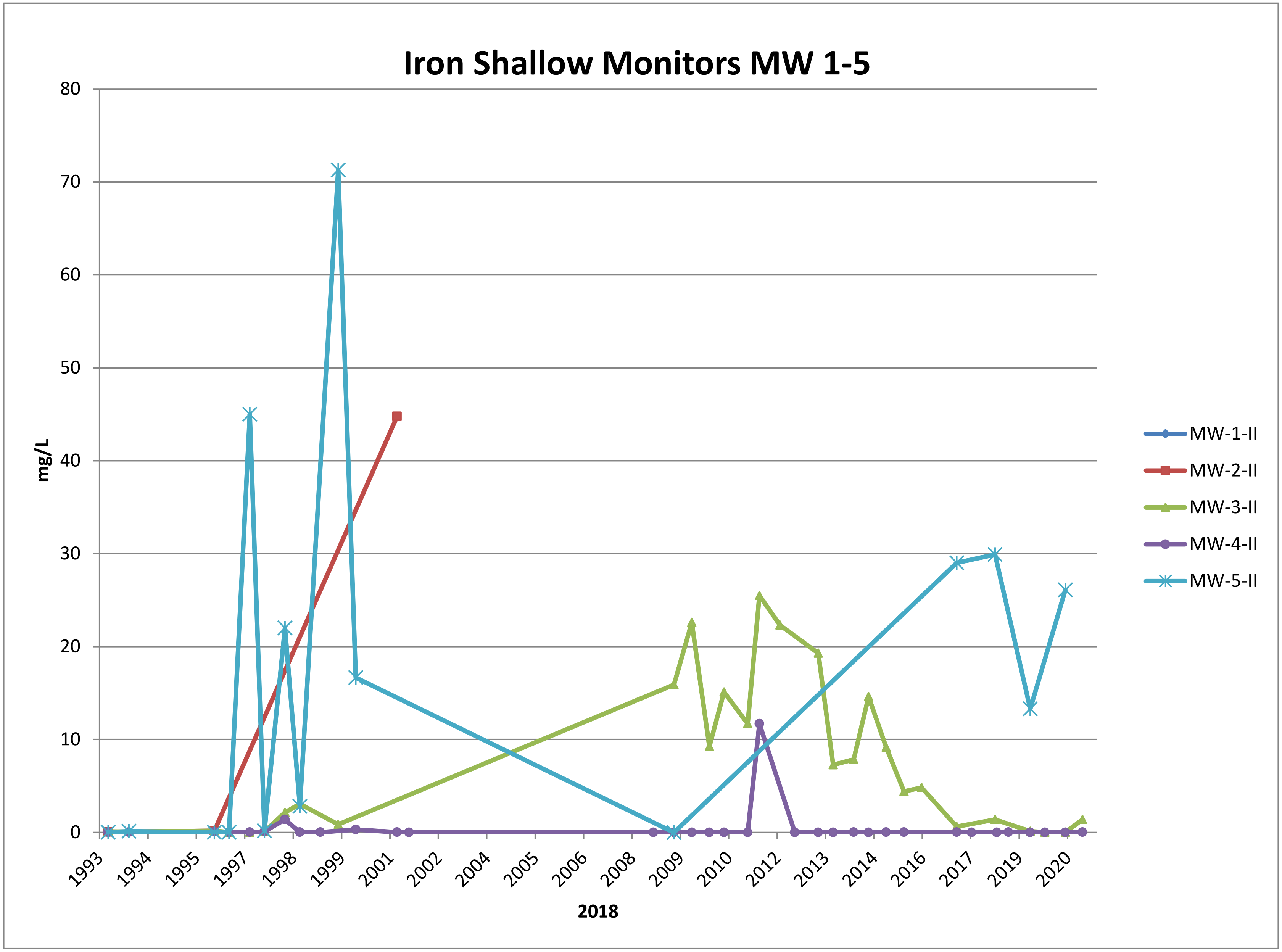
2016
2017
2019
2020
Year
MW-10-I
MW-11-I
MW-12-II
MW-12-III
MW-13-I



Iron Shallow Monitors MW 1-5
mg/L
80
70
60
50
40
30
20
10
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
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2019
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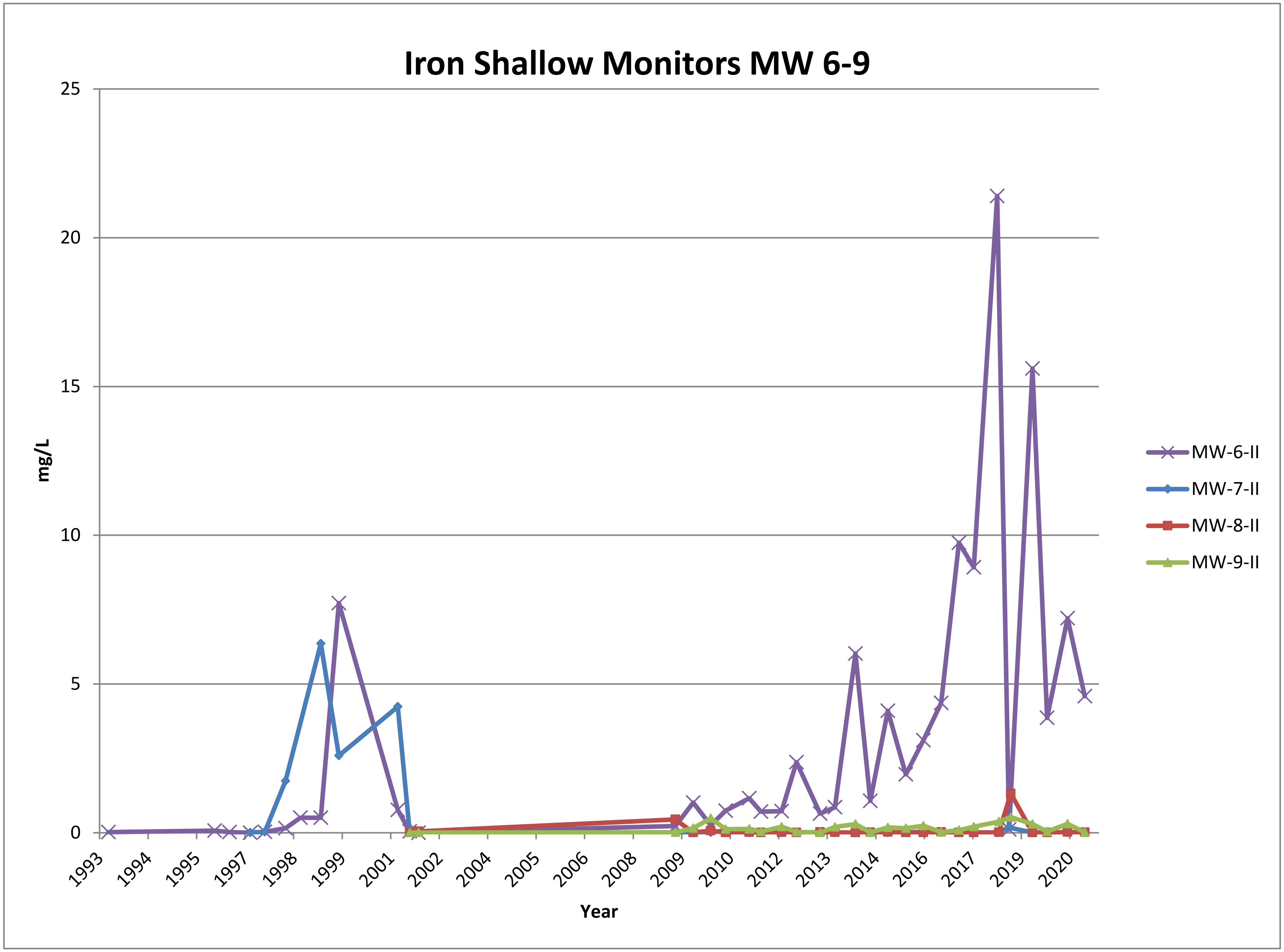
MW-1-II
MW-2-II
MW-3-II
MW-4-II
MW-5-II



Iron Shallow Monitors MW 6-9
25
20
15
10
5
0
mg/L
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
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2014
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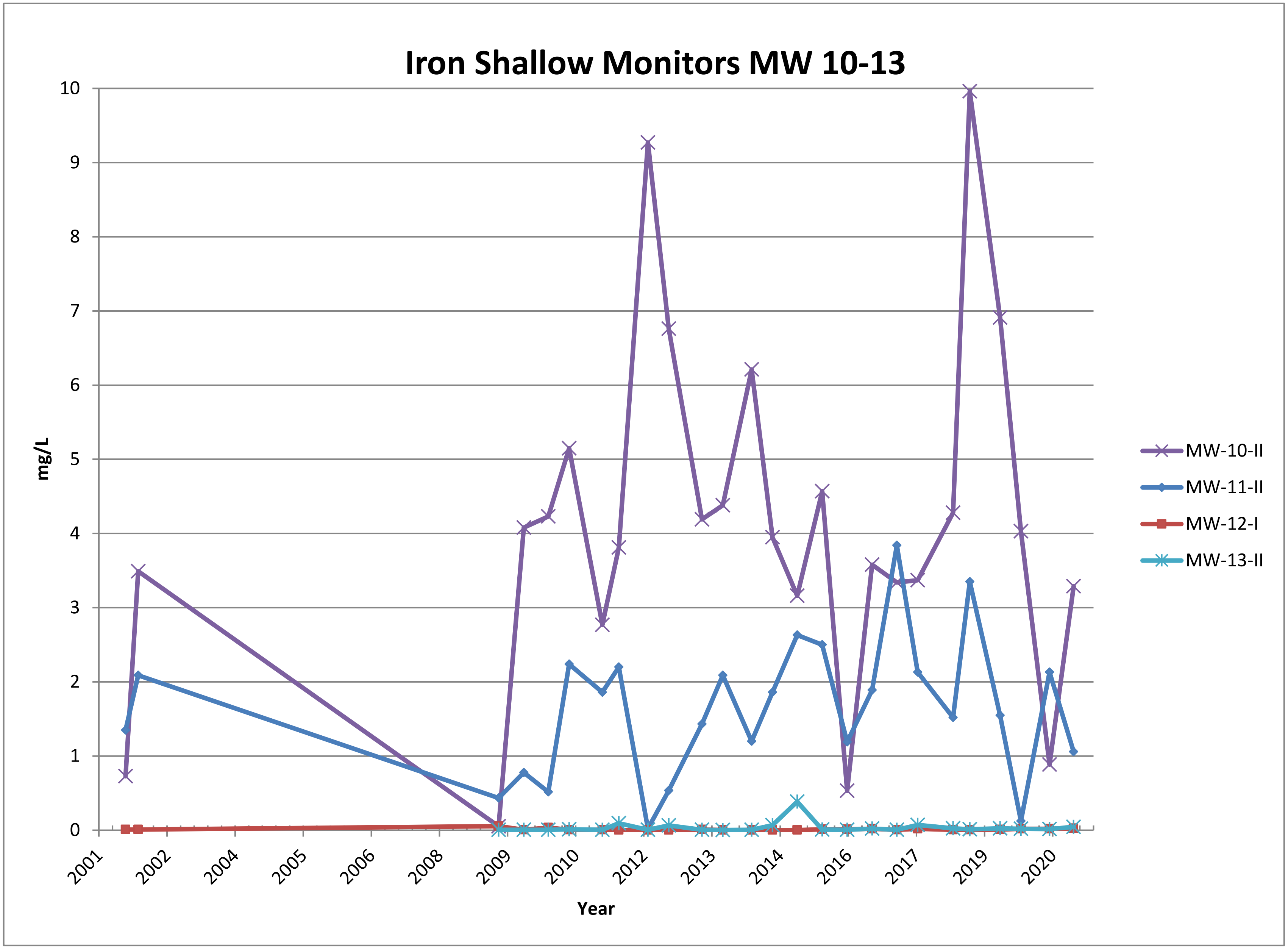
MW-8-II
MW-9-II



Iron Shallow Monitors MW 10-13
mg/L
10
9
8
7
6
5
4
3
2
1
0
2001
2002
2004
2005
2006
2008
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Year
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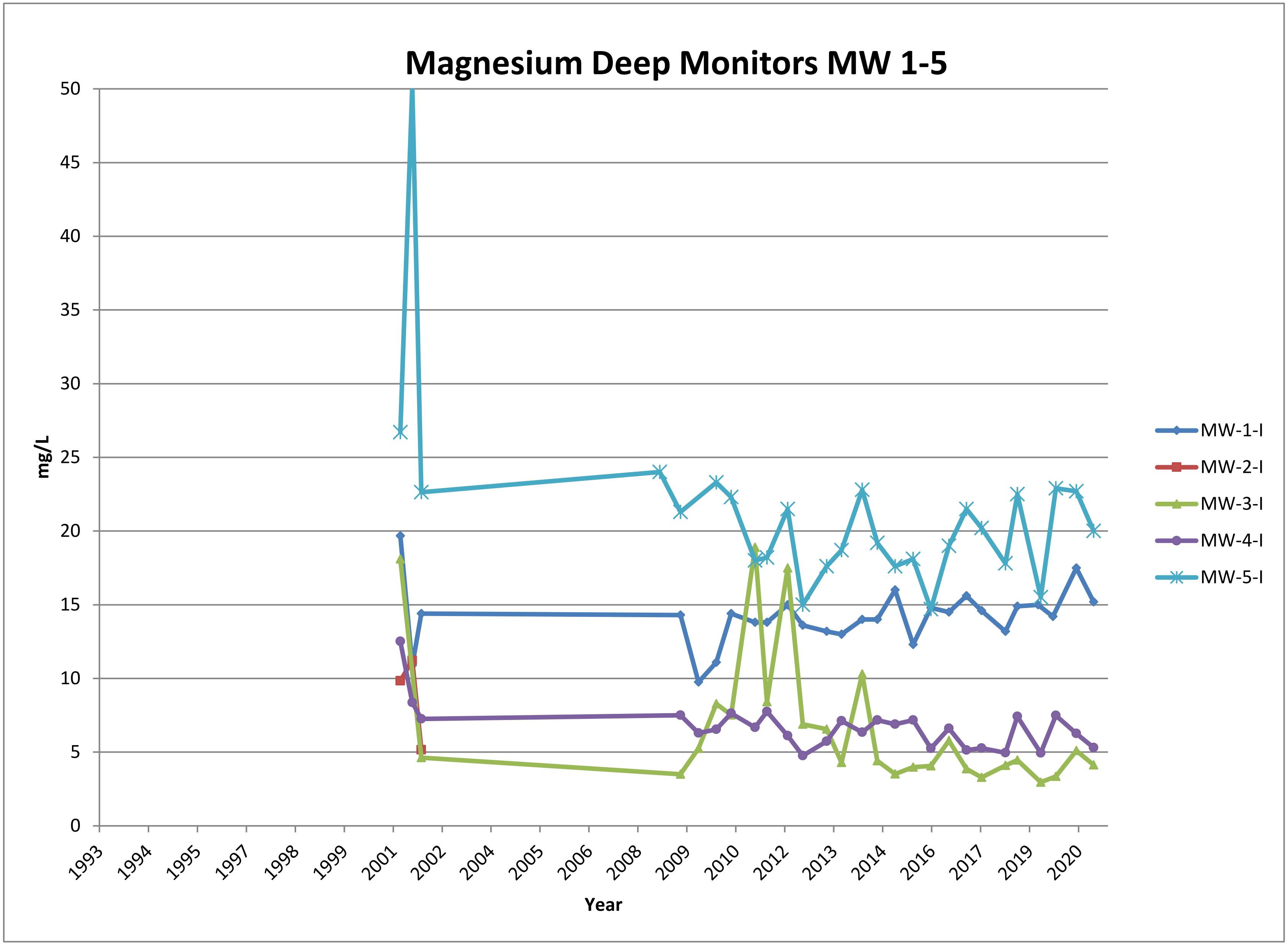
MW-12-I
MW-13-II



Magnesium Deep Monitors MW 1-5
mg/L
50
45
40
35
30
25
20
15
10
5
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
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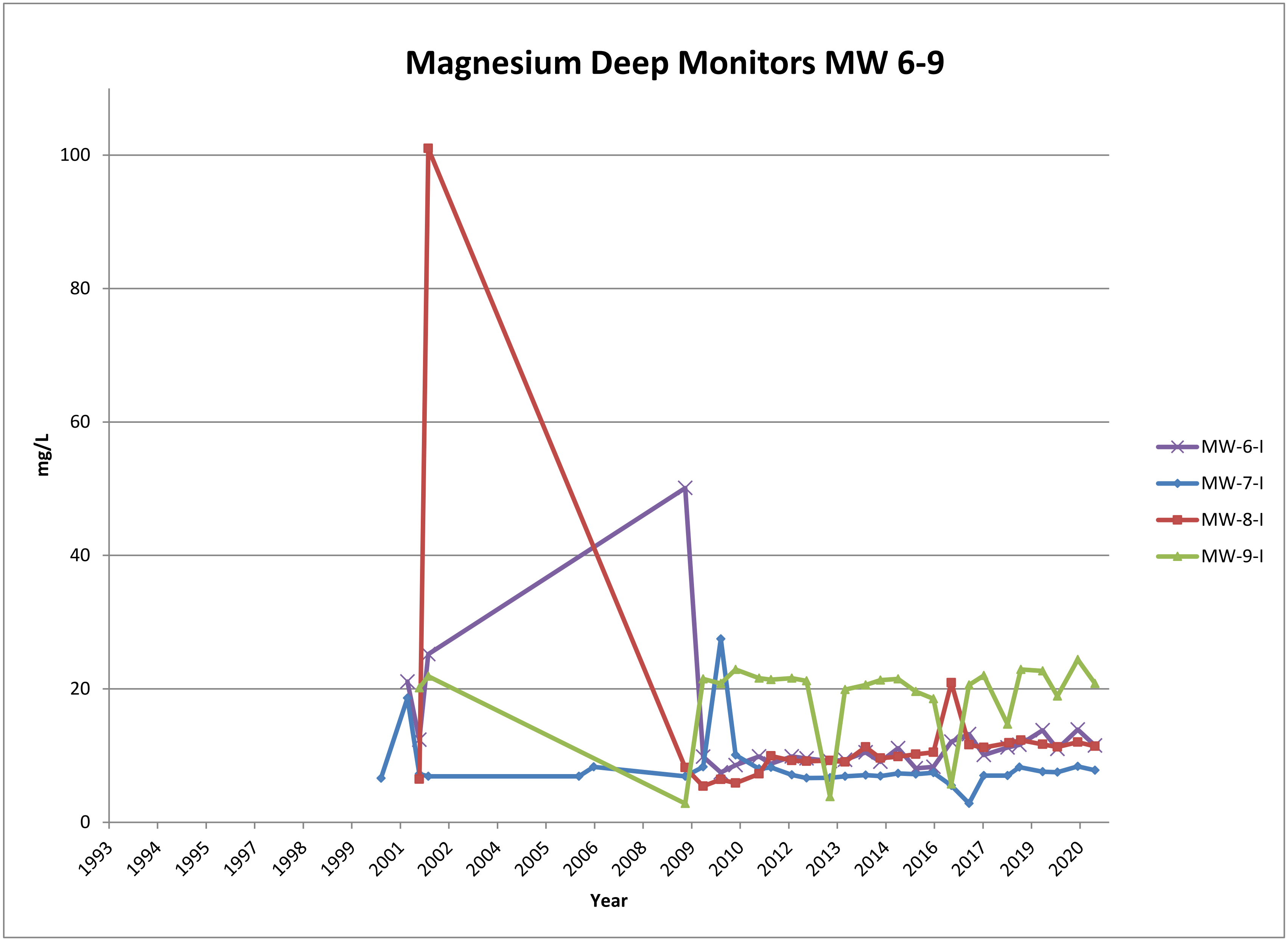
Year
MW-1-I
MW-2-I
MW-3-I
MW-4-I
MW-5-I


Magnesium Deep Monitors MW 6-9
mg/L
100
80
60
40
20
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
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Year
MW-6-I
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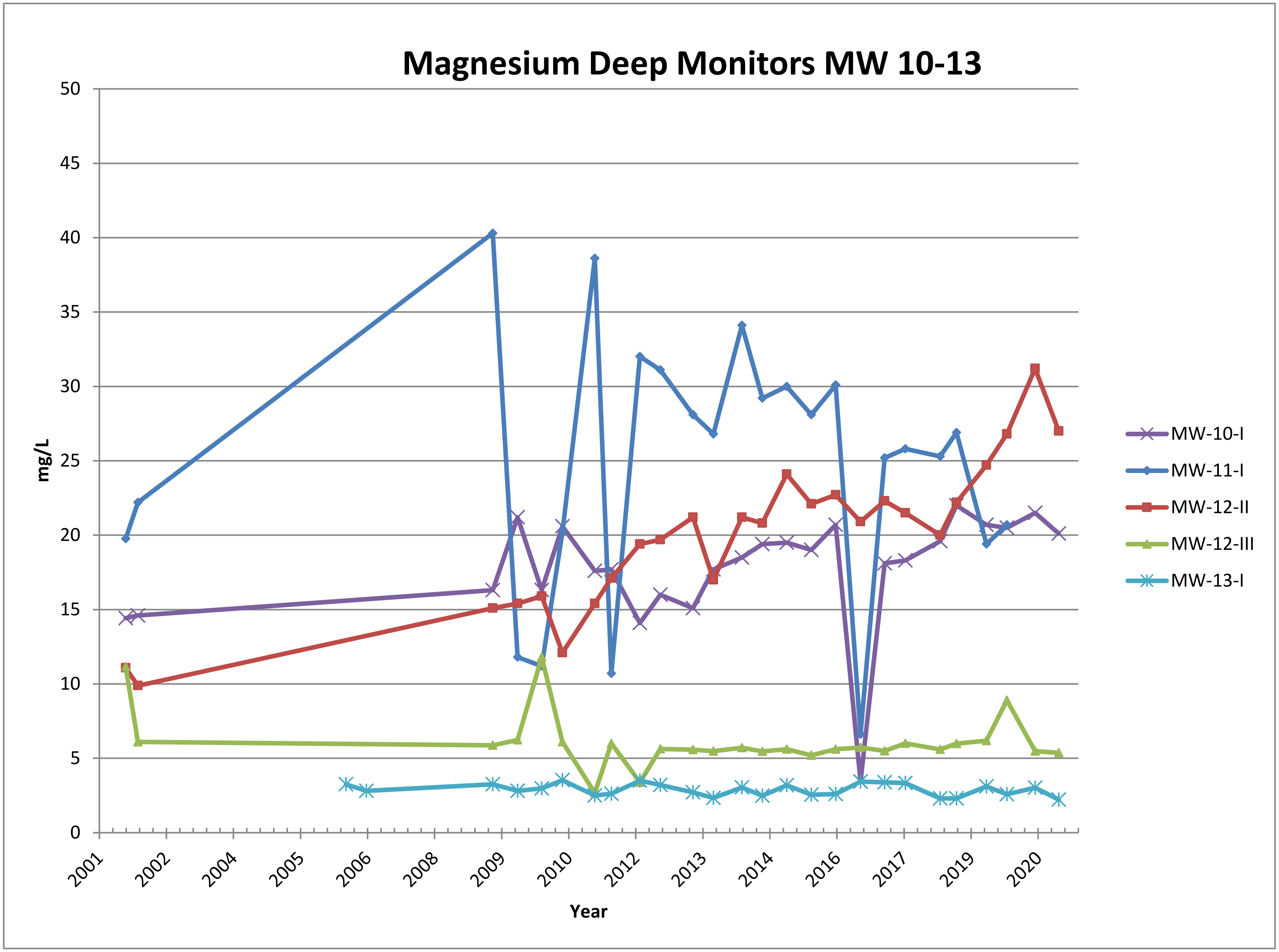
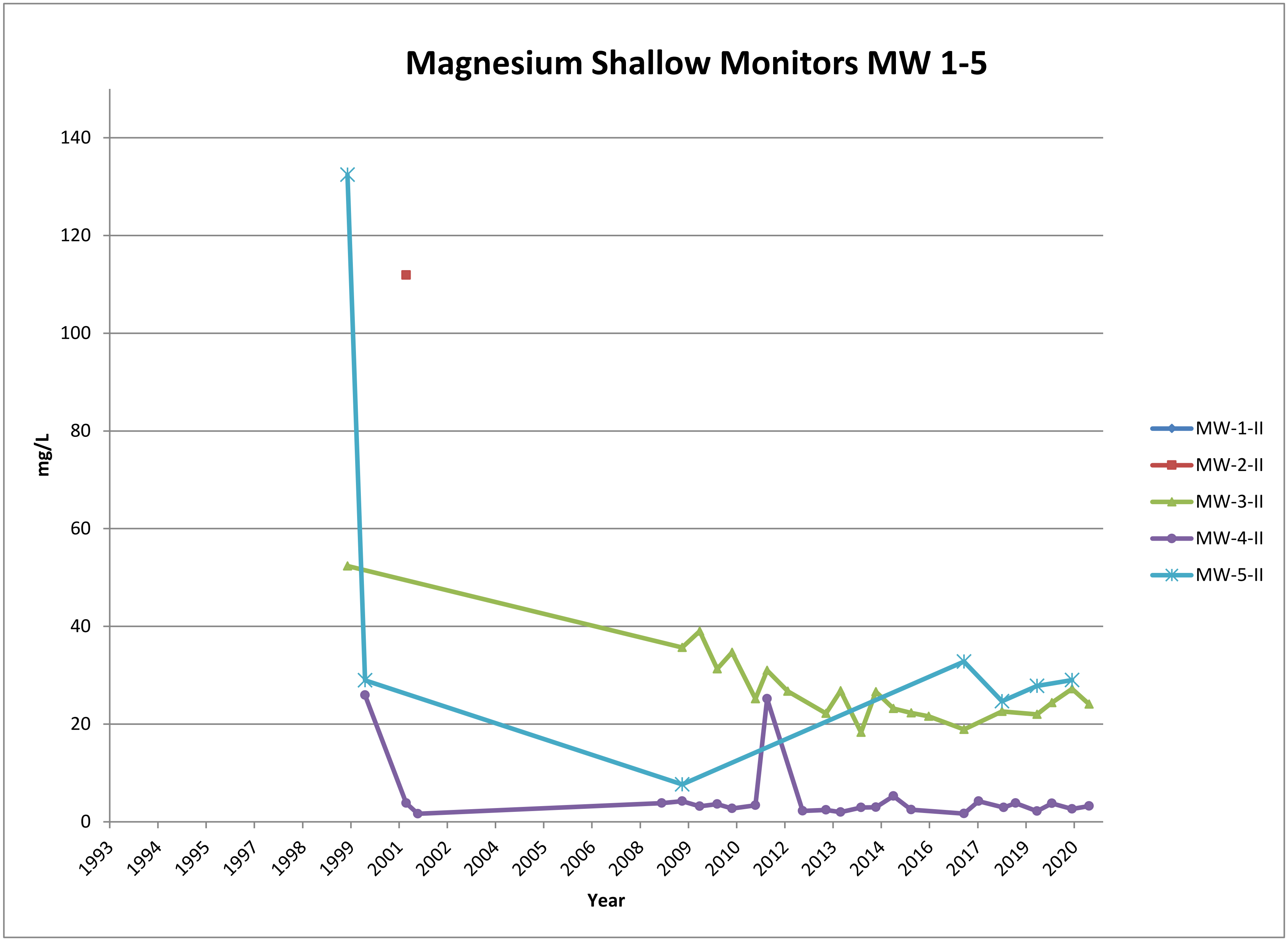
MW-8-I
MW-9-I



Magnesium Deep Monitors MW 10-13
mg/L
50
45
40
35
30
25
20
15
10
5
0
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-10-I
MW-11-I
MW-12-II
MW-12-III
MW-13-I



Magnesium Shallow Monitors MW 1-5
mg/L
0
20
40
60
80
100
120
140
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
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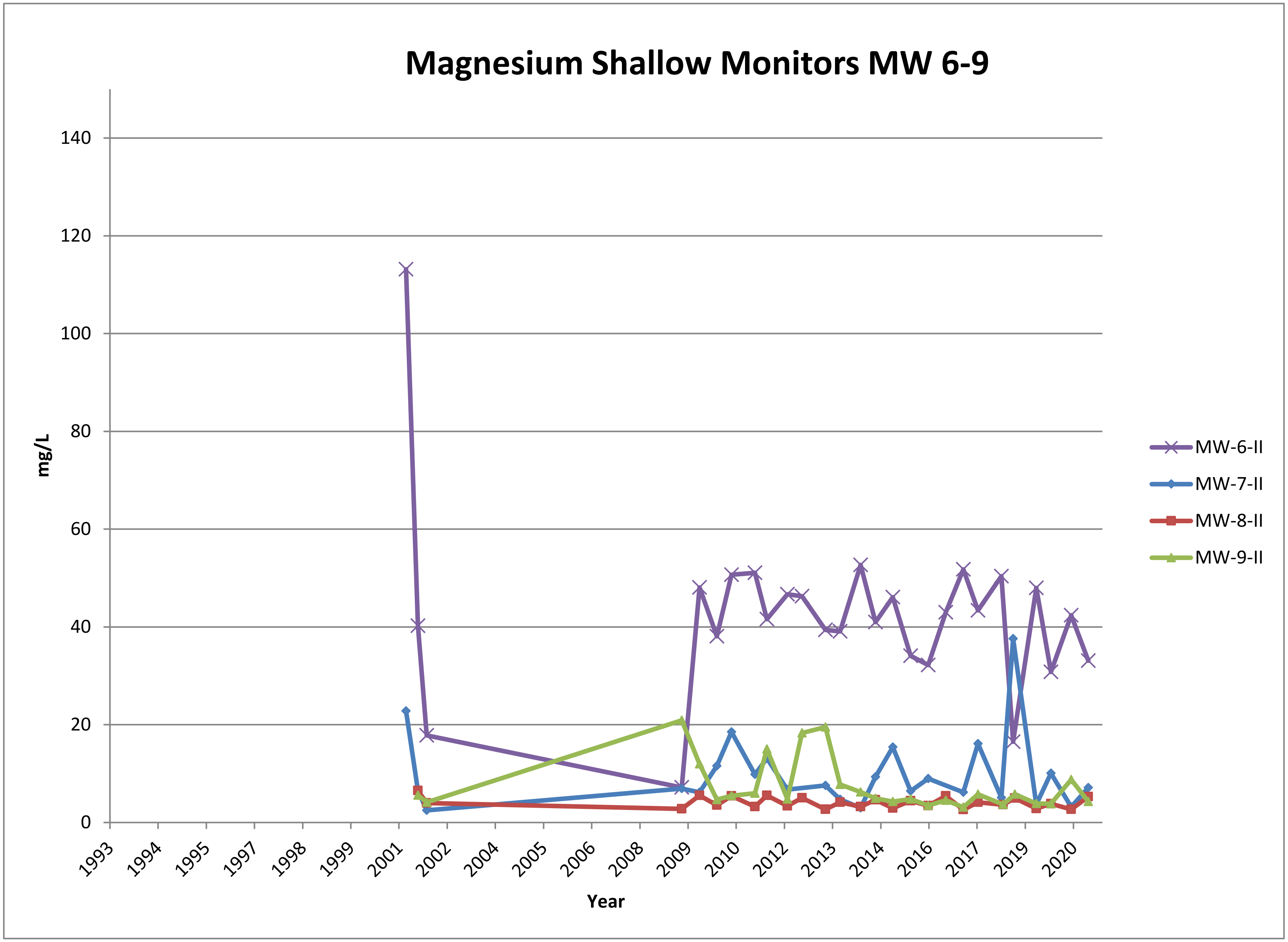
Year
MW-1-II
MW-2-II
MW-3-II
MW-4-II
MW-5-II



Magnesium Shallow Monitors MW 6-9
mg/L
0
20
40
60
80
100
120
140
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
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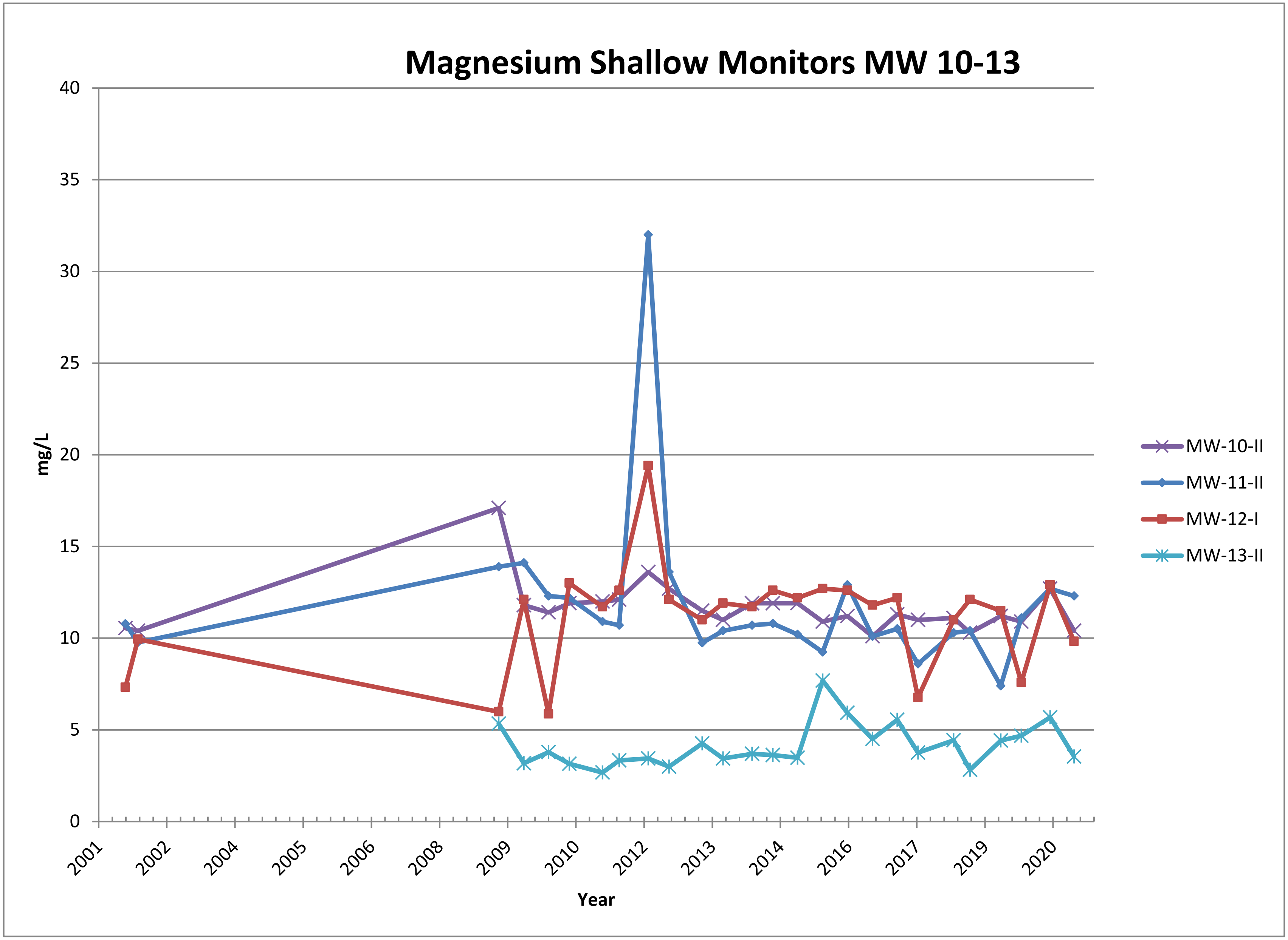
Year
MW-6-II
MW-7-II
MW-8-II
MW-9-II



Magnesium Shallow Monitors MW 10-13
mg/L
40
35
30
25
20
15
10
5
0
2001
2002
2004
2005
2006
2008
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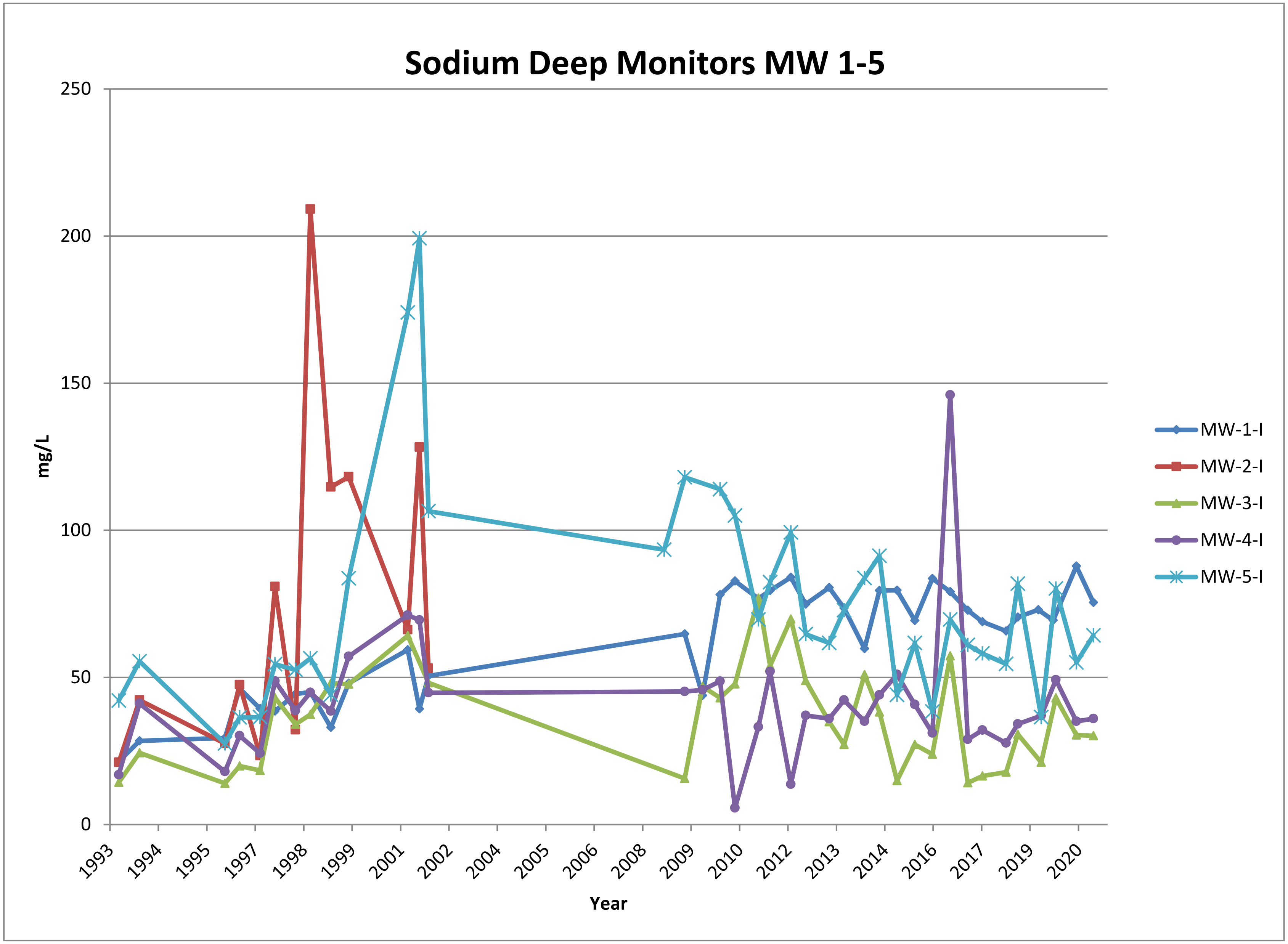
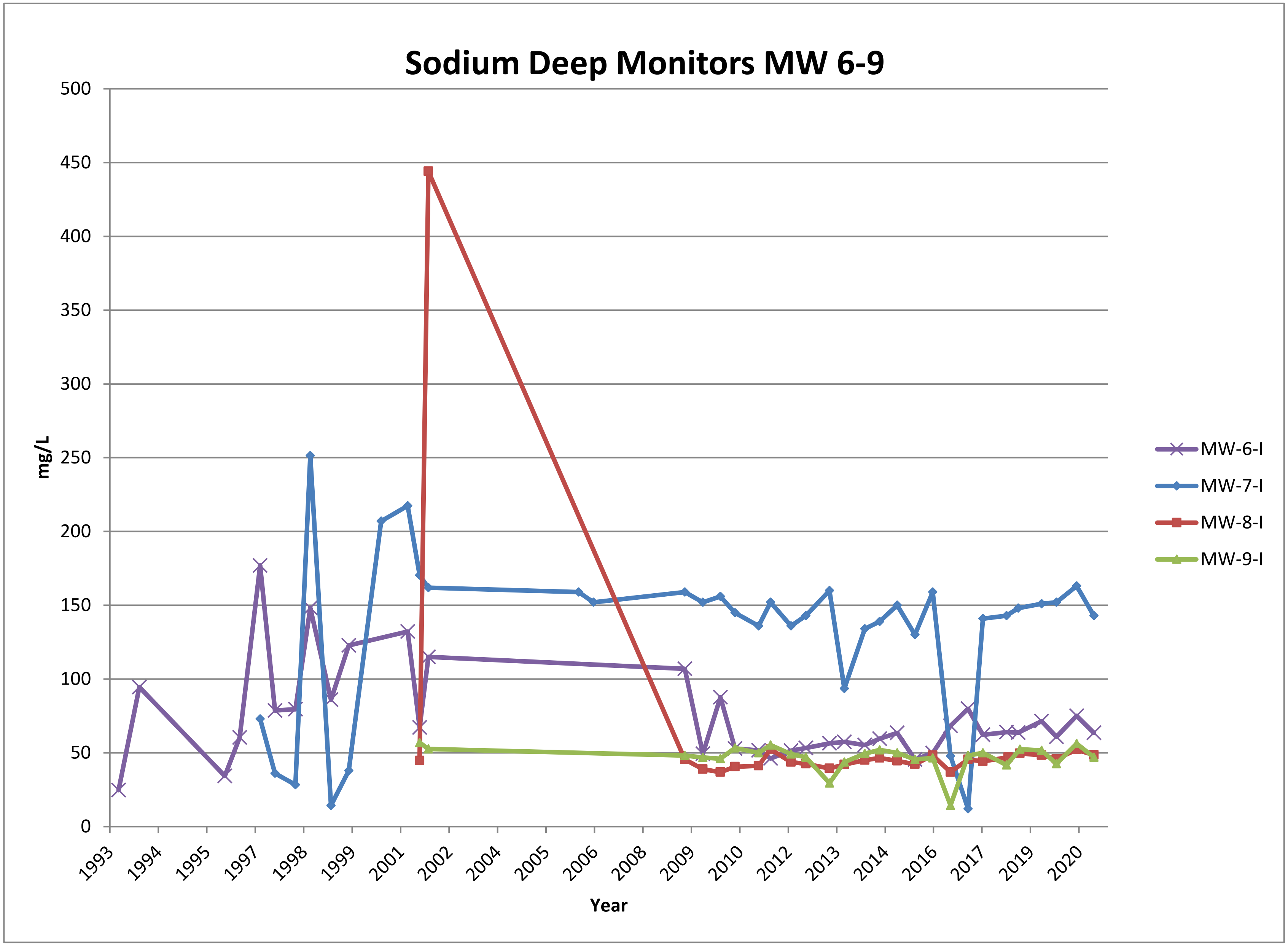
MW-12-I
MW-13-II



Sodium Deep Monitors MW 1-5
250
200
150
100
50
0
mg/L
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-1-I
MW-2-I
MW-3-I
MW-4-I
MW-5-I


Sodium Deep Monitors MW 6-9
mg/L
500
450
400
350
300
250
200
150
100
50
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
2012
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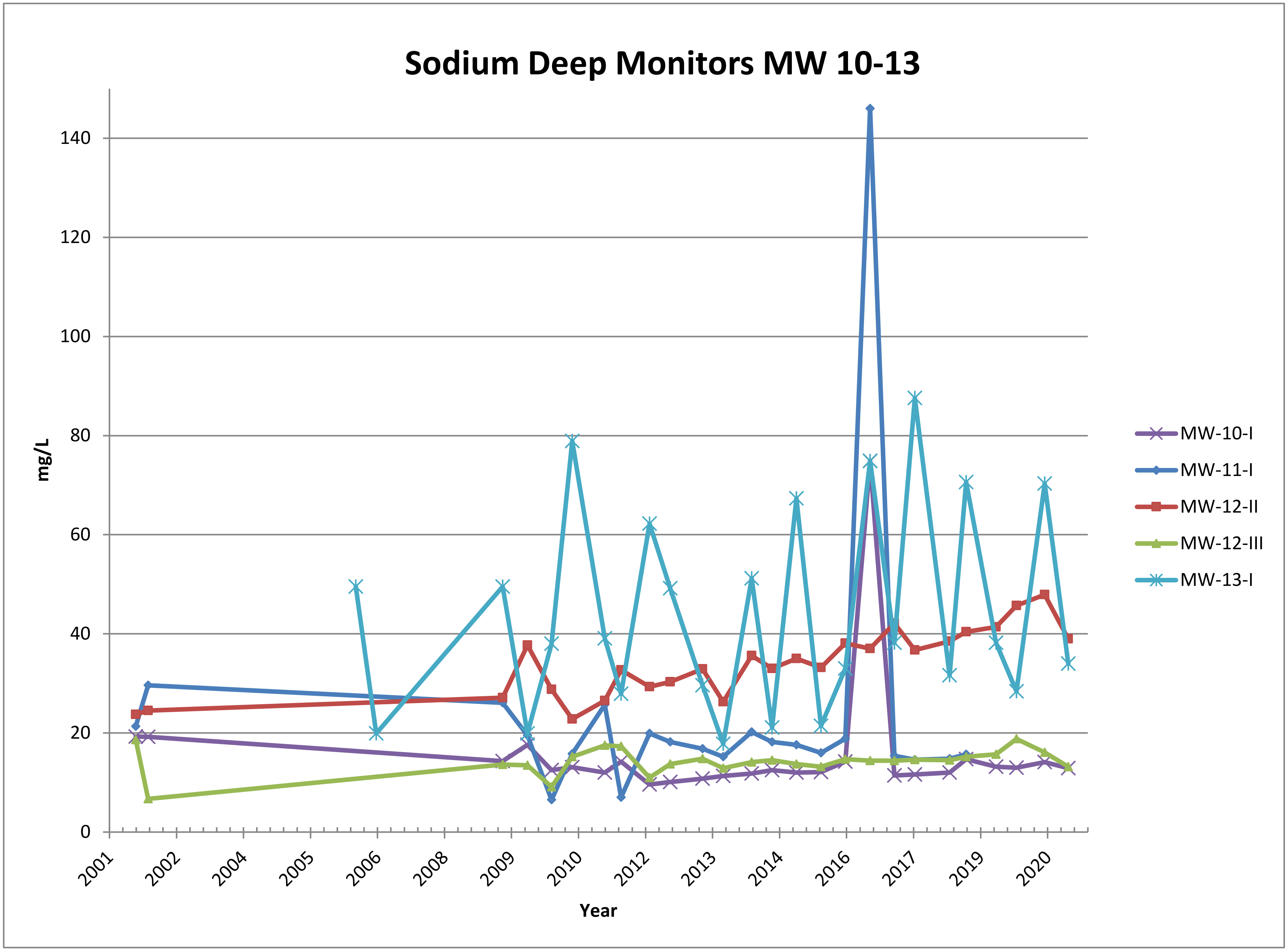
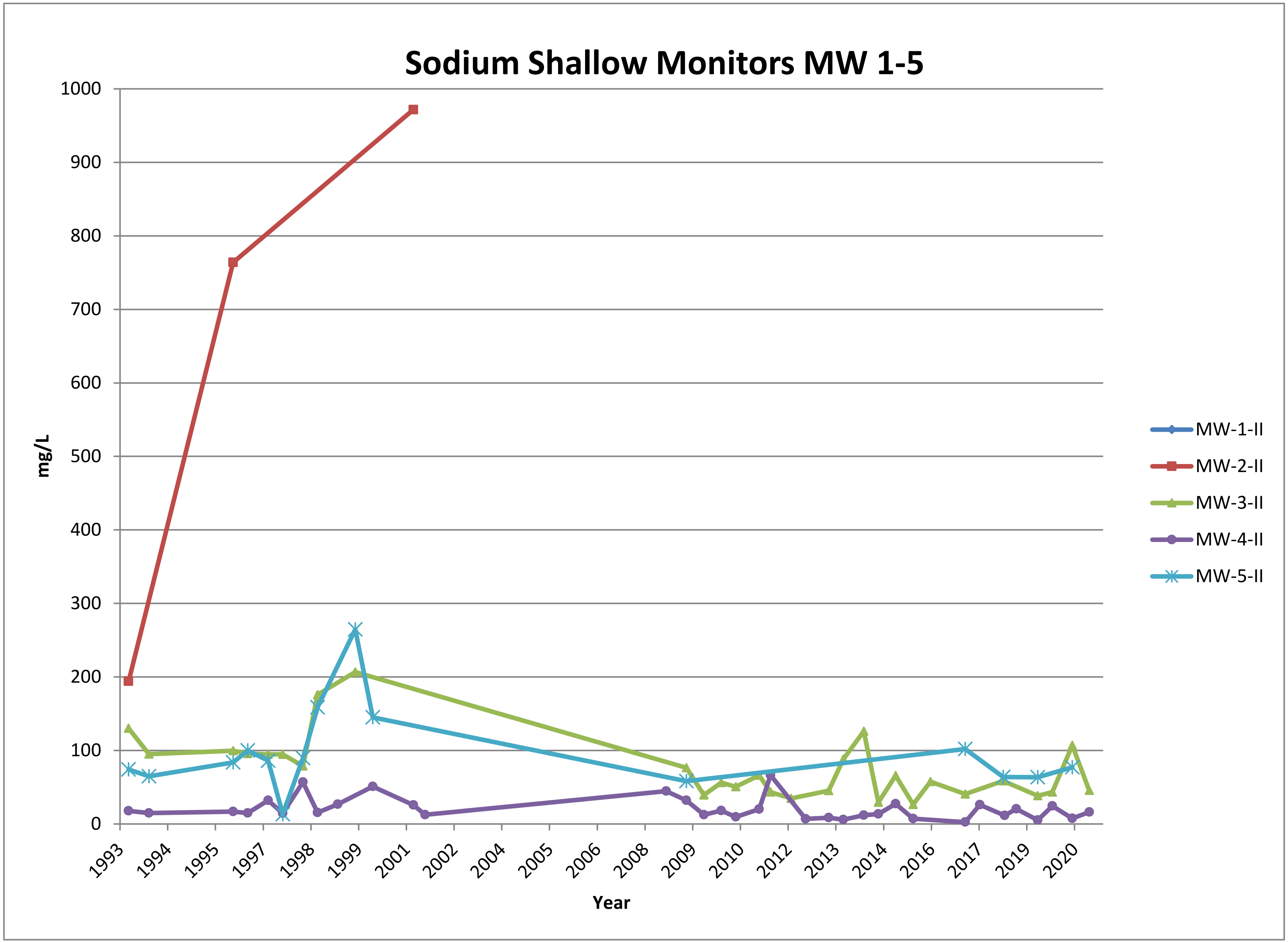
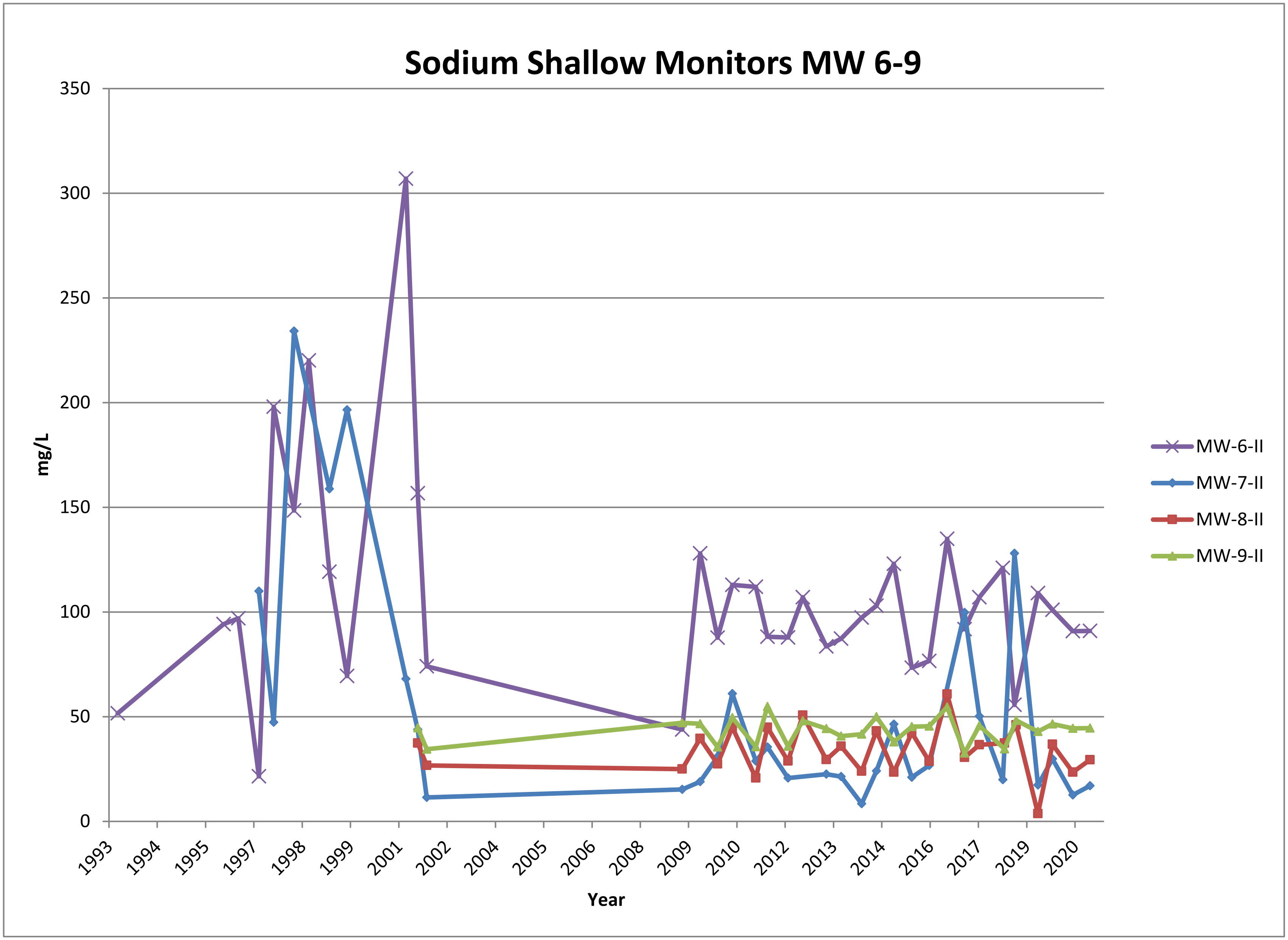
2019
2020
Year
MW-6-I
MW-7-I
MW-8-I
MW-9-I



Sodium Deep Monitors MW 10-13
mg/L
0
20
40
60
80
100
120
140
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-10-I
MW-11-I
MW-12-II
MW-12-III
MW-13-I



Sodium Shallow Monitors MW 1-5
1000
900
800
700
600
500
400
300
200
100
0
mg/L
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
2020
Year
MW-1-II
MW-2-II
MW-3-II
MW-4-II
MW-5-II


Sodium Shallow Monitors MW 6-9
mg/L
Year
350
300
250
200
150
100
50
0
1993
1994
1995
1997
1998
1999
2001
2002
2004
2005
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MW-6-II
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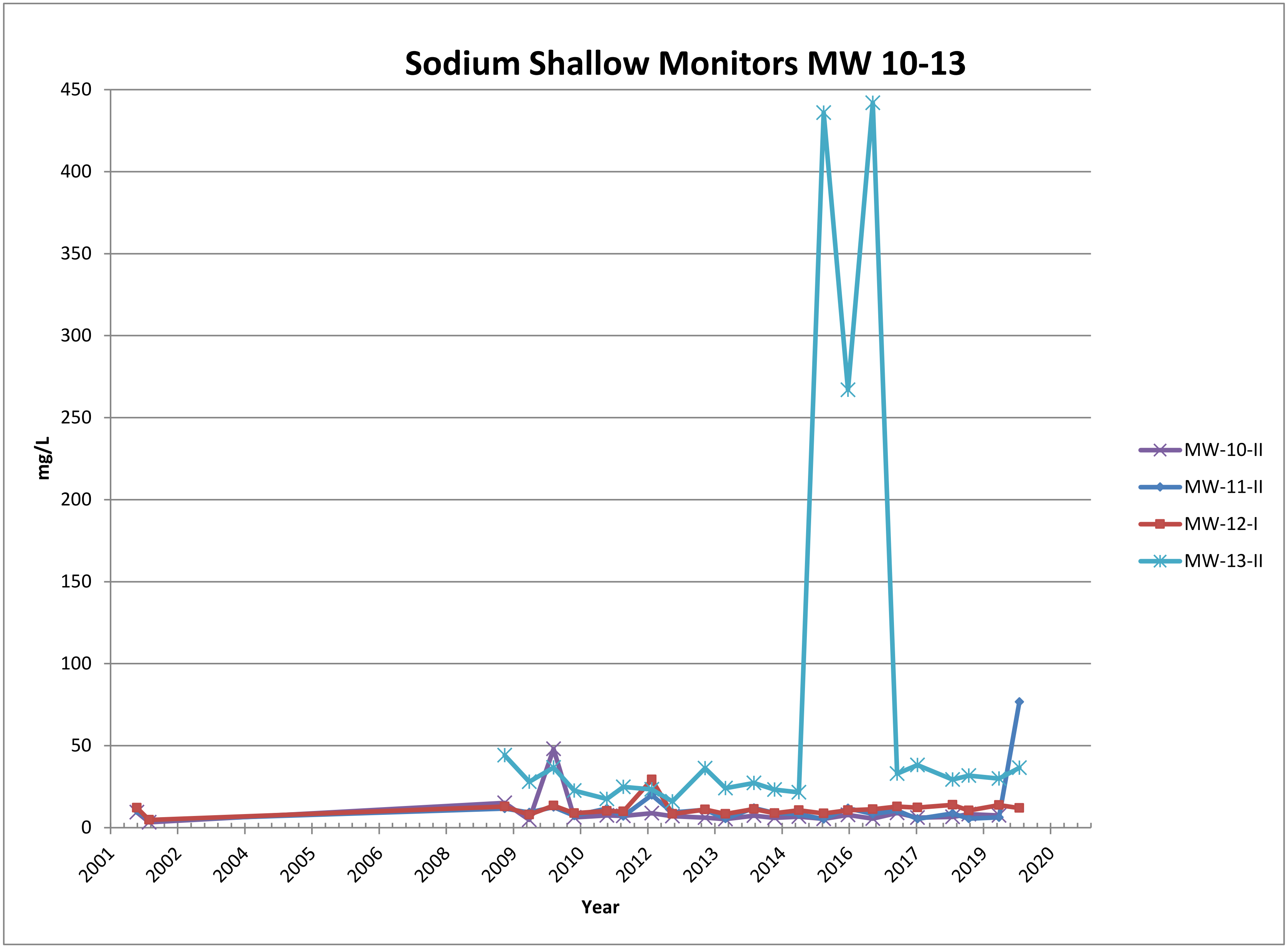
MW-8-II
MW-9-II



Sodium Shallow Monitors MW 10-13
mg/L
450
400
350
300
250
200
150
100
50
0
2001
2002
2004
2005
2006
2008
2009
2010
2012
2013
2014
2016
2017
2019
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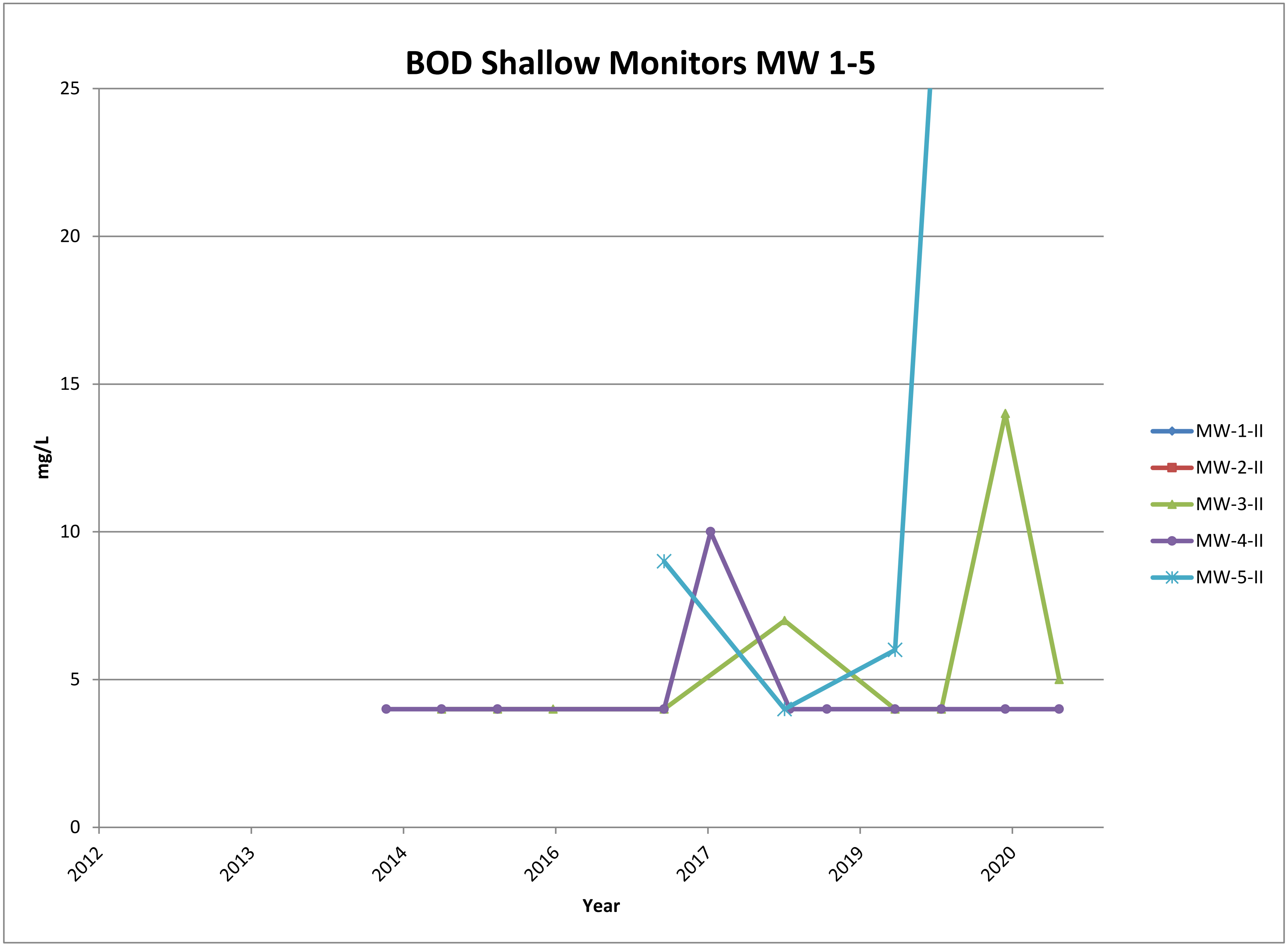
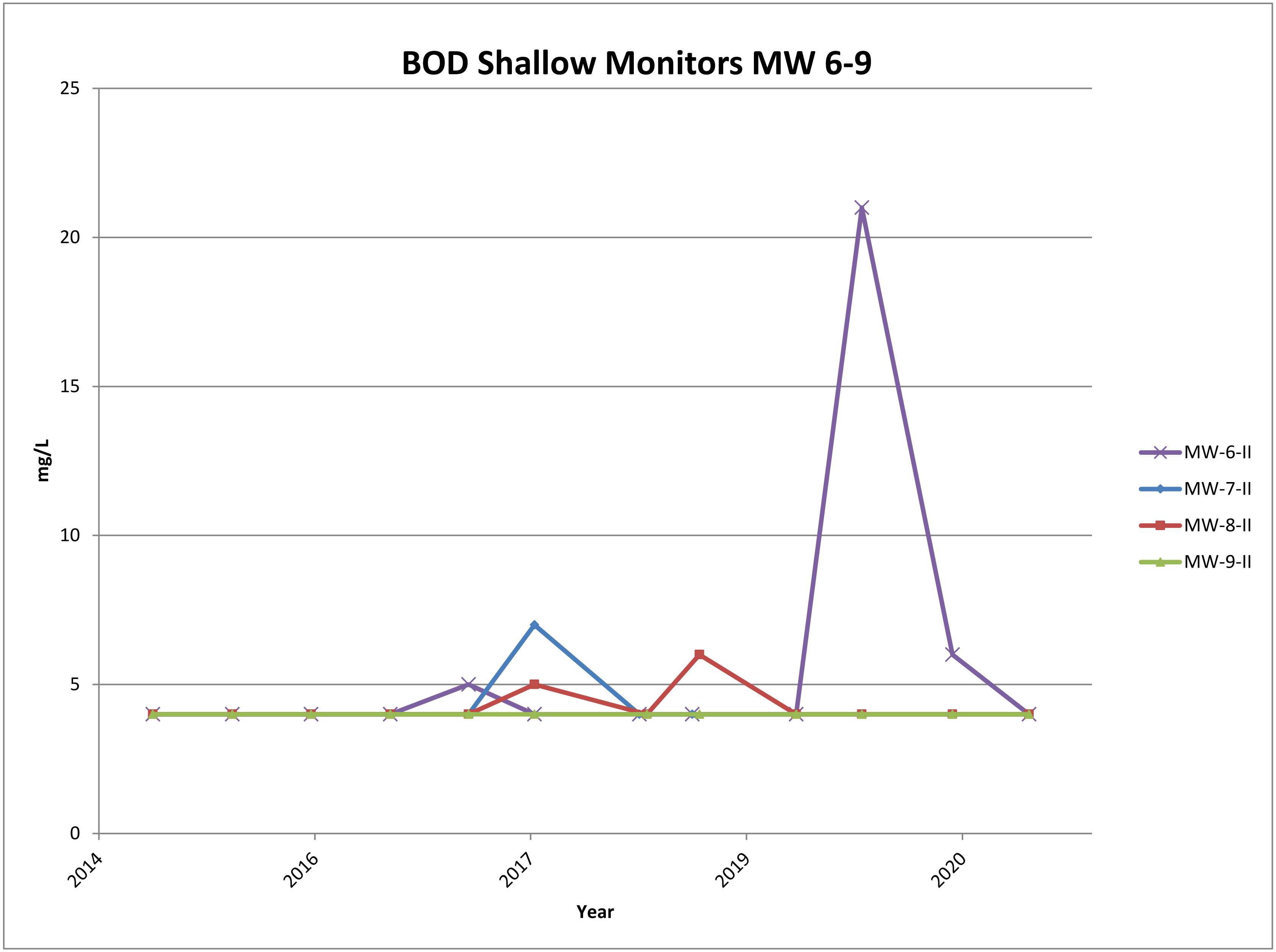
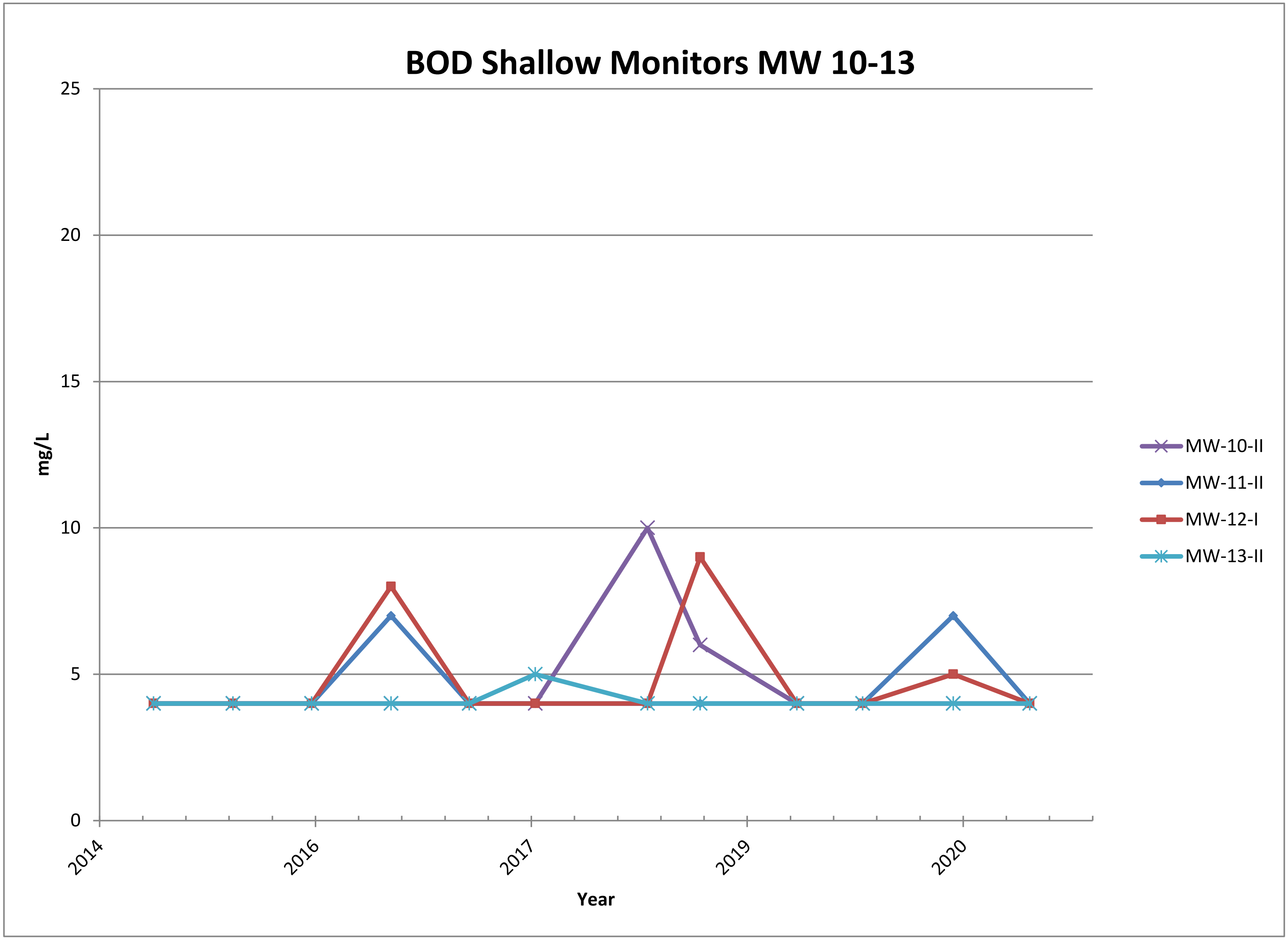
Year
MW-10-II
MW-11-II
MW-12-I
MW-13-II

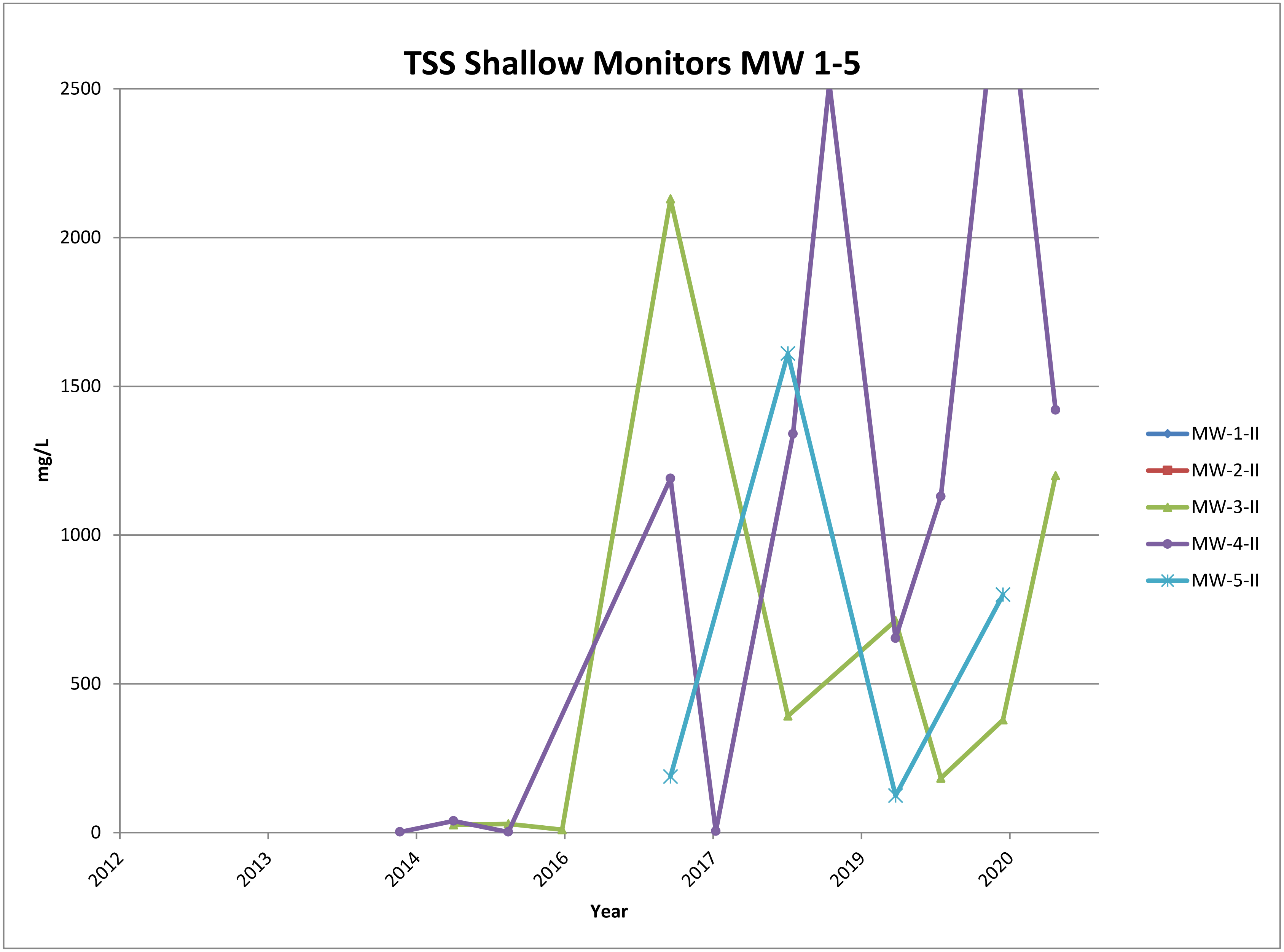


BOD Shallow Monitors MW 1-5
25
20
15
10
5
0
mg/L
2012
2013
2014
2016
2017
2019
2020
Year
MW-1-II
MW-2-II
MW-3-II
MW-4-II
MW-5-II

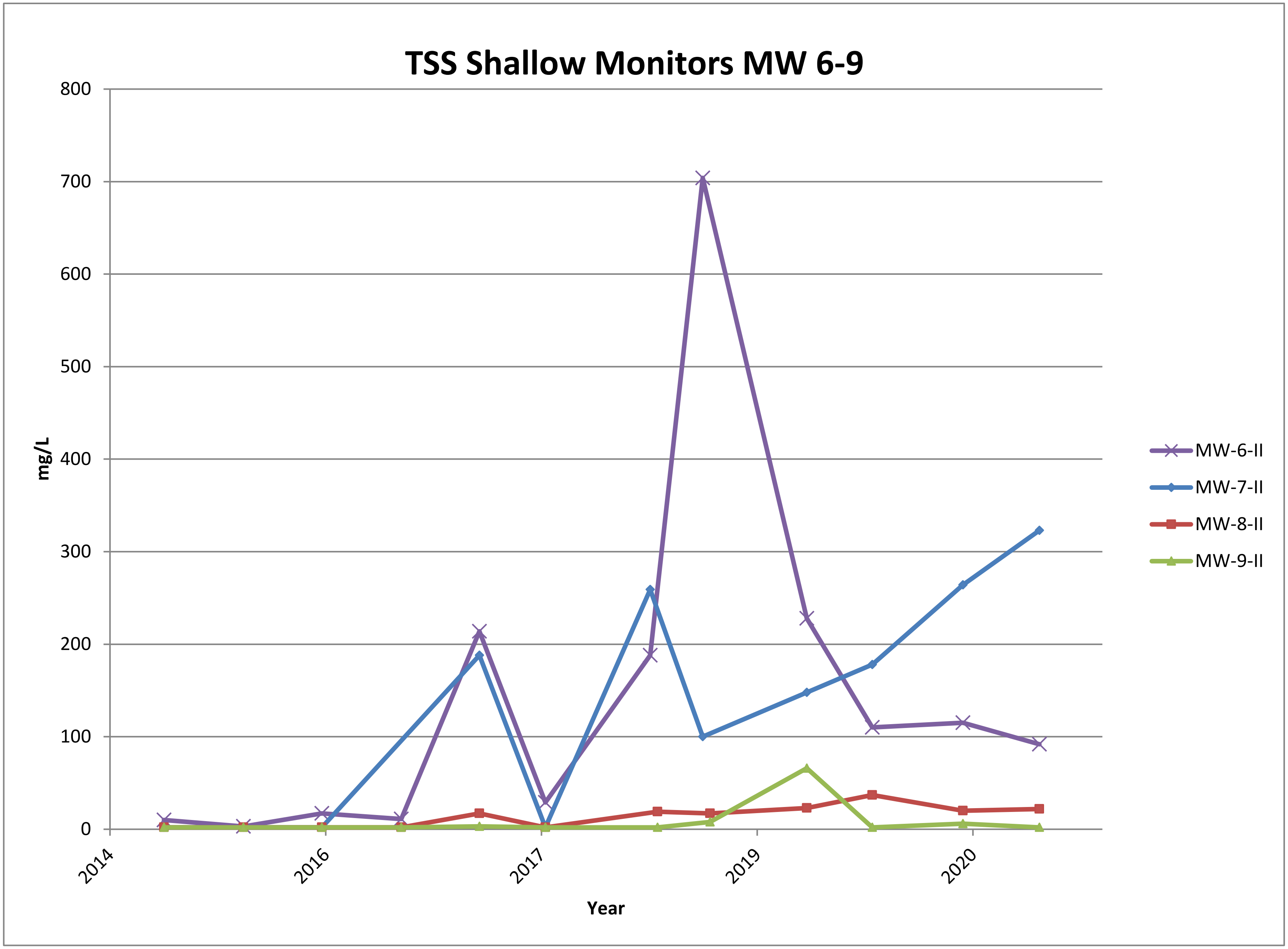


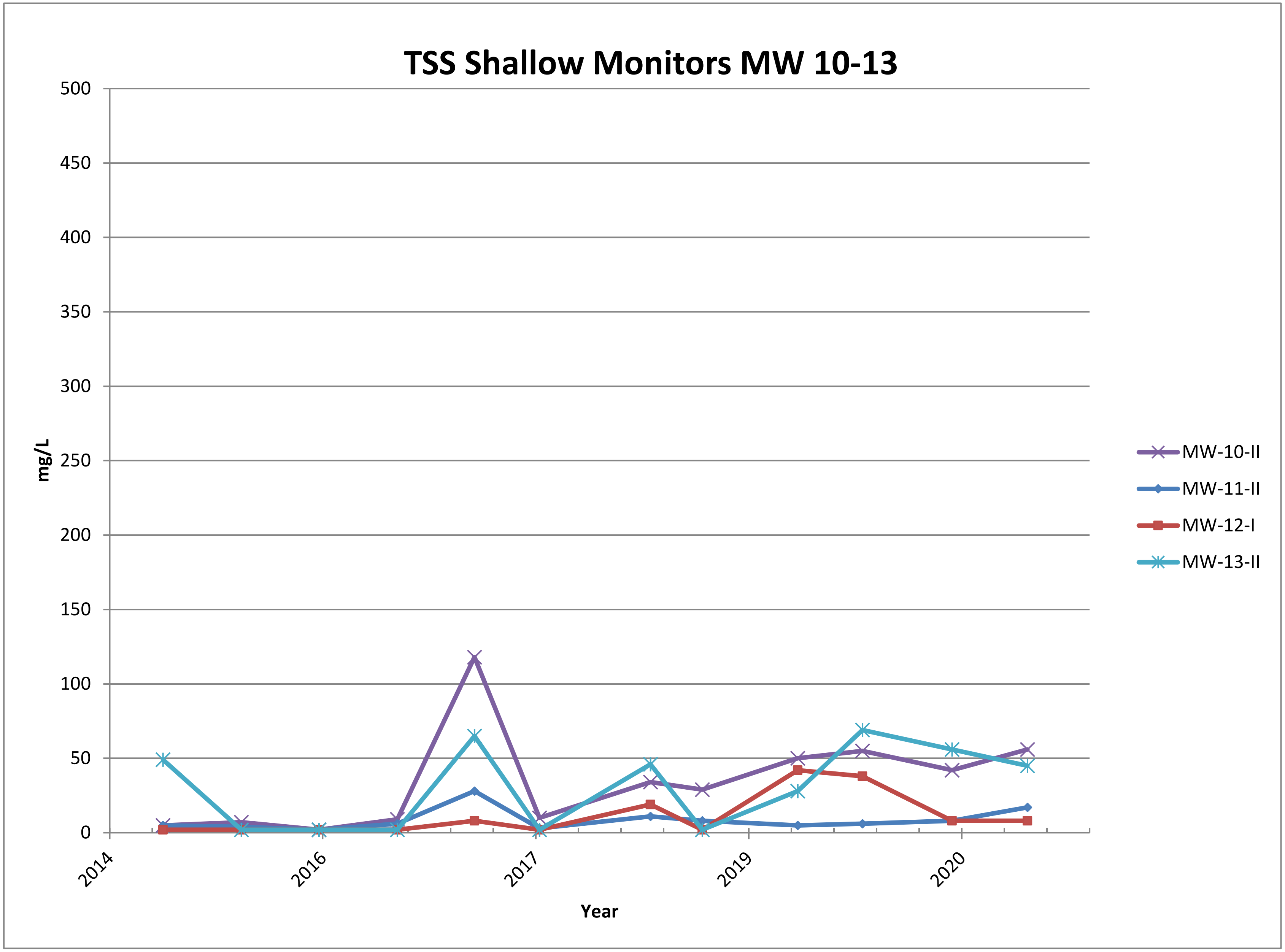
BOD Shallow Monitors MW 6-9
25
20
15
10
5
0
mg/L
2014
2016
2017
2019
2020
Year
MW-6-II
MW-7-II
MW-8-II
MW-9-II


BOD Shallow Monitors MW 10-13
25
20
15
10
5
0
mg/L
2014
2016
2017
2019
2020
Year
MW-10-II
MW-11-II
MW-12-I
MW-13-II



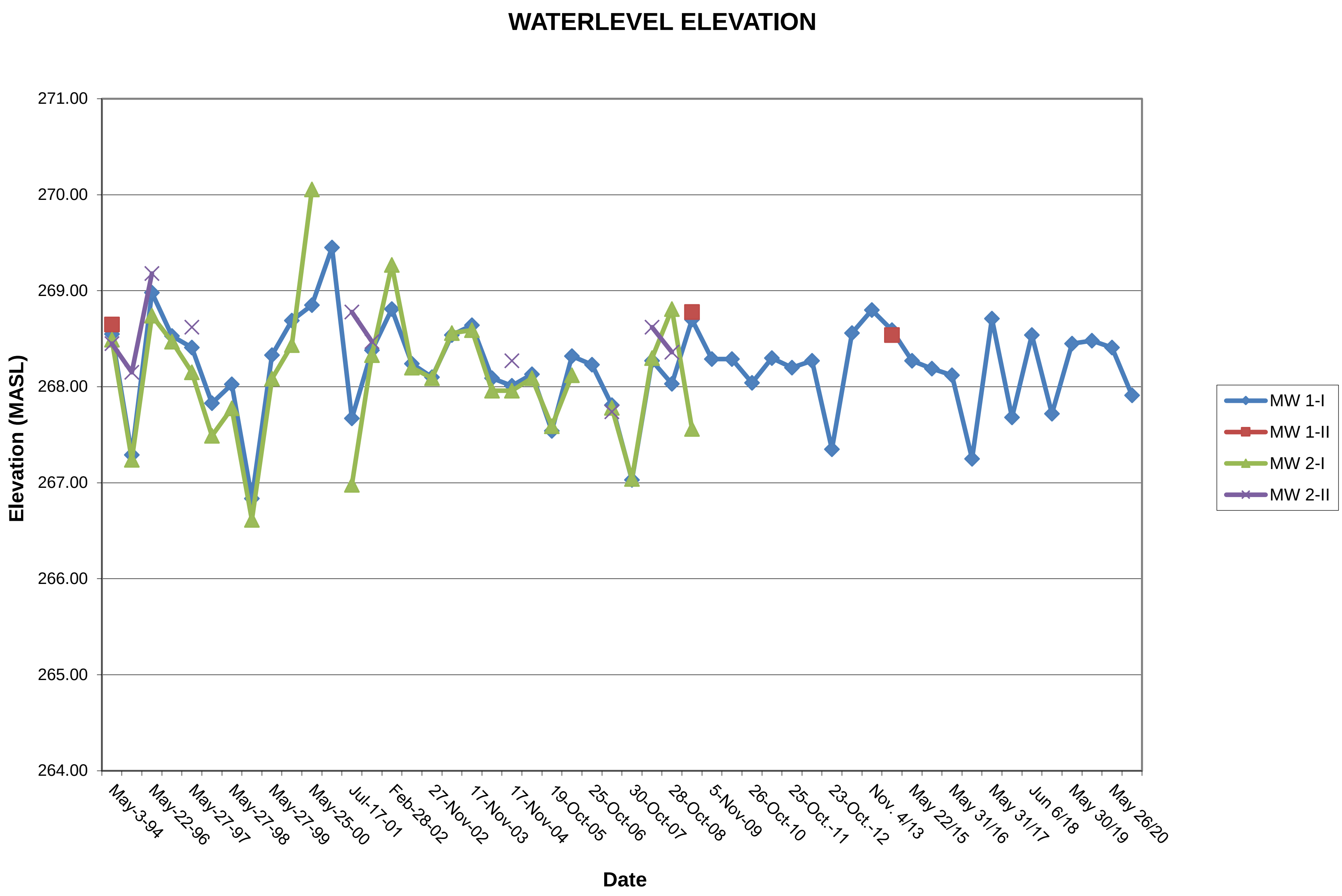
TSS Shallow Monitors MW 1-5
2500
2000
1500
1000
500
0
mg/L
2012
2013
2014
2016
2017
2019
2020
Year
MW-1-II
MW-2-II
MW-3-II
MW-4-II
MW-5-II

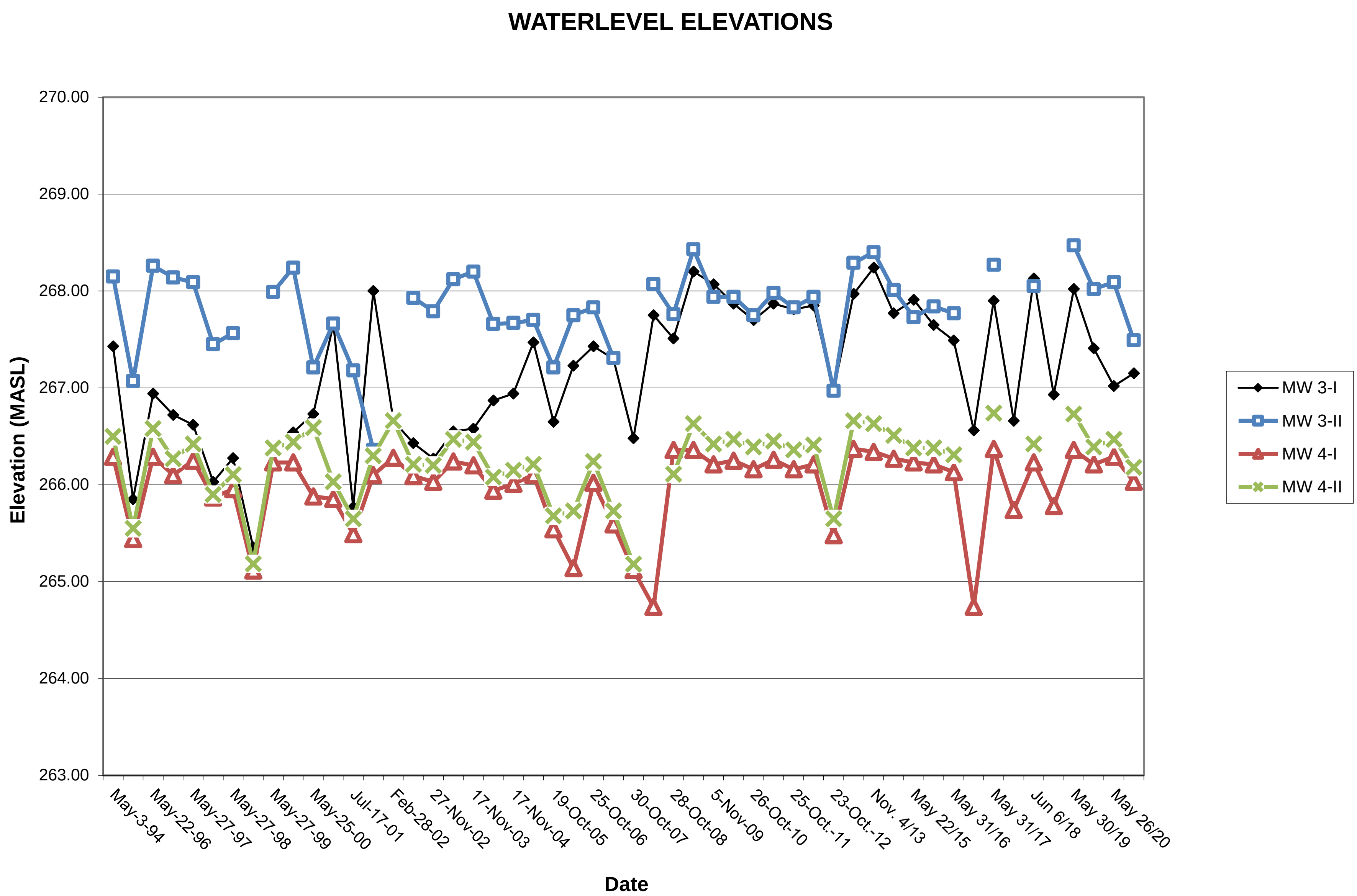

TSS Shallow Monitors MW 6-9
800
700
600
500
400
300
200
100
0
mg/L
2014
2016
2017
2019
2020
Year
MW-6-II
MW-7-II
MW-8-II
MW-9-II

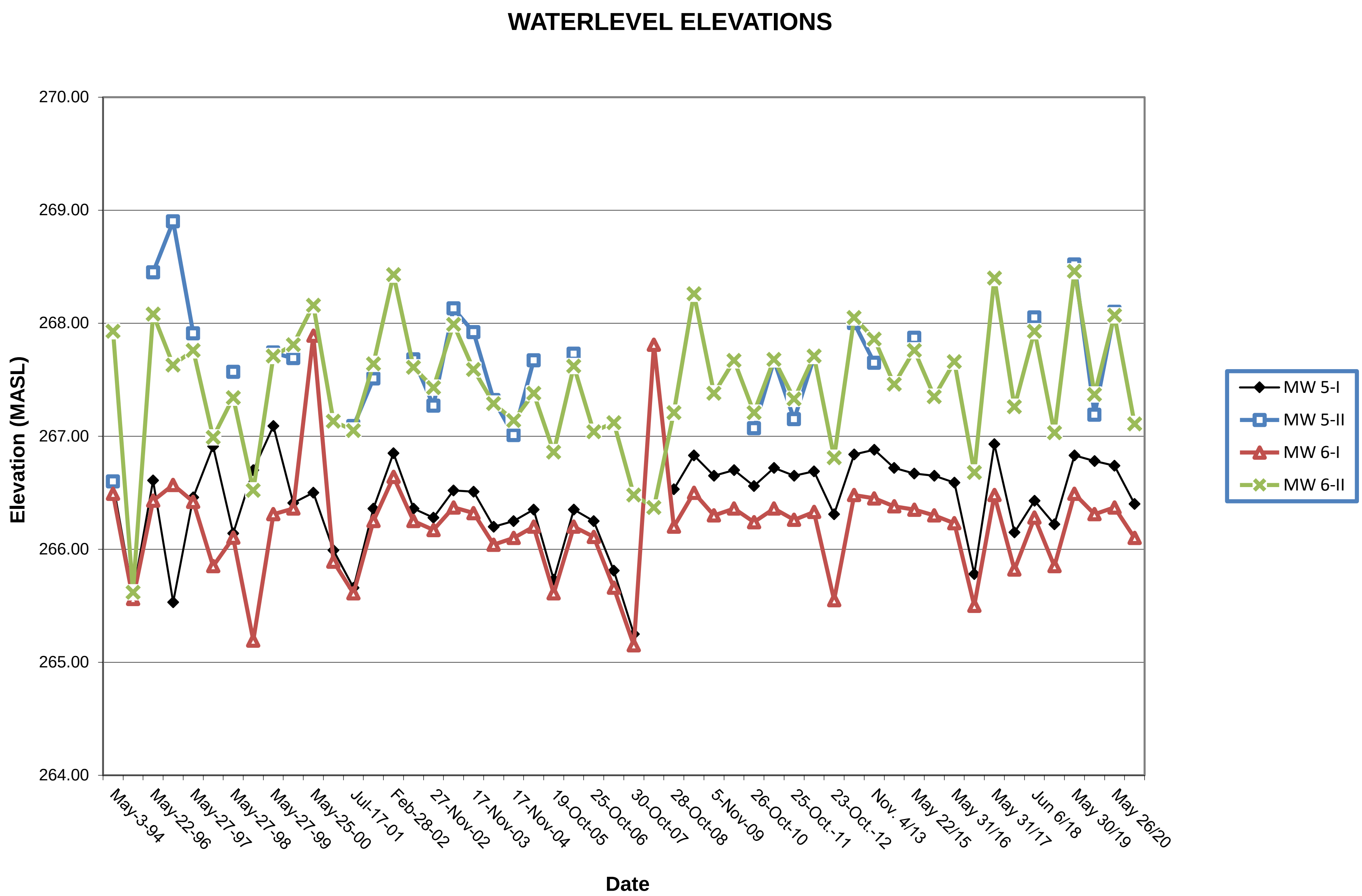


TSS Shallow Monitors MW 10-13
500
450
400
350
300
250
200
150
100
50
0
mg/L
2014
2016
2017
2019
2020
Year
MW-10-II
MW-11-II
MW-12-I
MW-13-II

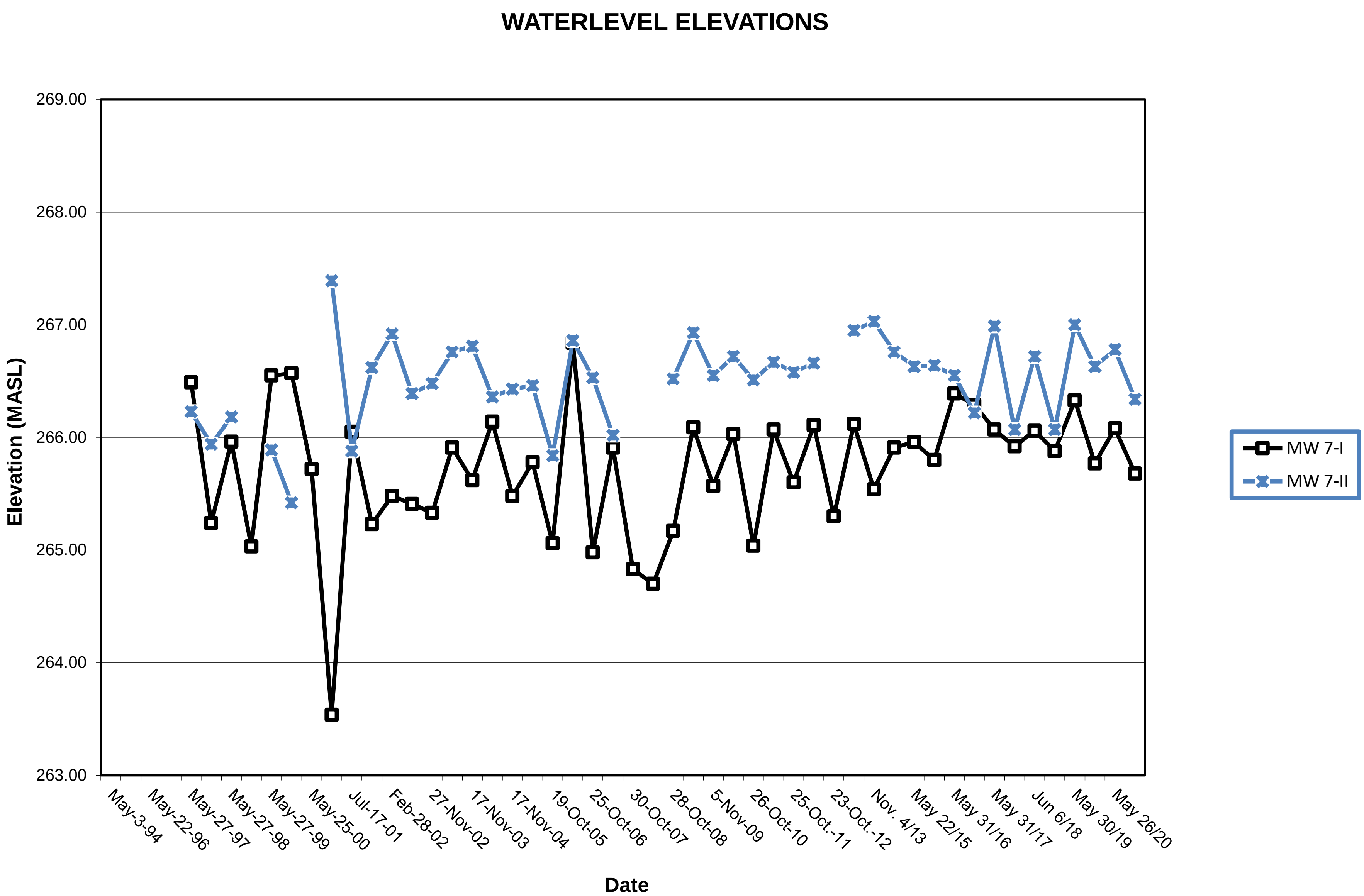
Appendix D
Water Level Elevations and Hydraulic Gradient Graphs

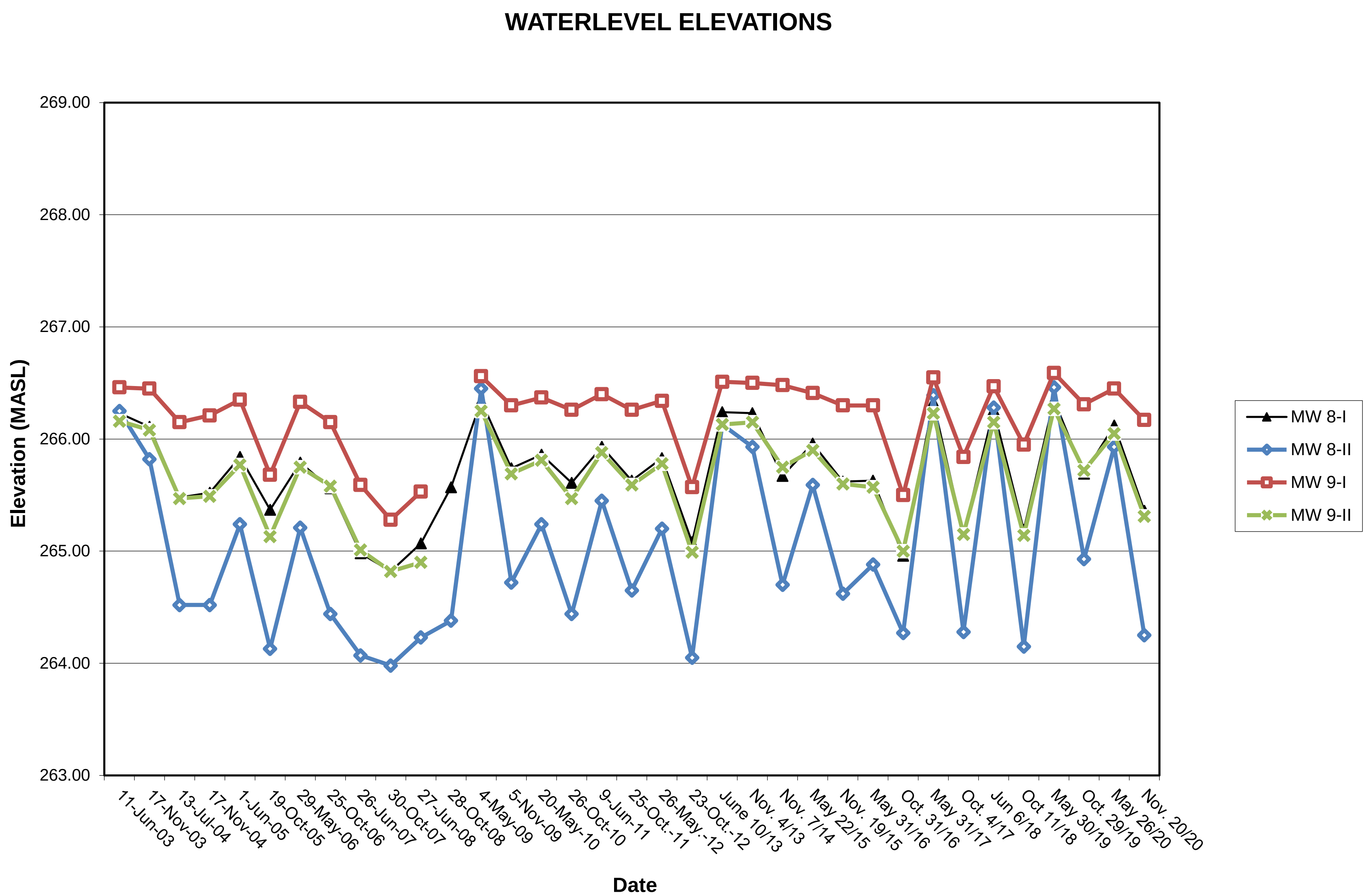

WATERLEVEL ELEVATION
Elevation (MASL)
271.00
270.00
269.00
268.00
267.00
266.00
265.00
264.00
May-3-94
May-22-96
May-27-97
May-27-98
May-27-99
May-25-00
Jul-17-01
Feb-28-02
27-Nov-02
17-Nov-03
17-Nov-04
19-Oct-05
25-Oct-06
30-Oct-07
28-Oct-08
5-Nov-09
26-Oct-10
25-Oct.-11
23-Oct.-12
Nov. 4/13
May 22/15
May 31/16
May 31/17
Jun 6/18
May 30/19
May 26/20
Date
MW 1-I
MW 1-II
MW 2-I
MW 2-II


WATERLEVEL ELEVATIONS
Elevation (MASL)
270.00
269.00
268.00
267.00
266.00
265.00
264.00
263.00
May-3-94
May-22-96
May-27-97
May-27-98
May-27-99
May-25-00
Jul-17-01
Feb-28-02
27-Nov-02
17-Nov-03
17-Nov-04
19-Oct-05
25-Oct-06
30-Oct-07
28-Oct-08
5-Nov-09
26-Oct-10
25-Oct.-11
23-Oct.-12
Nov. 4/13
May 22/15
May 31/16
May 31/17
Jun 6/18
May 30/19
May 26/20
Date
MW 3-I
MW 3-II
MW 4-I
MW 4-II



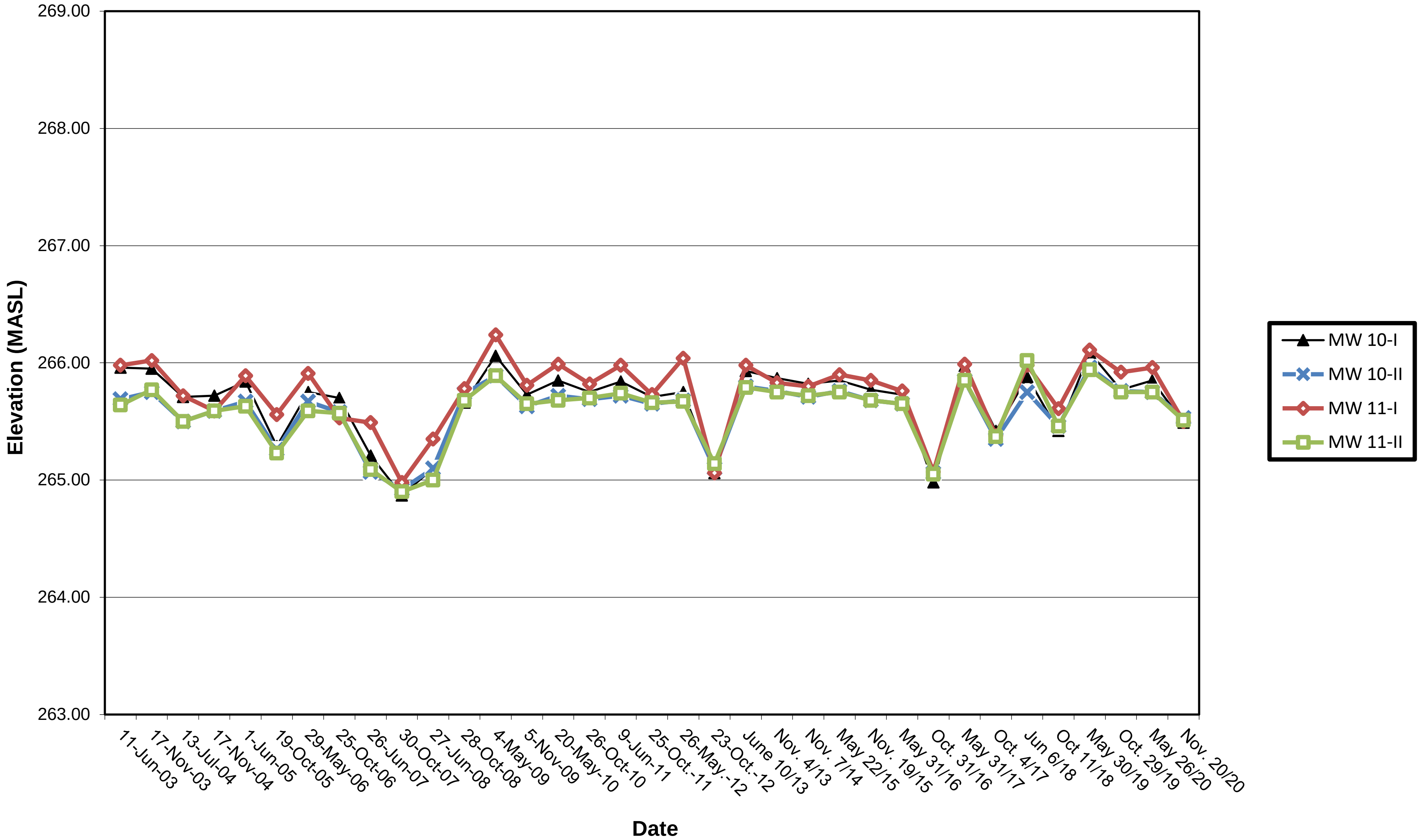
WATERLEVEL ELEVATIONS
270.00
269.00
268.00
267.00
266.00
265.00
264.00
Elevation (MASL)
May-3-94
May-22-96
May-27-97
May-27-98
May-27-99
May-25-00
Jul-17-01
Feb-28-02
27-Nov-02
17-Nov-03
17-Nov-04
19-Oct-05
25-Oct-06
30-Oct-07
28-Oct-08
5-Nov-09
26-Oct-10
25-Oct.-11
23-Oct.-12
Nov. 4/13
May 22/15
May 31/16
May 31/17
Jun 6/18
May 30/19
May 26/20
Date
MW 5-I
MW 5-II
MW 6-I
MW 6-II


WATERLEVEL ELEVATIONS
Elevation (MASL)
269.00
268.00
267.00
266.00
265.00
264.00
263.00
May-3-94
May-22-96
May-27-97
May-27-98
May-27-99
May-25-00
Jul-17-01
Feb-28-02
27-Nov-02
17-Nov-03
17-Nov-04
19-Oct-05
25-Oct-06
30-Oct-07
28-Oct-08
5-Nov-09
26-Oct-10
25-Oct.-11
23-Oct.-12
Nov. 4/13
May 22/15
May 31/16
May 31/17
Jun 6/18
May 30/19
May 26/20
Date
MW 7-I
MW 7-II

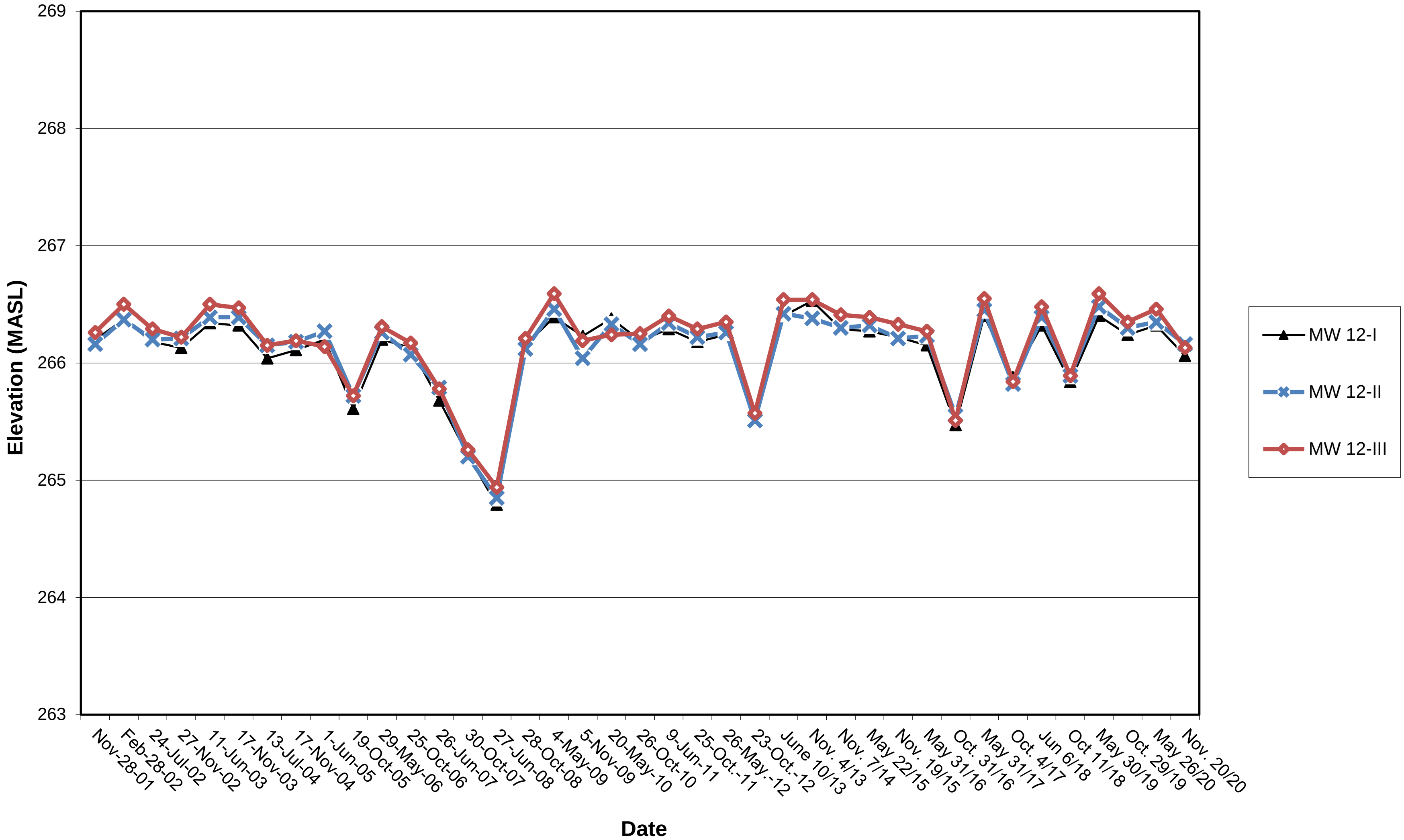


WATERLEVEL ELEVATIONS
Elevation (MASL)
269.00
268.00
267.00
266.00
265.00
264.00
263.00
11-Jun-03
17-Nov-03
13-Jul-04
17-Nov-04
1-Jun-05
19-Oct-05
29-May-06
25-Oct-06
26-Jun-07
30-Oct-07
27-Jun-08
28-Oct-08
4-May-09
5-Nov-09
20-May-10
26-Oct-10
9-Jun-11
25-Oct.-11
26-May.-12
23-Oct.-12
June 10/13
Nov. 4/13
Nov. 7/14
May 22/15
Nov. 19/15
May 31/16
Oct. 31/16
May 31/17
Oct. 4/17
Jun 6/18
Oct 11/18
May 30/19
Oct. 29/19
May 26/20
Nov. 20/20
Date
MW 8-I
MW 8-II
MW 9-I
MW 9-II

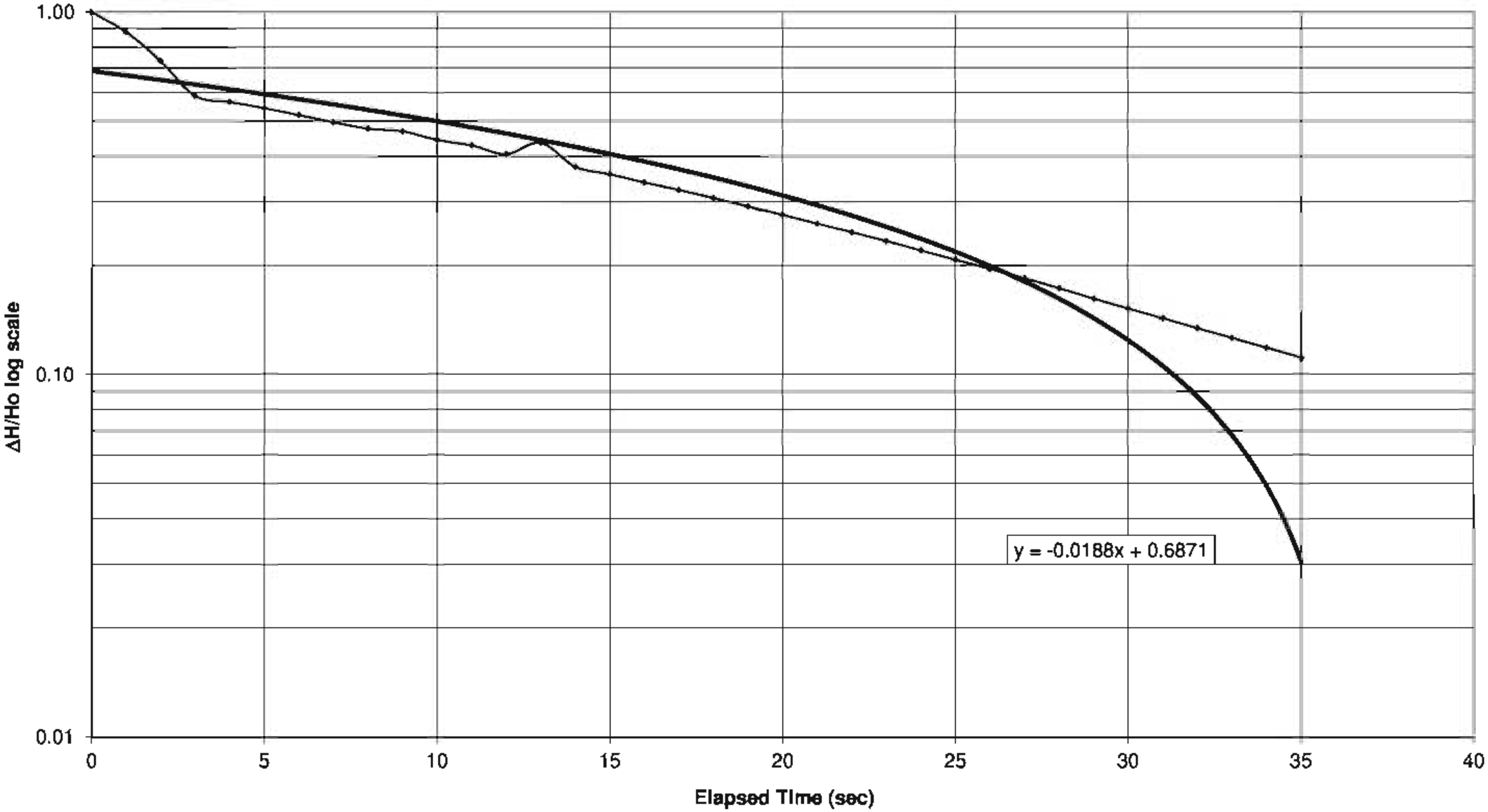
WATERLEVEL ELEVATIONS

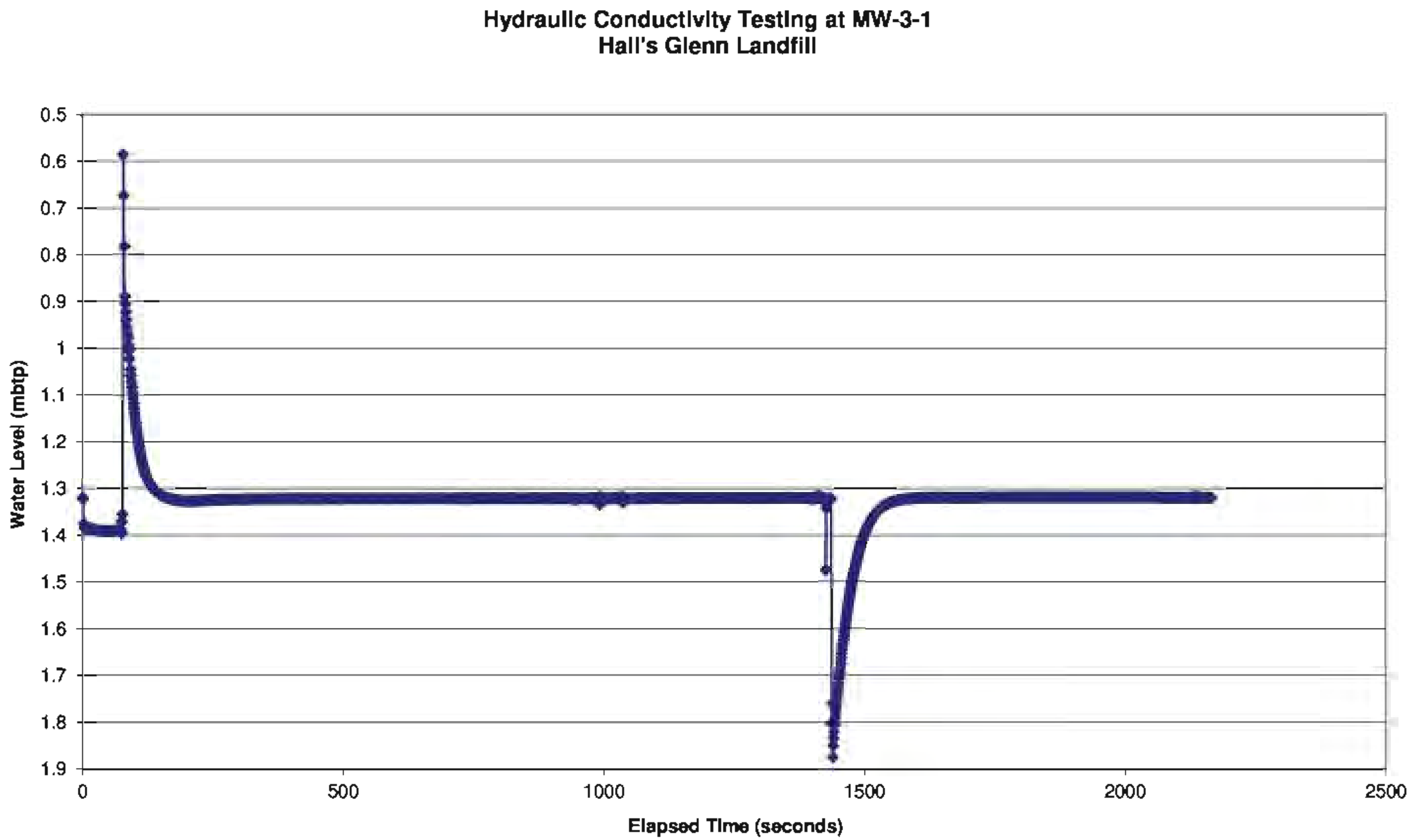


WATERLEVEL ELEVATIONS

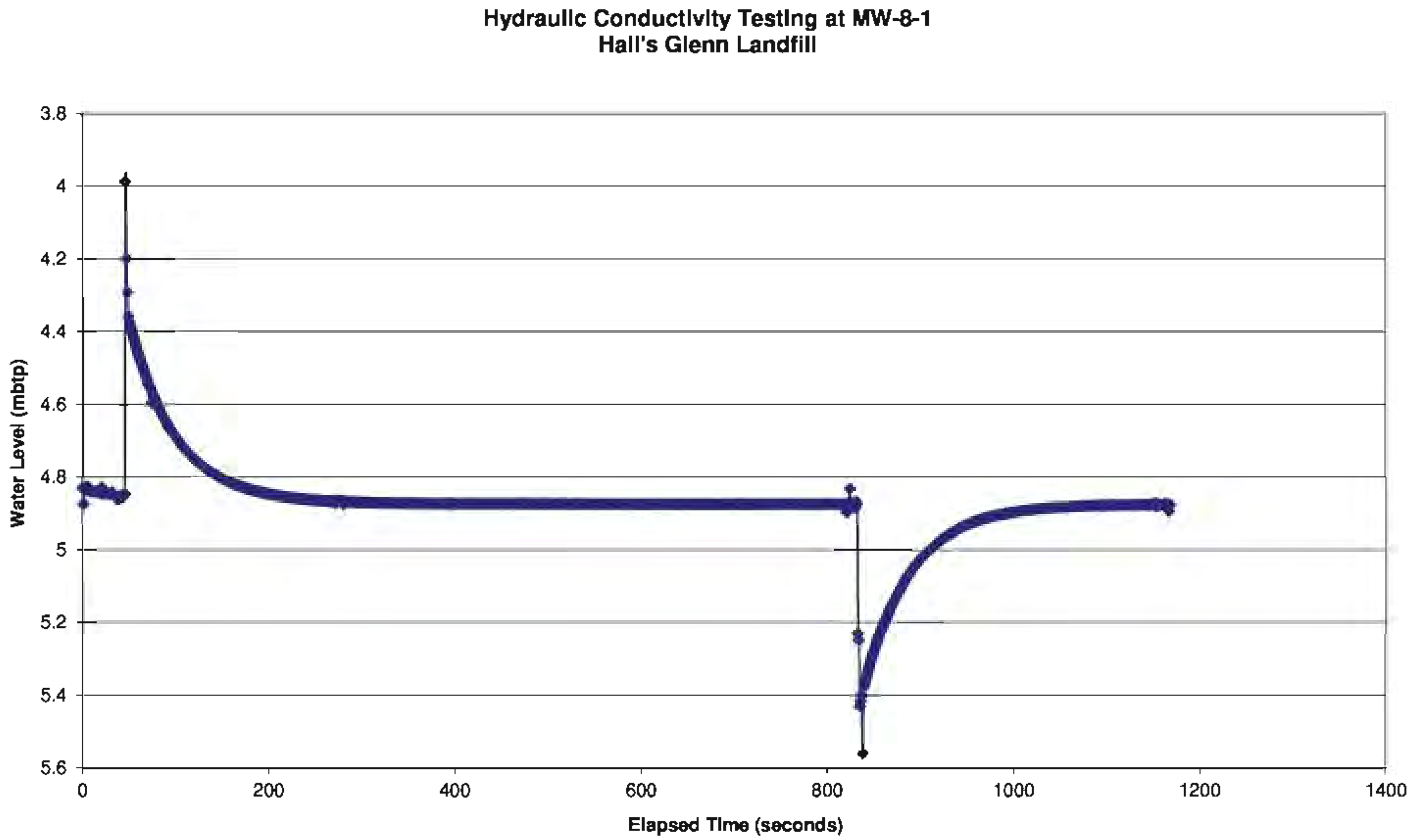


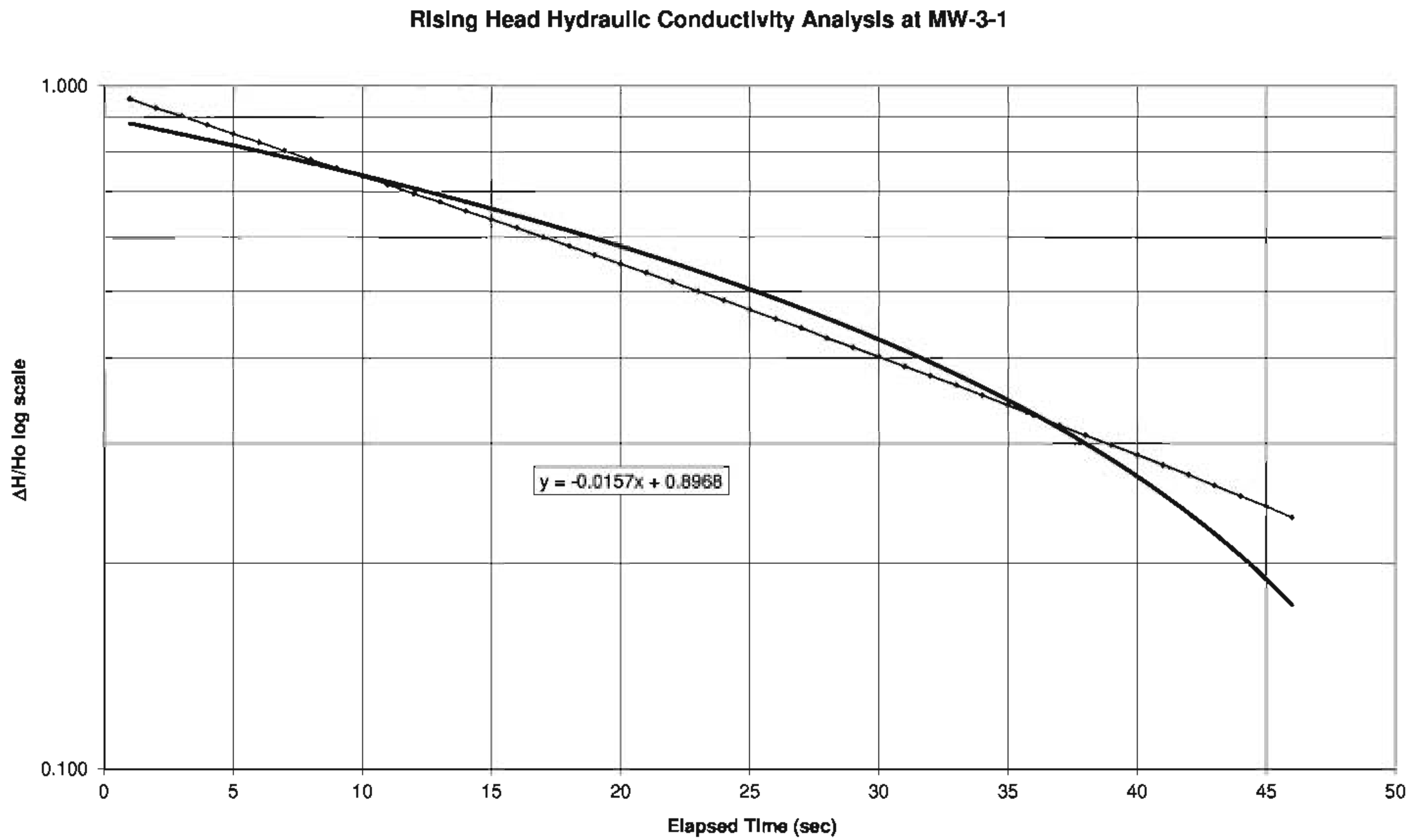
Falling Head Hydraulic Conductivity Analysis at MW-3-1



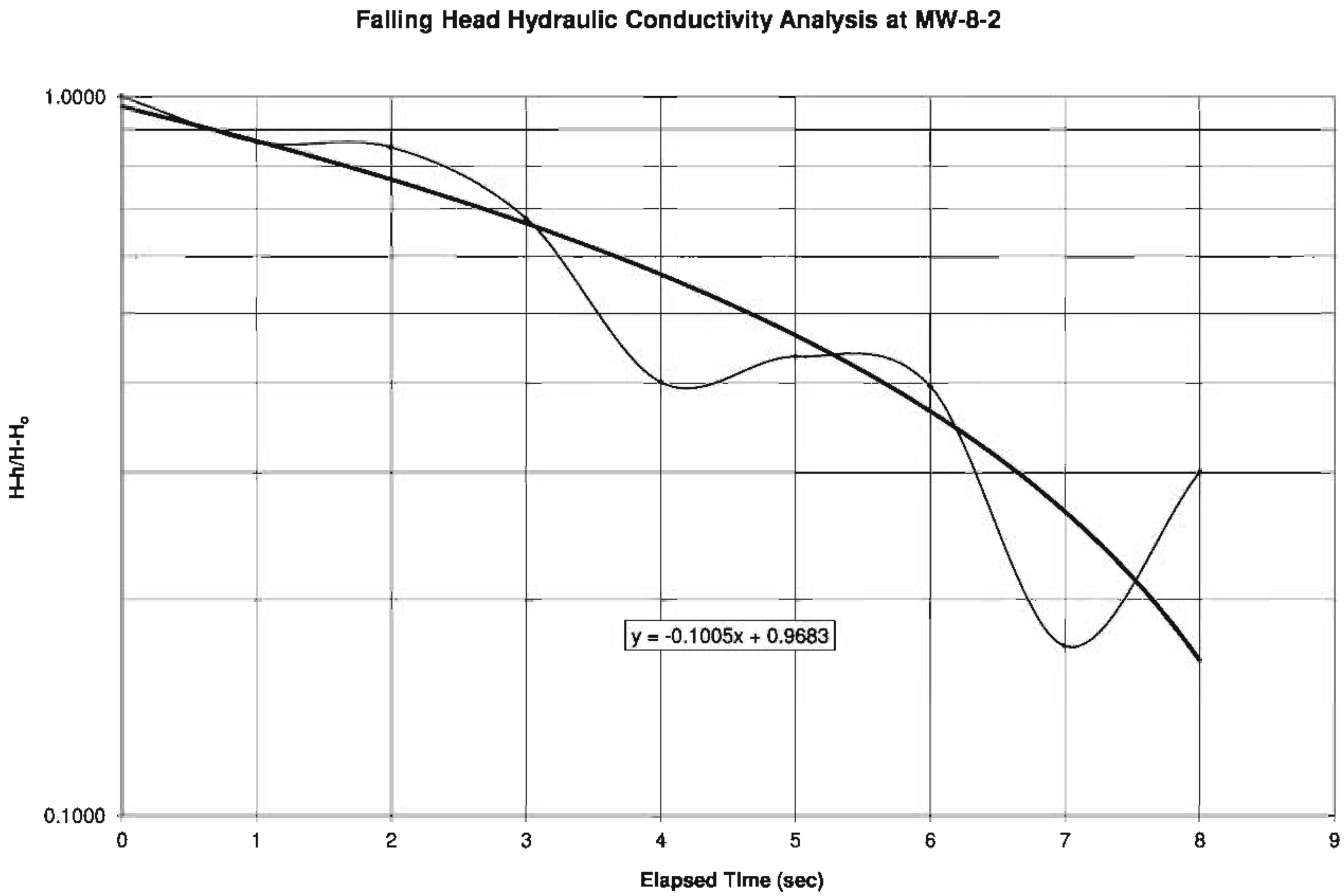


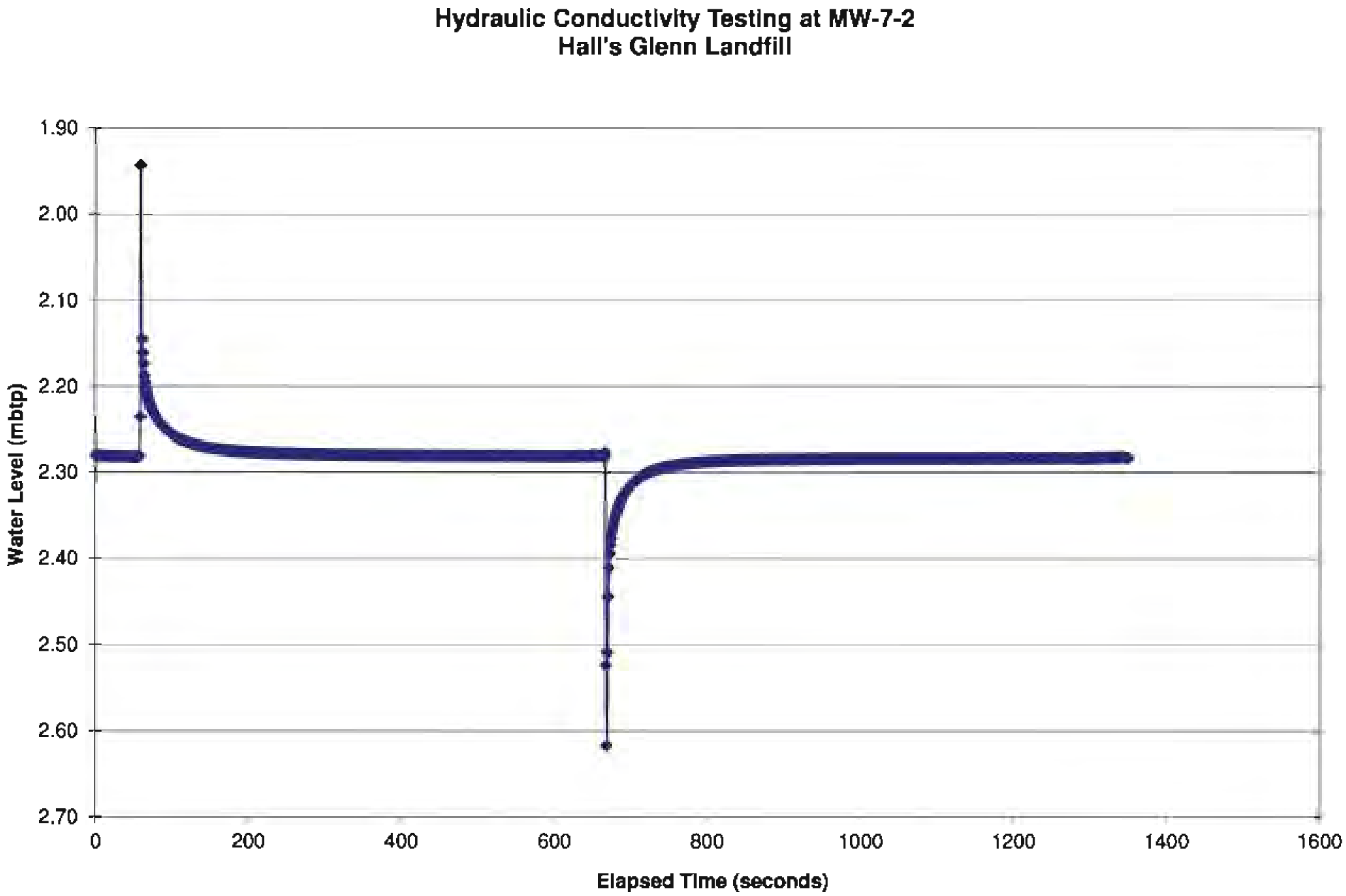
Hydraulic Conductivity Testing at MW-3-1
Hall's Glenn Landfill
Water Level (mbtp)
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
0
500
1000
1500
2000
2500
Elapsed Time (seconds)

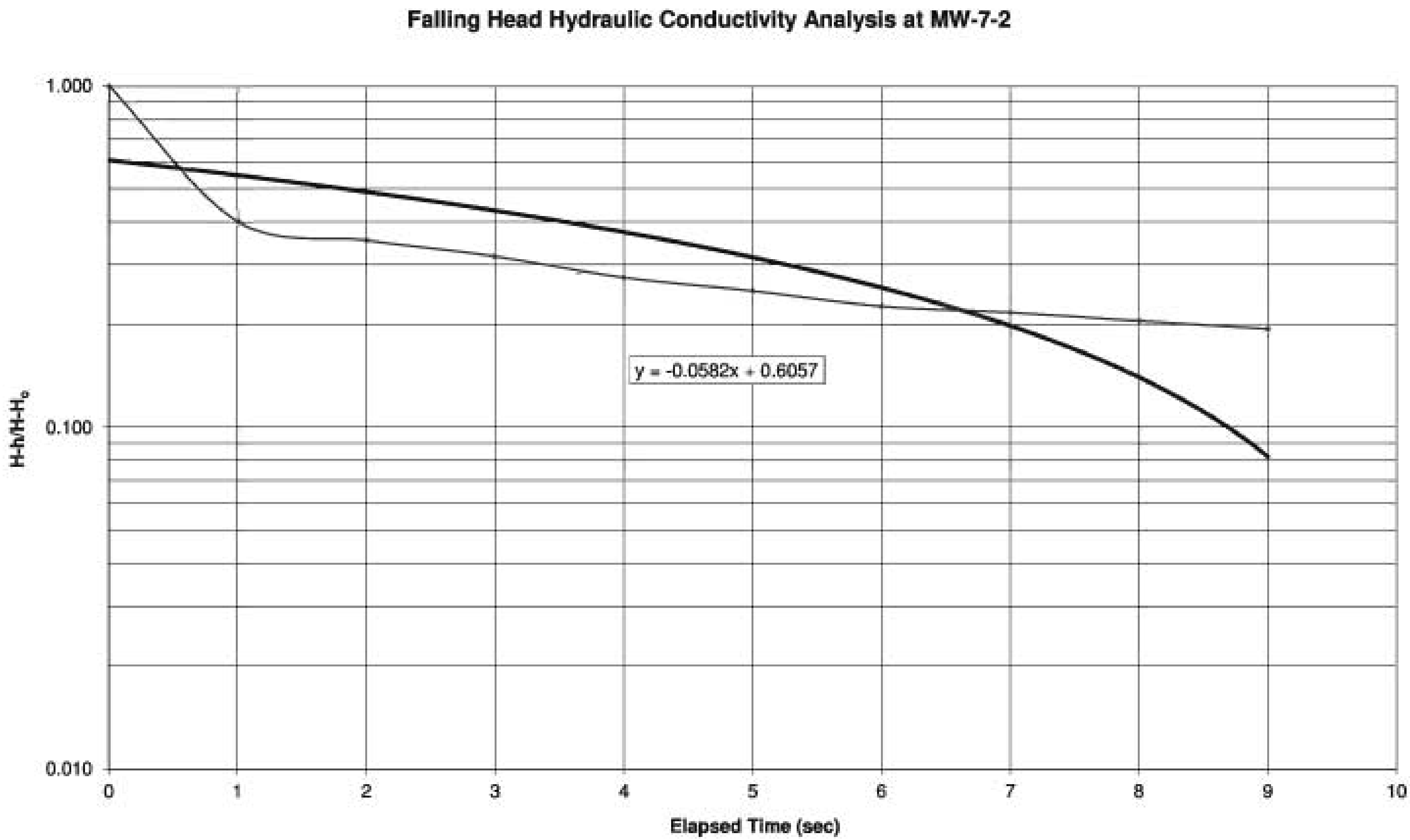

Hydraulic Conductivity Testing at MW-8-1
Hall's Glenn Landfill
Water Level (mbtp)
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
0
200
400
600
800
1000
1200
1400
Elapsed Time (seconds)



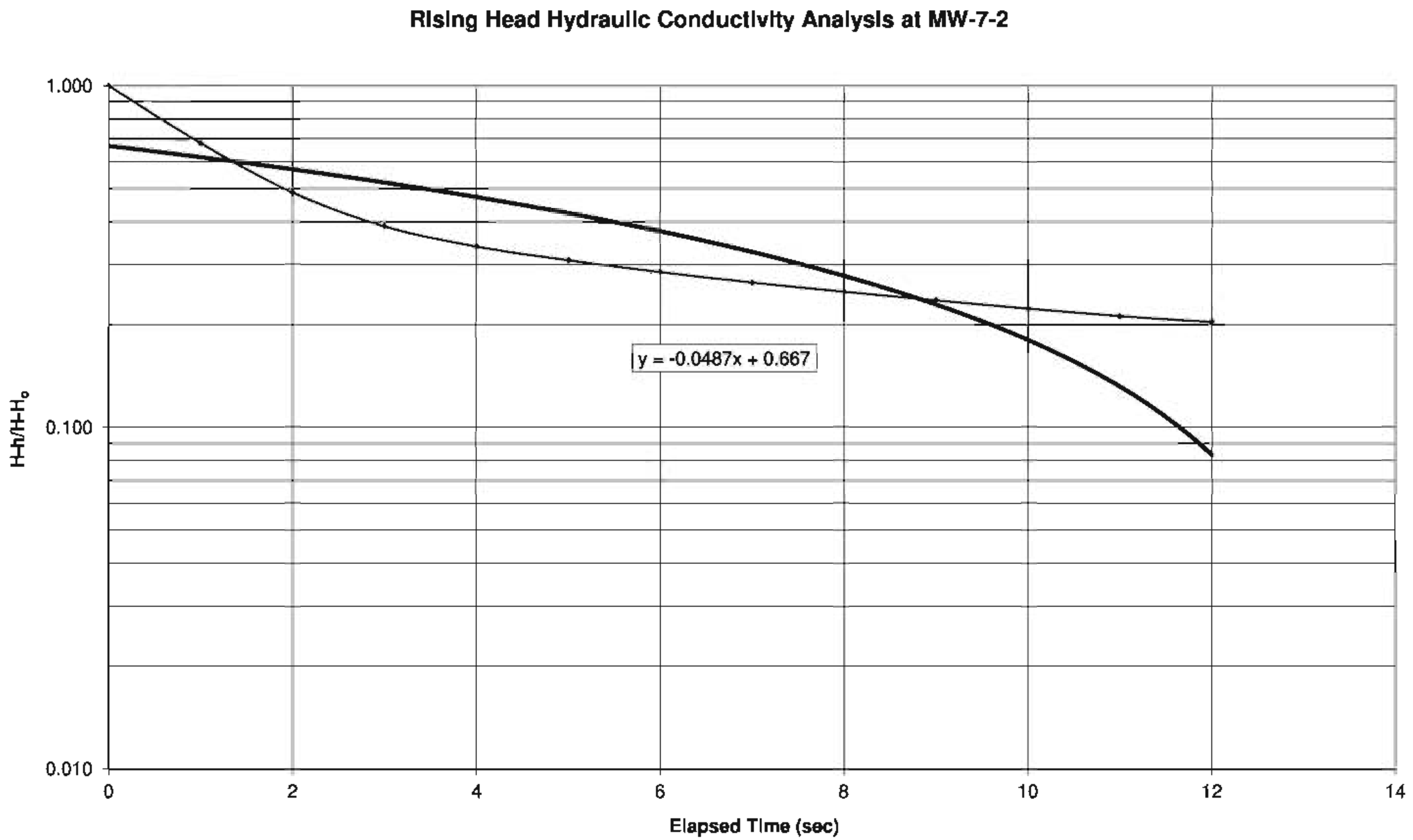
Rising Head Hydraulic Conductivity Analysis at MW-3-1
1.000
0.100
ΔH/Ho log scale
y = -0.0157x + 0.8968
0
5
10
15
20
25
30
35
40
45
50
Elapsed Time (sec)

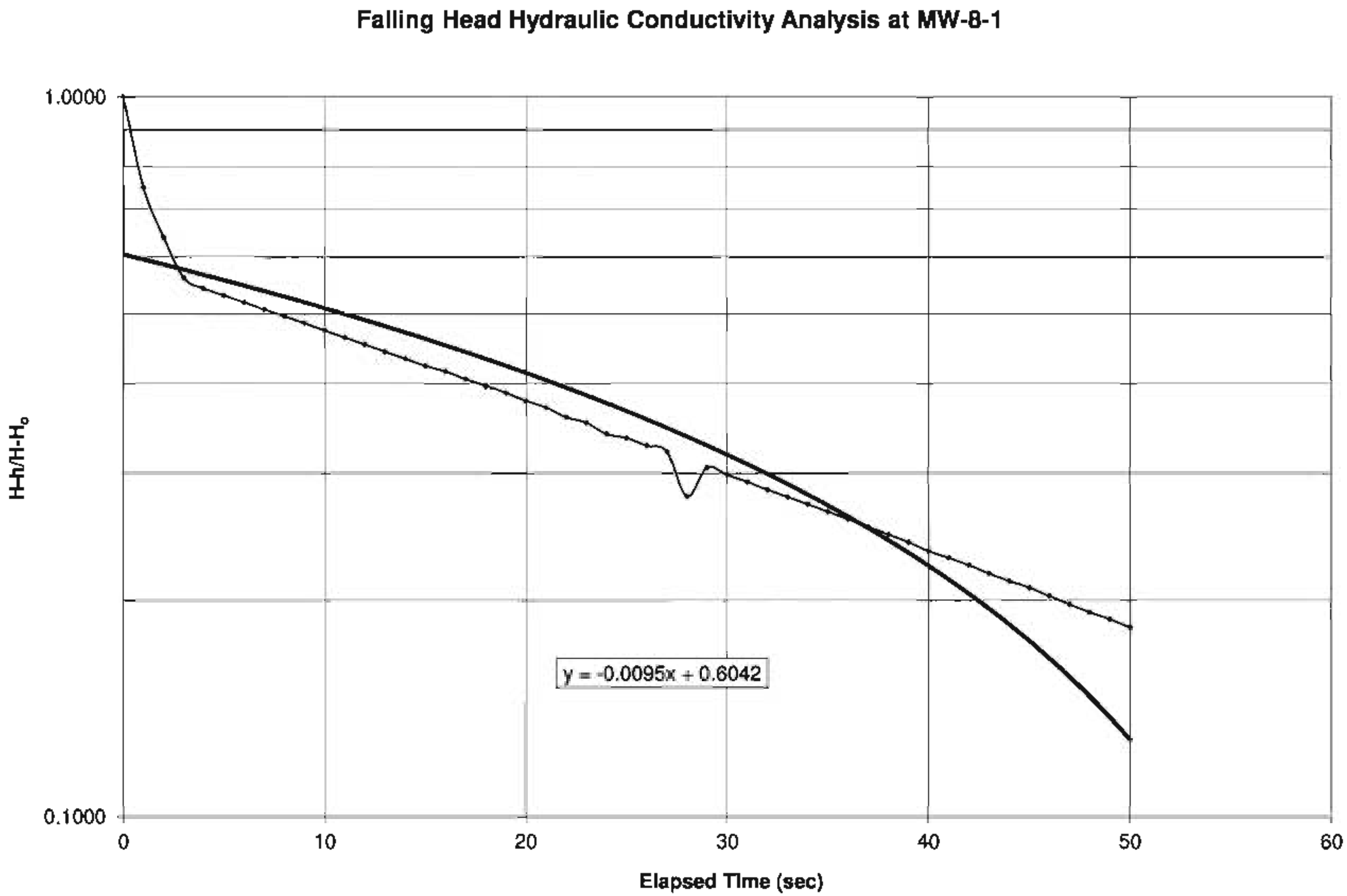

Falling Head Hydraulic Conductivity Analysis at MW-8-2
1.0000
0.1000
0
1
2
3
4
5
6
7
8
9
Elapsed Time (sec)
H-h/H-Ho
y = -0.1005x + 0.9683


Hydraulic Conductivity Testing at MW-7-2
Hall's Glenn Landfill
Water Level (mbtp)
1.90
2.00
2.10
2.20
2.30
2.40
2.50
2.60
2.70
0
200
400
600
800
1000
1200
1400
1600
Elapsed Time (seconds)

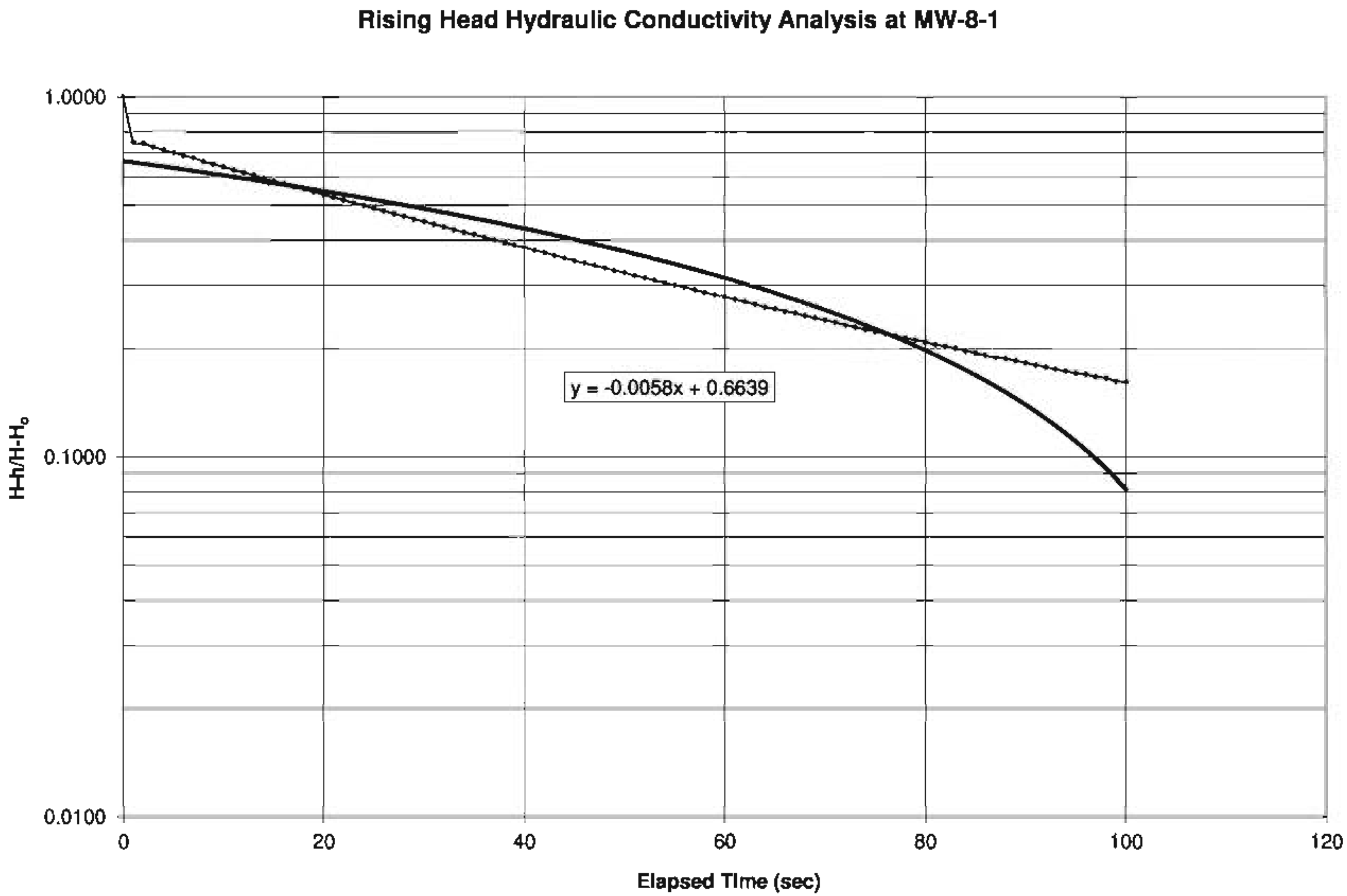


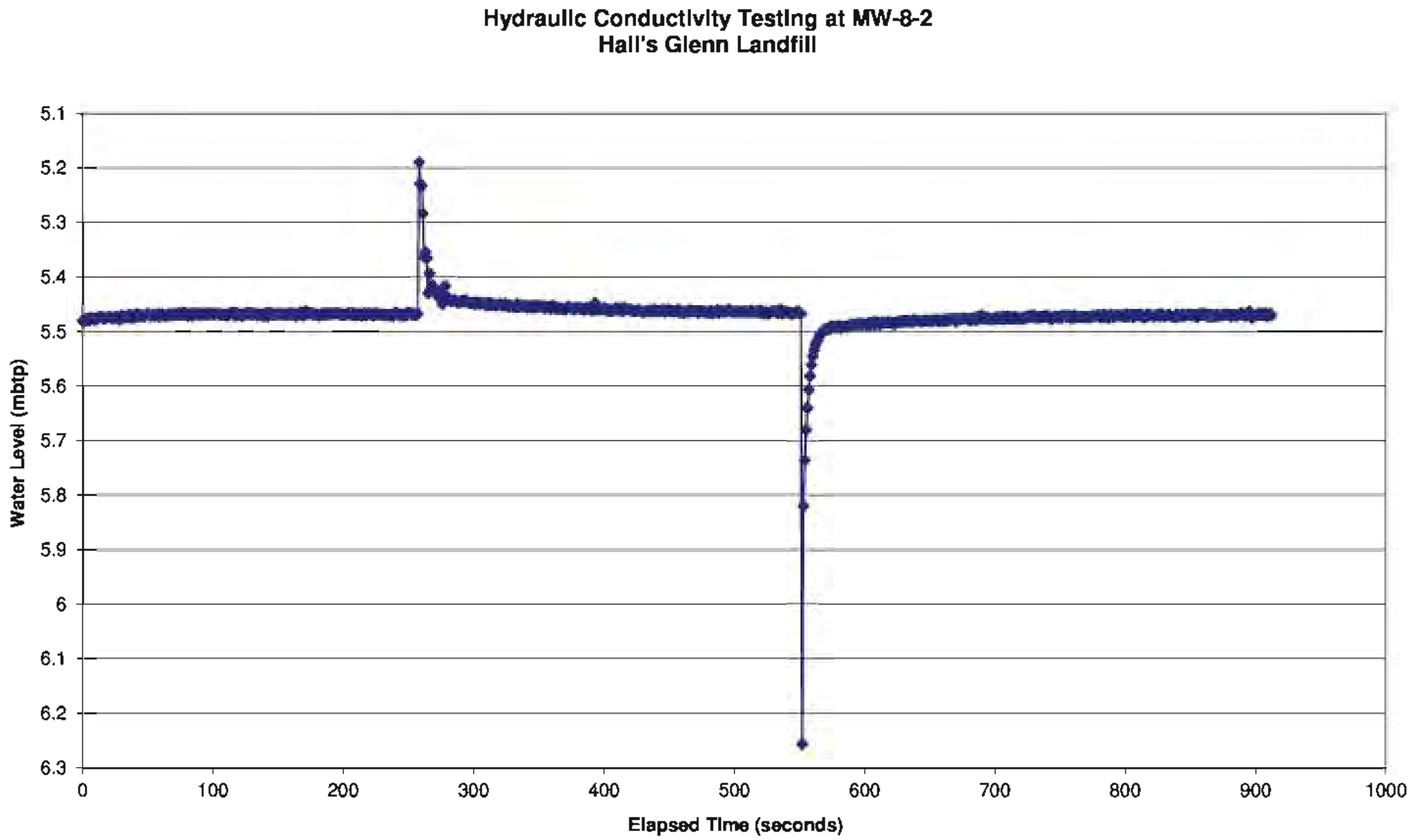
Falling Head Hydraulic Conductivity Analysis at MW-7-2
1.000
0.100
0.010
H-h/H-Ho
y = -0.0582x + 0.6057
0
1
2
3
4
5
6
7
8
9
10
Elapsed Time (sec)

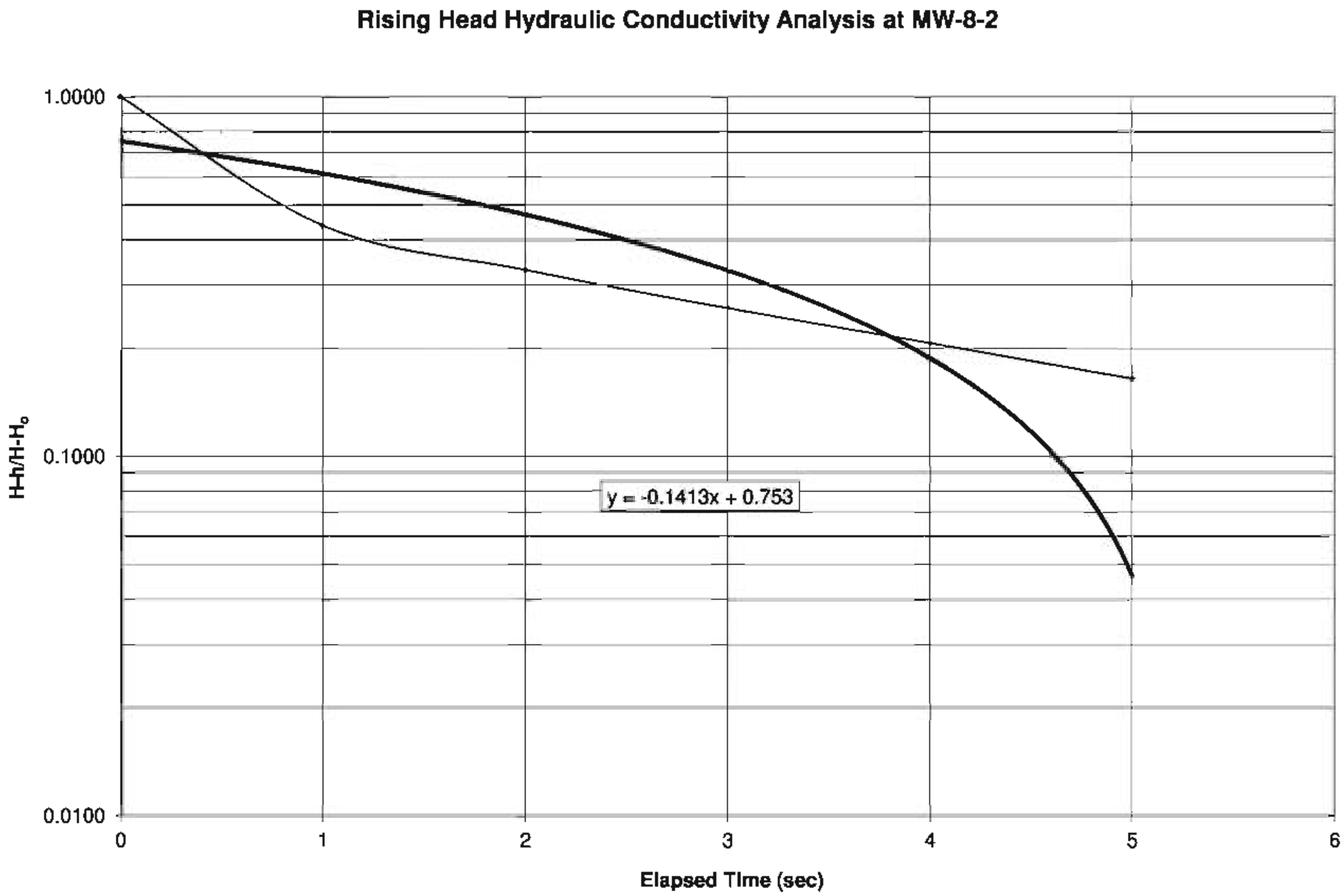

Rising Head Hydraulic Conductivity Analysis at MW-7-2
1.000
0.100
0.010
H-h/H-Ho
y = -0.0487x + 0.667
0
2
4
6
8
10
12
14
Elapsed Time (sec)



Falling Head Hydraulic Conductivity Analysis at MW-8-1
1.0000
0.1000
H-h/H-Ho
y = -0.0095x + 0.6042
0
10
20
30
40
50
60
Elapsed Time (sec)


Rising Head Hydraulic Conductivity Analysis at MW-8-1
1.0000
0.1000
0.0100
H-h/H-H$_o$
y = -0.0058x + 0.6639
0
20
40
60
80
100
120
Elapsed Time (sec)


Hydraulic Conductivity Testing at MW-8-2
Hall's Glenn Landfill
Water Level (mbtp)
Elapsed Time (seconds)
5.1
5.2
5.3
5.4
5.5
5.6
5.7
5.8
5.9
6
6.1
6.2
6.3
0
100
200
300
400
500
600
700
800
900
1000


Rising Head Hydraulic Conductivity Analysis at MW-8-2
1.0000
0.1000
0.0100
$H-h/H-H_o$
y = -0.1413x + 0.753
0
1
2
3
4
5
6
Elapsed Time (sec)

Appendix E
MOECC Monitoring and Screening Checklist

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

General Information: The checklist is to be completed, and submitted with the Monitoring Report.
Instructions: A complete checklist consists of:
(a) a completed and signed checklist, including any additional pages of information which can be attached as needed to provide further details where indicated.
(b) completed contact information for the Competent Environmental Practitioner (CEP)
(c) self-declaration that CEP(s) meet(s) the qualifications as set out below and in Section 1.2 of the Technical Guidance Document.

Definition of Groundwater CEP:
For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:
(a) the person holds a licence, limited licence or temporary licence under the *Professional Engineers Act*; or
(b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..
Definition of Surface water CEP:
A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

The type of scientific work that a CEP performs must be consistent with that person's education and experience. If an individual has appropriate training and credentials in both groundwater and surface water and is responsible for both areas of expertise, the CEP may then complete and validate both sections of the checklist.

Monitoring Report and Site Information	
Waste Disposal Site Name	Hall's Glenn Landfill Site
Location (e.g. street address, lot, concession)	1951 County Road 6, Part Lot 5, Concession 4, Township of Douro-Dummer (Douro), County of Peterborough
GPS Location (taken within the property boundary at front gate/ front entry)	17 781275E 445174N
Municipality	Township of Douro-Dummer
Client and/or Site Owner	Corporation of the Township of Douro-Dummer
Monitoring Period (Year)	2020
This Monitoring Report is being submitted under the following:	
Environmental Compliance Approval Number:	Provisional Certificate of Approval A341004
Director's Order No.:	N/A
Provincial Officer's Order No.:	N/A
Other:	N/A

Report Submission Frequency	(●) **Annual** ( ) **Other**	Specify (Type Here):	
The site is: **(Operation Status)**	( ) **Open** ( ) **Inactive** (●) **Closed**		
Does your Site have a Total Approved Capacity?	( ) **Yes** ( ) **No**		
If yes, please specify Total Approved Capacity		*Units*	
Does your Site have a Maximum Approved Fill Rate?	( ) **Yes** ( ) **No**		
If yes, please specify Maximum Approved Fill Rate		*Units*	
Total Waste Received within Monitoring Period (Year)		*Units*	
Total Waste Received within Monitoring Period (Year) *Methodology*			
Estimated Remaining Capacity		*Units*	
Estimated Remaining Capacity *Methodology*			
Estimated Remaining Capacity *Date Last Determined*	Select Date		
Non-Hazardous Approved Waste Types	☐ Domestic ☐ Industrial, Commercial & Institutional (IC&I) ☐ Source Separated Organics (Green Bin) ☐ Tires	☐ Contaminated Soil ☐ Wood Waste ☐ Blue Box Material ☐ Processed Organics ☐ Leaf and Yard Waste	☐ Food Processing/Preparation Operations Waste ☐ Hauled Sewage Other: Provide any other approved waste types not listed here
Subject Waste Approved Waste Classes: Hazardous & Liquid Industrial *(separate waste classes by comma)*			
Year Site Opened *(enter the Calendar Year only)*	1977	**Current ECA Issue Date**	5-Mar-13
Is your Site required to submit Financial Assurance?		( ) **Yes** (●) **No**	
Describe how your Landfill is designed.		(●) Natural Attenuation only ( ) Fully engineered Facility ( ) Partially engineered Facility	
Does your Site have an approved Contaminant Attenuation Zone?		( ) **Yes** (●) **No**	

If closed, specify C of A, control or authorizing document closure date:	22-May-96
Has the nature of the operations at the site changed during this monitoring period?	◯ **Yes** ◉ **No**
If yes, provide details:	Type Here
Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i.e. exceeded the LEL for methane)	◯ Yes ◉ No

Groundwater WDS Verification:

Based on all available information about the site and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The monitoring program continues to effectively characterize site conditions and any groundwater discharges from the site. All monitoring wells are confirmed to be in good condition and are secure:	(●) **Yes** ( ) **No**	If no, list exceptions (Type Here):
2) All groundwater, leachate and WDS gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by Certificate(s) of Approval or other relevant authorizing/control document (s):	(●) **Yes** ( ) **No** ( ) **Not Applicable**	If no, list exceptions below or attach information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

3) a) Is landfill gas being monitored or controlled at the site?	(•) **Yes** ( ) **No**	
If yes to 3(a), please answer the next two questions below.		
b) Have any measurements been taken since the last reporting period that indicate landfill gas is present in the subsurface at levels exceeding criteria established for the site?	( ) **Yes** (•) **No**	
c) Has the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:	(•) **Yes** ( ) **No** ( ) **Not Applicable**	If no, list exceptions below or attach additional information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for groundwater investigations was done in accordance with standard operating procedures as established/outlined per the Technical Guidance Document (including internal/external QA/QC requirements) (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	(•) **Yes** ( ) **No**	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	(•) **Yes** ( ) **No**	If no, the potential design and operational concerns/exceptions are as follows (Type Here):	
6) The site meets compliance and assessment criteria.	(•) **Yes** ( ) **No**	If no, list and explain exceptions (Type Here):	
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	(•) **Yes** ( ) **No**	If no, list exceptions and explain reason for increase/change (Type Here):	
1) Is one or more of the following risk reduction practices in place at the site: ***(a)*** **There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/ treatment; or** ***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or** ***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):** ***i.*****The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and** ***ii.*****Seasonal and annual water levels and water quality fluctuations are well understood.**	(•) **Yes** ( ) **No**	**Note which practice(s):**	☐ **(a)** ☐ **(b)** ☒ **(c)**
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	( ) **Yes** (•) **No** ( ) **Not Applicable**	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here):	

Groundwater CEP Declaration:

I am a licensed professional Engineer or a registered professional geoscientist in Ontario with expertise in hydrogeology, as defined in Appendix D under Instructions. Where additional expertise was needed to evaluate the site monitoring data, I have relied on individuals who I believe to be experts in the relevant discipline, who have co-signed the compliance monitoring report or monitoring program status report, and who have provided evidence to me of their credentials.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended), and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature and will be rectified for the next monitoring/reporting period. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

Select Date

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

◉ **No changes to the monitoring program are recommended** ○ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No Changes to site design and operation are recommended** ○ **The following change(s) to the site design and operation is/ are recommended:**	Type Here

Name:	Nyle McIlveen, P.Eng.		
Seal:	Add Image LICENSED PROFESSIONAL ENGINEER N. C. McILVEEN Mar 23/21 PROVINCE OF ONTARIO		
Signature:		**Date:**	23-Mar-21
CEP Contact Information:	Nyle McIlveen, P./Eng.		
Company:	GHD		
Address:	347 Pido Road, Unit 29, Peterborough, Ontario K9J 6X7		
Telephone No.:	(705) 749-3317	Fax No. :	(705) 749-9248
E-mail Address:	nyle.mcilveen@ghd.com		
Co-signers for additional expertise provided:			
Signature:		**Date:**	30/03/2017
Signature:		**Date:**	Select Date

Surface Water WDS Verification:

Provide the name of surface water body/bodies potentially receiving the WDS effluent and the approximate distance to the waterbody (including the nearest surface water body/bodies to the site):

Name (s)	Dummer Lake
Distance(s)	2.5 Km

Based on all available information and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:	(●) Yes ( ) No	If no, identify issues (Type Here):
2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the Certificate(s) of Approval or relevant authorizing/control document(s) (if applicable):	(●) Yes ( ) No ( ) **Not applicable (No C of A, authorizing / control document applies)**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

3) a) Some or all surface water sampling and monitoring program requirements for the monitoring period have been established outside of a ministry C of A or authorizing/control document.	◯ **Yes** ◉ **No** ◯ **Not Applicable**	
b) If yes, all surface water sampling and monitoring identified under 3 (a) was successfully completed in accordance with the established program from the site, including sampling protocols, frequencies, locations and parameters) as developed per the Technical Guidance Document:	◯ **Yes** ◯ **No** ◯ **Not Applicable**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for surface water investigations was done in accordance with standard operating procedures, including internal/external QA/QC requirements, as established/outlined as per the Technical Guidance Document, MOE 2010, or as amended. (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ◯ **No**	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The receiving water body meets surface water-related compliance criteria and assessment criteria: i.e., there are no exceedances of criteria, based on MOE legislation, regulations, Water Management Policies, Guidelines and Provincial Water Quality Objectives and other assessment criteria (e.g., CWQGs, APVs), as noted in Table A or Table B in the Technical Guidance Document (Section 4.6):	◉ **Yes** ◯ **No**

If no, list parameters that exceed criteria outlined above and the amount/percentage of the exceedance as per the table below or provide details in an attachment:

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	◯ **Yes** ◯ **No**	If yes, specify (Type Here)

7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	(•) **Yes** ( ) **No**	If no, list parameters and stations that is outside the expected range. Identify whether parameter concentrations show an increasing trend or are within a high historical range (Type Here)
8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g. , PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	( ) Yes (•) No ( ) Not Known ( ) Not Applicable	.
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	( ) **Yes** (•) **No** ( ) **Not Applicable**	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here)

Surface Water CEP Declaration:

I, the undersigned hereby declare that I am a Competent Environmental Practitioner as defined in Appendix D under Instructions, holding the necessary level of experience and education to design surface water monitoring and sampling programs, conduct appropriate surface water investigations and interpret the related data as it pertains to the site for this monitoring period.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended) and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature or will be rectified for future monitoring events. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

Select Date

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

◉ **No Changes to the monitoring program are recommended** ○ **The following change(s) to the monitoring program is/are recommended:**	Type Here
◉ **No changes to the site design and operation are recommended** ○ **The following change(s) to the site design and operation is/are recommended:**	Type Here

CEP Signature	Nyl McIl
Relevant Discipline	civil engineering, hydrogeology
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