February 26, 2018

Mr. Stanley Radon, CPG
New York State Dept. of Environmental Conservation
Division of Solid and Hazardous Materials, Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999

Re: *Tecumseh Redevelopment Inc. - Lackawanna, New York Site*
EPA ID# NYD002134880
Hazardous Waste Management Units (HWMUs) 1 and 2
2017 Annual Groundwater Quality Monitoring Report

Dear Mr. Radon:

On behalf of our client, Tecumseh Redevelopment Inc., TurnKey Environmental Restoration, LLC has prepared this letter report to transmit the results of the 2017 annual groundwater monitoring event conducted at Hazardous Waste Management Unit No. 1 (HWMU-1A and HWMU-1B) and Hazardous Waste Management Unit No. 2 (HWMU-2) at the Tecumseh Site, Lackawanna, New York (see Figure 1). The current groundwater event for HWMU-1A and 1B was performed May 18 – 19th 2017 and HWMU-2 was performed on May 22nd, 2017. The groundwater monitoring network wells are summarized in Table 1 and shown on Figures 2 and 3. Table 2 summarizes the site-specific constituents of concern (SSCOCs) that have been detected since 2003 at concentrations in groundwater above their respective NYSDEC Class GA Groundwater Quality Standards (GWQSs)/Guidance Values (GVs) at a minimum of one location for two consecutive events for each HWMU. A summary of field activities and findings for each HWMU is presented below.

PURPOSE

The activities conducted during the current groundwater monitoring event were performed in general accordance with the following documents:

- *Groundwater Monitoring, Sampling and Analysis Plan (GWMSAP)*, Bethlehem Steel Corporation, March 1994.
- USEPA/NYSDEC-approved *Work Plan, Comprehensive Well Sampling*, Bethlehem Steel Corporation, September 1999.
- September 2, 2009 NYSDEC modification approval letter.

This annual report includes a detailed discussion of current groundwater quality compared to historical data for HWMU-1 and HWMU-2. Tables and graphs are provided to summarize groundwater elevations, analytical data, and illustrate trends in groundwater quality and flow patterns.

GROUNDWATER ELEVATIONS & FLOW

On May, 18 2017, groundwater elevations were measured from the 21 monitoring wells and 4 piezometers located in the vicinity of HWMU-1 and the eight monitoring wells in the vicinity of HWMU-2. Table 3 summarizes the depth to water and calculated groundwater elevation for each monitored location. The Lake Erie elevation presented in the table was obtained from the National Oceanic and Atmospheric Administration/National Ocean Service's (NOAA/NOS) Center for Operational Oceanographic Products and Services (CO-OPS) web page; Great Lakes Water Level Data Inventory for Station Number 9063020 Buffalo, Lake Erie, New York.

Groundwater data for the current monitoring event are generally consistent with historical data. Attachment 1 includes historical elevation data and elevation versus time plots for each monitoring well and Lake Erie, showing seasonal fluctuations throughout each monitored year. Groundwater and Lake Erie elevations are also generally trending upward, possibly in response to increased precipitation (e.g., rain and snow) over the same period.

Figures 2 and 3 are isopotential maps representing the shallow groundwater in the vicinity of HWMU-1 and HWMU-2, respectively, prepared from the May 18, 2017 groundwater elevations. As indicated, the shallow groundwater migrates toward Lake Erie with a localized mound flowing radially outward in the vicinity of HWMU-1, consistent with historic flow patterns at the Site.

FIELD ACTIVITIES & FINDINGS

Table 2 summarizes the SSCOCs detected in HWMU-1 and HWMU-2 along with the USEPA SW-846 Method used to analyze the groundwater samples. Field-measured parameters and analytical results for the current sampling event conducted near HWMU-1 are summarized in Table 4 and near HWMU-2 in Table 5. Compounds detected above method detection limits (MDLs) are included with their associated concentration and NYSDEC Groundwater Quality Standard (NYSDEC TOGS 1.1.1, Ambient Water Quality Standards and Guidance Values, June 1998) for comparison. Concentrations exceeding NYSDEC GWQ/GVs are highlighted.

Well MW-2U1 was dry during the May 2017 sampling event and was therefore not sampled. Well MW-2U1 has been dry since October 1999; therefore, TurnKey proposed and NYSDEC agreed to add well MWS-11A as the HWMU-2 upgradient network monitoring well. TurnKey field personnel collected a sample from well MWS-11A in December 2017 and analyzed the groundwater for the same parameters as the downgradient network monitoring wells.

On May 28, 2009, TurnKey submitted a request to revise the March 1994 Groundwater Monitoring, Sampling and Analysis Plan (GWMSAP); NYSDEC approved the modifications on September 2, 2009. TurnKey has reviewed the GWMSAP and has attached and updated GWMSAP for your review and approval.

HISTORICAL COMPARISONS

A comparison of the 2017 analytical results to the historical database for each HWMU indicates similar detections of parameters at similar concentrations for the current monitoring period. Attachment 2 includes historical presentations of concentration versus time plots for the SSCOCs identified in Table 2 separated by HWMU. Concentrations reported below MDLs (e.g., non-detect) are not plotted.

Upon further examination, the majority of the SSCOC plots represent either a decreasing or neutral (neither increasing nor decreasing) trend, excluding the occasional outlier data point, with no apparent increasing trends. Table 6 summarizes the results of the concentration versus time plots presented in Attachment 2. Of the 41 decreasing trends shown in Table 6, 27 are approaching or have trended below their respective GWQSs/GVs.

Between June 2005 and May 2011, an apparent increasing trend for benzene, ethylbenzene, toluene, TCE, total xylenes, and naphthalene was observed downgradient of HWMU-1B at well MW-1D1, coincident with the destruction of the "temporary" 30-mil reinforced polyvinyl chloride (PVC) cover by a severe wind storm (Fall 2005). However, as illustrated by time-concentration plots in Attachment 2, a neutral trend (neither increasing nor decreasing) for those same compounds since May 2011 has been observed at well MW-1D1. In nearby well MW-1D7, TCE concentrations are continuing to trend well below the GWQS and a decreasing (or neutral) trend is apparent for TCE breakdown daughter products cis-1,2-DCE and trans-1,2-DCE.

NYSDEC EQUIS DELIVERABLES

On June 9, 2017, TurnKey submitted the analytical data in Electronic Data Deliverable (EDD) format for the current monitoring event to the NYSDEC on behalf of Tecumseh to satisfy the NYSDEC EQuIS submittal requirement. TurnKey received confirmation on June 14, 2017 that the submittals were successfully uploaded and the data is available for use within the NYSDEC system.

PLANNED ACTIVITIES

The next planned groundwater monitoring event for HWMU-1 and HWMU-2 is tentatively scheduled for April 2018.

Please contact us if you have any questions or require additional information.

Sincerely,
TurnKey Environmental Restoration, LLC

Brock Greene
Project Environmental Scientist

ec: Larry Thomas (NYSDEC – Albany)
Keith Nagel, (Tecumseh Redevelopment)
Paul Werthman (TurnKey)

File: 0071-017-240

TABLES

TABLE 1

GROUNDWATER MONITORING NETWORK AND SAMPLE FREQUENCY

2017 Annual Event
Hazardous Waste Management Units HWMU-1 & HWMU-2
Tecumseh Redevelopment Inc.
Lackawanna, New York

Well Designation	Network Well	Monitoring Event														
		2006		2007		2008		2009	2010	2011	2012	2013	2014	2015	2016	2017
		1 SA	2 SA	1 SA	2 SA	1 SA	2 SA	Annual	Annual	Annual	Annual	Annual	Annual	Annual	Annual	Annual
HWMU-1A																
MW-1D2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MW-1D3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MW-1D4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MW-1U1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
HWMU-1B																
MW-1D1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MW-1D6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MW-1D7	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MW-1D8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MW-1U1	x	*~ upgradient location for both units HWMU 1A and 1B - frequency shown above ~*														
MWN-12	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
HWMU-1A & HWMU-1B																
MW-1D5		*~ w a t e r l e v e l o n l y ~*														
MWN-03		*~ w a t e r l e v e l o n l y ~*														
MWN-04		*~ w a t e r l e v e l o n l y ~*														
MWN-05A		*~ w a t e r l e v e l o n l y ~*														
MWN-13A		*~ w a t e r l e v e l o n l y ~*														
MWN-28A		*~ w a t e r l e v e l o n l y ~*														
MWN-29A		*~ w a t e r l e v e l o n l y ~*														
MWN-35A		*~ w a t e r l e v e l o n l y ~*														
MWN-36A		*~ w a t e r l e v e l o n l y ~*														
MWN-42A		*~ w a t e r l e v e l o n l y ~*														
P-4S		*~ w a t e r l e v e l o n l y ~*														
P-5S		*~ w a t e r l e v e l o n l y ~*														
P-6S		*~ w a t e r l e v e l o n l y ~*														
P-7S		*~ w a t e r l e v e l o n l y ~*														
WT8-01		*~ w a t e r l e v e l o n l y ~*														
WT8-02		*~ w a t e r l e v e l o n l y ~*														
HWMU-2																
MW-2D2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MW-2D3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MW-2D4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
MW-2U1	x	*~ upgradient location for HWMU 2 - frequency shown above ~*														
MWS-09		*w a t e r l e v e l o n l y*														
MWS-11A		*w a t e r l e v e l o n l y*														
MWS-15		*w a t e r l e v e l o n l y*														
MWS-26A		*w a t e r l e v e l o n l y*														

Notes:

1. SA = semi-annual monitoring event.

TABLE 2

SUMMARY OF SITE-SPECIFIC CONSTITUENTS OF CONCERN

2017 Annual Event
Hazardous Waste Management Units HWMU-1 & HWMU-2
Tecumseh Redevelopment Inc.
Lackawanna, New York

Parameter	HWMU 1A	HWMU 1B	HWMU 2
Site-Specific Volatile Organic Compounds (SS-VOCs) - Method 8260C (CP-51 compounds in blue)			
Benzene	x	x	x
cis-1,2-Dichloroethene		x	
trans-1,2-Dichloroethene		x	
Ethylbenzene		x	x
Toluene	x	x	x
Trichloroethene		x	
1,2,4-Trimethylbenzene	x		x
1,3,5-Trimethylbenzene	x		
Vinyl chloride		x	
Xylenes, Total	x	x	x
Site-Specific Semi-Volatile Organic Compounds (SS-SVOCs) - Method 8270D (base-neutrals only)			
Benzo(a)anthracene		x	
Bis(2-ethylhexyl) phthalate		x	
Chrysene		x	x
Naphthalene	x	x	x
Total Recoverable Phenolics (TRP) - Method 9066			
Phenolics	x	x	x

Notes:

1. Parameter lists were modified in September 2009 with NYSDEC approval.

TABLE 3

SUMMARY OF GROUNDWATER ELEVATIONS
May 18, 2017

2017 Annual Event
Hazardous Waste Management Units HWMU-1 & HWMU-2
Tecumseh Redevelopment Inc.
Lackawanna, New York

Location	TOR Elevation [1] (fmsl)	DTP (if present) (fbTOR)	DTW (fbTOR)	Product Thickness (feet)	GWE [1] (fmsl)	Corrected GWE [2] (fmsl)
HWM-1A & 1B MONITORING WELLS (25)						
MW-1D1	610.59	NP	31.97	NP	578.62	578.62
MW-1D2	614.46	NP	40.82	NP	573.64	573.64
MW-1D3	612.69	NP	39.01	NP	573.68	573.68
MW-1D4	612.52	NP	38.76	NP	573.76	573.76
MW-1D5	613.49	NP	39.77	NP	573.72	573.72
MW-1D6	610.94	NP	37.17	NP	573.77	573.77
MW-1D7	611.26	NP	35.68	NP	575.58	575.58
MW-1D8	610.74	NP	39.96	NP	570.78	570.78
MW-1U1	613.18	NP	39.09	NP	574.09	574.09
MWN-03	611.96	NP	NM	NP	NM	NM
MWN-04	623.45	NP	NM	NP	NM	NM
MWN-05A	622.84	NP	49.47	NP	573.37	573.37
MWN-12	608.59	NP	35.05	NP	573.54	573.54
MWN-13A	607.32	NP	32.98	NP	574.34	574.34
MWN-28A	595.76	NP	21.70	NP	574.06	574.06
MWN-29A	596.19	NP	22.29	NP	573.90	573.90
MWN-35A	608.71	NP	34.56	NP	574.15	574.15
MWN-36A	598.42	NP	24.11	NP	574.31	574.31
MWN-42A	579.37	NP	5.52	NP	573.85	573.85
P-4S	610.85	NP	37.26	NP	573.59	573.59
P-5S	616.71	NP	43.02	NP	573.69	573.69
P-6S	618.92	NP	45.35	NP	573.57	573.57
P-7S	610.59	NP	37.03	NP	573.56	573.56
WT8-01	612.49	NP	38.68	NP	573.81	573.81
WT8-02	645.62	NP	72.02	NP	573.60	573.60
HWM-2 MONITORING WELLS (8)						
MW-2D2	632.11	NP	58.33	NP	573.78	573.78
MW-2D3	636.52	NP	61.32	NP	575.20	575.20
MW-2D4	630.44	NP	55.35	NP	575.09	575.09
MW-2U1	628.32	DRY	DRY	DRY	DRY	DRY
MWS-09	630.82	NP	56.87	NP	573.95	573.95
MWS-11A	639.56	NP	65.04	NP	574.52	574.52
MWS-15	627.09	NP	52.33	NP	574.76	574.76
MWS-26A	624.80	NP	51.50	NP	573.30	573.30
LAKE ERIE						
Lake Erie [3]	NA	NP	NA	NP	573.51	573.51

Notes:

1. Top of Riser (TOR) elevation and Groundwater Elevation (GWE) is measured in feet; distance above mean sea level (fmsl).
2. Groundwater elevation (GWE) corrected based on the presence of free product (i.e., LNAPL), if applicable.
3. Source: NOAA Tides & Currents Web Page- Buffalo, NY Station ID 9063020
4. fbTOR = feet below top of riser or casing
5. fmsl = feet above mean sea level.
6. NM = not measured
7. NP = no product was present.

TABLE 4

SUMMARY OF HWMU-1 GROUNDWATER ANALYTICAL RESULTS [1,2]

2017 Annual Event
Hazardous Waste Management Units HWMU-1 & HWMU-2
Tecumseh Redevelopment Inc.
Lackawanna, New York

Parameter	Monitoring Well and HWMU Location																		GWQS [4]
	MW-1D1 (HWM-1B)		MW-1D2 [3] (HWM-1A)		MW-1D3 [3] (HWM-1A)		MW-1D4 [3] (HWM-1A)		MW-1D6 (HWM-1B)		MW-1D7 (HWM-1B)		MW-1D8 (HWM-1B)		MWN-12 (HWM-1B)		MW-1U1 (HWM-1A) (HWM-1B)		
Field Measurements [5]:																			
Sample No.	*Initial*	*Final*	*Initial*	*Final*	*Initial*	*Final*	*Initial*	*Final*	*Initial*	*Final*	*Initial*	*Final*	*Initial*	*Final*	*Initial*	*Final*	*Initial*	*Final*	--
pH (units)	**10.35**	**10.60**	**12.10**	**12.08**	**12.39**	**12.40**	**12.52**	**12.17**	**12.10**	**12.07**	7.33	7.34	**11.18**	**11.21**	**12.64**	**12.62**	**12.32**	**12.31**	**6.5 - 8.5**
Temperature (°C)	14.4	14.8	13.1	13.1	12.9	12.9	13.1	13.3	14.6	14.2	15.2	15.0	17.8	18.0	15.8	16.6	15.7	16.3	**NA**
Sp. Conductance (uS)	4196	4205	1951	1936	2356	2301	2233	2232	3886	3883	5218	5398	2316	2322	3734	3516	2592	2573	**NA**
Turbidity (NTU)	88.90	23.40	0.76	0.65	0.74	0.70	2.38	1.12	5.31	3.29	2.78	1.52	0.40	0.31	0.65	0.46	2.06	1.49	**NA**
DO (ppm)	2.10	2.18	1.42	1.40	1.11	1.20	1.86	1.99	2.31	2.81	1.92	1.68	4.49	4.33	2.15	2.01	1.42	1.58	**NA**
Eh (mV)	-95	-66	-177	-161	-335	-314	-367	-300	-174	-194	-8	-15	-56	-42	-194	-189	-227	-209	**NA**
Appearance and Odor	Clear, odor	Clear, odor	Clear, odor	Clear, odor	Clear SL.odor	Clear SL.odor	Clear SL.odor	Clear SL.odor	Clear SL.odor	Clear SL.odor	Clear, odor	Clear, odor	Clear, no odor	Clear, no odor	Clear, no odor	Clear, no odor	Clear, no odor	Clear, no odor	**NA**
Volatile Organic Compounds (ug/L):																			
Acetone	ND		"--"		"--"		"--"		ND		ND		ND		2.5 J		ND		**50***
Benzene	**15**		**1.3**		**4.2**		**6**		**1.6**		**7.6**		ND		**1.8**		**23**		**1**
1,1-Dichloroethane	ND		"--"		"--"		"--"		1.9 J		ND		ND		ND		ND		**5**
1,2-Dichloroethane	ND		"--"		"--"		"--"		0.3 J		ND		ND		ND		ND		**0.6**
cis-1,2-Dichloroethene	ND		"--"		"--"		"--"		ND		**14**		ND		ND		ND		**5**
trans-1,2-Dichloroethene	ND		"--"		"--"		"--"		ND		**15**		ND		ND		ND		**5**
Ethylbenzene	**25**		ND		ND		ND		ND		ND		ND		ND		ND		**5**
Styrene	**5.5 J**		"--"		"--"		"--"		ND		ND		ND		ND		ND		**5**
Toluene	**12**		2.5 J		1.8 J		3.1		0.84 J		ND		ND		0.78 J		**4.6**		**5**
Trichloroethene	**8.5**		"--"		"--"		"--"		ND		0.48 J		ND		ND		ND		**5**
1,2,4-Trimethylbenzene	**51**		**13**		ND		ND		0.84 J		ND		ND		ND		ND		**5**
1,3,5-Trimethylbenzene	ND		**6.3**		0.8 J		1.4 J		ND		ND		ND		0.81 J		0.81 J		**5**
Vinyl Chloride	ND		"--"		"--"		"--"		ND		**3.3**		ND		ND		ND		**2**
Xylenes, Total	**86**		7.5 J		4 J		**5.8**		ND		ND		ND		1.51 J		**8**		**5**

TABLE 4

SUMMARY OF HWMU-1 GROUNDWATER ANALYTICAL RESULTS [1,2]

2017 Annual Event
Hazardous Waste Management Units HWMU-1 & HWMU-2
Tecumseh Redevelopment Inc.
Lackawanna, New York

Parameter	Monitoring Well and HWMU Location									GWQS [4]
	MW-1D1 (HWM-1B)	MW-1D2 [3] (HWM-1A)	MW-1D3 [3] (HWM-1A)	MW-1D4 [3] (HWM-1A)	MW-1D6 (HWM-1B)	MW-1D7 (HWM-1B)	MW-1D8 (HWM-1B)	MWN-12 (HWM-1B)	MW-1U1 (HWM-1A) (HWM-1B)	
Semi-Volatile Organic Compounds (ug/L):										
Acenaphthene	2.7	1 J	ND	0.94 J	ND	ND	ND	3	0.76 J	**20***
Acenaphthylene	44	19	0.92 J	1.7 J	0.71 J	ND	ND	4.3	1.7 J	**--**
Acetophenone	ND	1.2 J	ND	ND	ND	ND	ND	ND	ND	**--**
Anthracene	ND	ND	ND	ND	ND	ND	ND	2.7	ND	**50***
Biphenyl	14	5.9	ND	ND	ND	ND	ND	2.6	ND	**5**
Bis(2-Ethylhexyl)phthalate	2.3 J	ND	ND	ND	1.8 J	3	2 J	ND	ND	**5**
Carbazole	1.2 J	1.6 J	1.1 J	1.8 J	3.4	ND	ND	5.8	1.8 J	**--**
Dibenzofuran	15	6.8	ND	1.4 J	1.5 J	ND	ND	7.7	0.89 J	**--**
Fluoranthene	ND	ND	0.8 J	0.6 J	4.3	ND	ND	5.6	1.8 J	**50***
Fluorene	9.8	4.5	1.2 J	2.2	0.84 J	4.6	ND	13	1.9 J	**50***
2-Methylnaphthalene	7.4	63	ND	1.4 J	2	ND	ND	9.3	1 J	**--**
Naphthalene	**260**	**170**	3.7	7.1	**28**	ND	ND	**49**	**11**	**10***
Phenanthrene	1.1 J	2.7	1.7 J	2.9	11	ND	ND	22	3.1	**50***
Pyrene	ND	ND	ND	ND	2.1	ND	ND	3.1	1.8 J	**50***
General Chemistry (ug/L):										
Total Recoverable Phenolics (TRP)	**22 J**	ND	ND	**11 J**	**12 J**	**15 J**	**10 J**	**9 J**	**7 J**	**1****

Notes:

1. Only those VOCs and SVOCs detected above the method detection limit at a minimum of one sample location are reported in this table.
2. Shaded and bolded values represent exceedances of the GWQS/GV. **BOLD**
3. Monitoring location analyzed for CP-51 VOCs via Method 8260 (indicated in the parameter list in blue).
4. NYSDEC Class "GA" Groundwater Quality Standards/Guidance Values (GWQS/GV) as per 6 NYCRR Part 703.
5. Field measurements were collected immediately before and after groundwater sample collection.
6. " J " = Estimated Value
7. " -- " = Not analyzed for this parameter
8. " ND " indicates parameter was not detected above laboratory reporting limit and is reported herein as not detected (ND).
9. " * " = The Guidance Value was used where a Standard has not been established.
10. " ** " = The general standard of 1.0 ug/L for phenolic compounds was used.

TABLE 5

SUMMARY OF HWMU-2 GROUNDWATER ANALYTICAL RESULTS [1,2]

2017 Annual Event
Hazardous Waste Management Units HWMU-1 & HWMU-2
Tecumseh Redevelopment Inc.
Lackawanna, New York

Parameter	Monitoring Well										GWQS [3]
	MW-2D2		MW-2D3		MW-2D4		MW-2U1		MWS-11A		
Field Measurements [4]:											
Sample No.	*Initial*	*Final*	*Initial*	*Final*	*Initial*	*Final*	*Initial*	*Final*	*Initial*	*Final*	--
pH (units)	8.44	8.49	**11.91**	**11.91**	8.41	8.43	NS	NS	12.28	12.33	**6.5 - 8.5**
Temperature (^{o}C)	17.3	17.3	17.7	17.8	17.9	17.6	NS	NS	13.8	13.5	**NA**
Sp. Conductance (mS)	1169	1168	1287	1273	1479	1464	NS	NS	2309	2297	**NA**
Turbidity (NTU)	0.58	0.77	0.95	0.72	2.28	2.17	NS	NS	2	3	**NA**
DO (ppm)	2.61	2.44	0.95	1.1	8.33	7.92	NS	NS	0.88	0.93	**NA**
Eh (mV)	133	129	-249	-239	41	49	NS	NS	-299	-305	**NA**
Appearance and Odor	Clear No odor	Clear No odor	Clear SL.odor	Clear SL.odor	Clear SL.odor	Clear SL.odor	NS	NS	Clear No odor	Clear No odor	**NA**
Volatile Organic Compounds (ug/L):											
Benzene	ND		**3.6**		ND		NS		**2.6**		**1**
Ethylbenzene	ND		2.2 J		ND		NS		ND		**5**
Toluene	ND		2.6		ND		NS		1 J		**5**
1,2,4-Trimethylbenzene	ND		4.6		ND		NS		2.8		**5**
1,3,5-Trimethylbenzene	ND		1.9 J		ND		NS		1.5 J		**5**
Xylenes, Total	ND		**17.7**		ND		NS		4.7 J		**5**
Semi-Volatile Organic Compounds (ug/L):											
Acenaphthene	ND		2.2		ND		NS		8.6		**20***
Acenaphthylene	ND		14		ND		NS		10		**--**
Anthracene	ND		1.7 J		ND		NS		1.4		**50***
Benzo(a)anthracene	ND		ND		ND		NS		0.28		**0.002***
Benzo(a)pyrene	ND		ND		ND		NS		0.1 J		**0.002***
Benzo(b)fluoranthene	ND		ND		ND		NS		0.14		**0.002***
Benzo(k)fluoranthene	ND		ND		ND		NS		0.05 J		**0.002**
Benzo(g,h,i)fluoranthene	ND		ND		ND		NS		0.06 J		**--**
Biphenyl	ND		2.5		ND		NS		NA		**5**
Carbazole	ND		8.8		ND		NS		NA		**--**
Chrysene	ND		ND		ND		NS		**0.21**		**0.002**
Dibenzofuran	ND		8.8		ND		NS		NA		**--**
Fluoranthene	ND		1.6 J		ND		NS		3.8		**50***
Fluorene	ND		12		ND		NS		9.3		**50***
Indeno(1,2,3-cd)pyrene	ND		ND		ND		NS		0.06 J		**0.002***
2-Methylnaphthalene	ND		12		ND		NS		38 D		**--**
Naphthalene	ND		**82**		ND		NS		**160 D**		**10***
Phenanthrene	ND		15		ND		NS		13		**50***
Pyrene	ND		0.9 J		ND		NS		2.6		**50***
General Chemistry (ug/L):											
Total Recoverable Phenolics (TRP)	ND		**6 J**		ND		NS		**9 J**		**1****

Notes:

1. Only those compounds detected above the method detection limit at a minimum of one sample location are reported in this table.
2. Shaded and bolded values represent exceedances of the GWQS/GV. **BOLD**
3. NYSDEC Class "GA" Groundwater Quality Standards (GWQS) as per 6 NYCRR Part 703.
4. Field measurements were collected immediately before and after groundwater sample collection.
5. " J " = Estimated Value
6. " ND " indicates parameter was not detected above laboratory reporting limit and is reported herein as not detected (ND).
7. " NS " = monitoring well not sampled; dry.
8. " * " = The Guidance Value was used where a Standard has not been established.
9. " ** " = The general standard of 1.0 ug/L for phenolic compounds was used.

TABLE 6

TREND ANALYSIS SUMMARY

2017 Annual Event
Hazardous Waste Management Units HWMU-1 & HWMU-2
Tecumseh Redevelopment Inc.
Lackawanna, New York

LOCATION	CONCENTRATION VERSUS TIME TREND [1]														
	B	cis-12-DCE	trans-12-DCE	E	T	TCE	124-TMB	135-TMB	VC	X	B(a)A	BEP	Chrysene	Naph	TRP
HWMU 1A															
MW-1D2	N	--	--	--	na	--	N	N	--	D	--	--	--	D	N
MW-1D3	D	--	--	--	D	--	na	na	--	D	--	--	--	D	I
MW-1D4	D	--	--	--	D	--	na	na	--	D	--	--	--	D	N
MW-1U1	N	--	--	--	D	--	na	na	--	D	--	--	--	D	N
HWMU 1B															
MW-1D1	N	na	na	N	N	N	--	--	na	N	na	D	na	N	N
MW-1D6	N	na	na	na	na	na	--	--	na	na	D	na	D	N	N
MW-1D7	D	D	N	na	na	D	--	--	N	na	na	D	na	na	N
MW-1D8	N	na	na	na	D	na	--	--	na	D	na	na	na	D	N
MW-1U1	D	na	na	na	D	na	--	--	na	D	D	na	id	D	N
MWN-12	D	na	na	na	na	na	--	--	na	na	D	D	D	N	N
HWMU 2															
MW-2D2	na	--	--	na	na	--	na	--	--	na	--	--	na	na	na
MW-2D3	D	--	--	D	D	--	D	--	--	D	--	--	D	N	N
MW-2D4	na	--	--	na	na	--	na	--	--	D	--	--	na	D	D

Notes:

1. Any parameter exceeding the GWQS two consecutive events has been statistically evaluated.
2. " -- " = parameter is not a site-specific constituent of concern (SSCOC) for this unit

Definitions:

B = benzene
cis-12-DCE = cis-1,2-dichloroethene
trans-12-DCE = trans-1,2-dichloroethene
E = ethylbenzene
T = toluene
124-TMB = 1,2,4-trimethylbenzene
135-TMB = 1,3,5-trimethylbenzene
TCE = trichloroethene
VC = vinyl chloride
X = total xylenes
B(a)A = benzo(a)anthracene
BEP = bis(2-ethylhexyl) phthalate
Naph = naphthalene
TRP = total recoverable phenolics

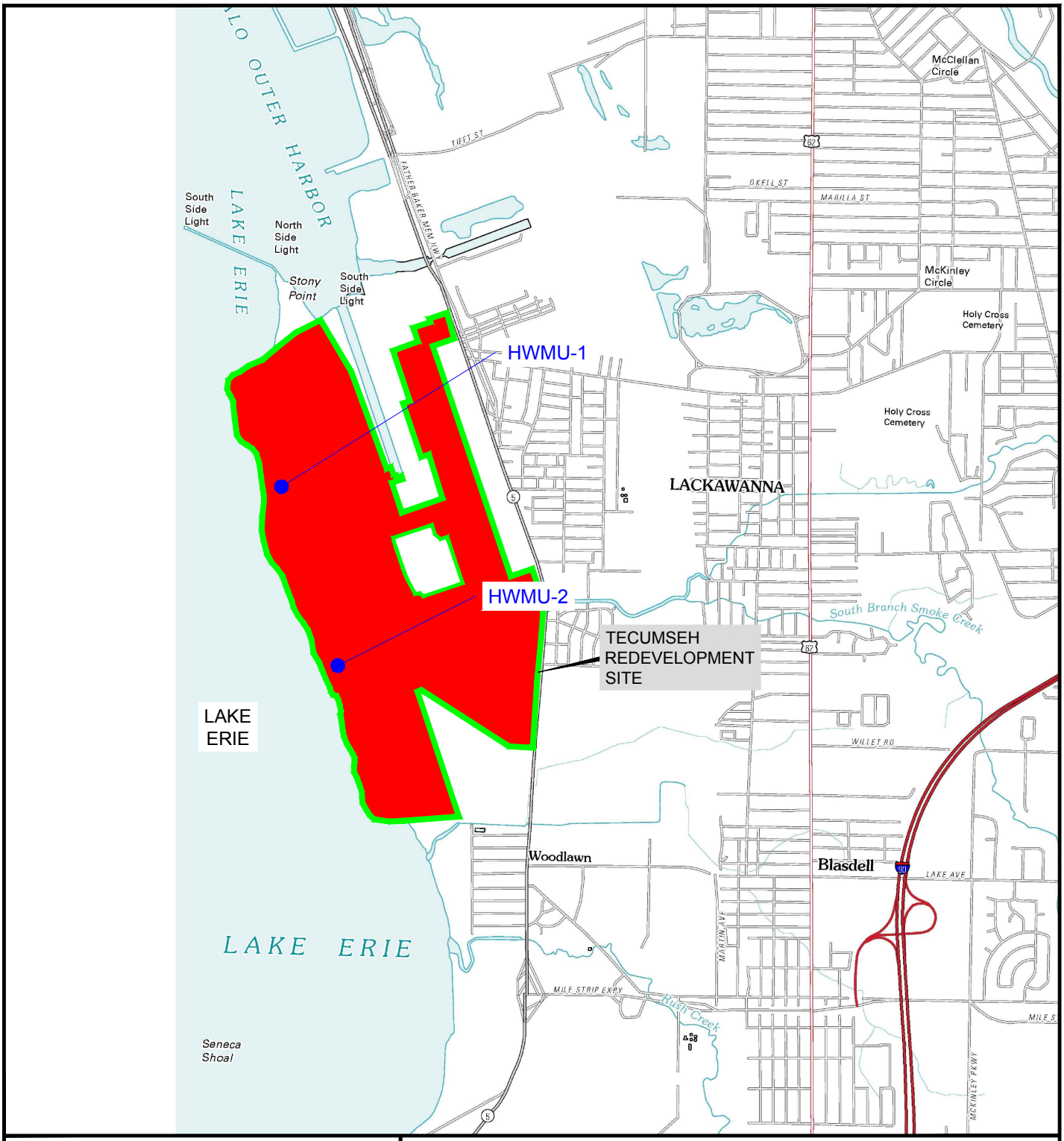
Color Scheme:

D	= concentrations are approaching or have trended below GWQSs/GVs
D	= concentrations are decreasing, albeit above GWQSs/GVs
N	= neutral trend (neither increasing nor decreasing)
I	= concentrations appear to be increasing, further monitoring is required
id	= concentrations are above GWQSs/GVs; however, insufficient data exists to make a trend deter
na	= trending is "not applicable" because there have not been two consecutive exceedances of the C

FIGURES

F:\CAD\TurnKey\Tecumseh Redevelopment\HWMU Groundwater Sampling\2017\Figure 1; Site Vicinity and Location Map.dwg

FIGURE 1



TURNKEY ENVIRONMENTAL RESTORATION, LLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

SITE VICINITY AND LOCATION MAP

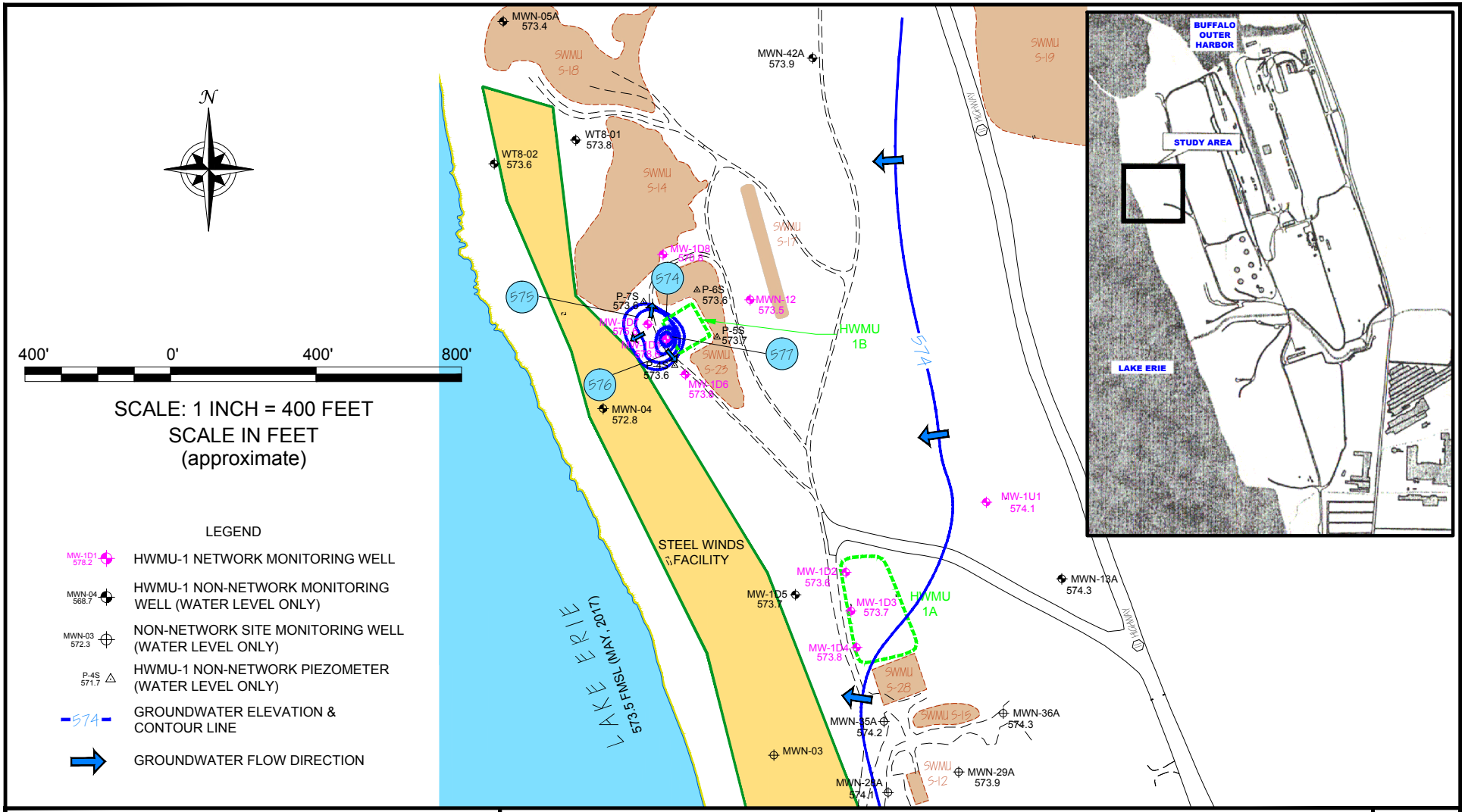
HWMU-1 & HWMU-2 ANNUAL GWM PROGRAM

FORMER BETHLEHEM STEEL LACKAWANNA COKE DIVISION SITE
LACKAWANNA, NEW YORK

PREPARED FOR

TECUMSEH REDEVELOPMENT INC.

PROJECT NO.:	0071-015-240
DATE:	JULY 2017
DRAFTED BY:	RFL



TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0071-07-240

DATE: DECEMBER 2017

DRAFTED BY: BCH-CMC

HWMU-1 SHALLOW GROUNDWATER ISOPOTENTIAL MAP MAY 18, 2017

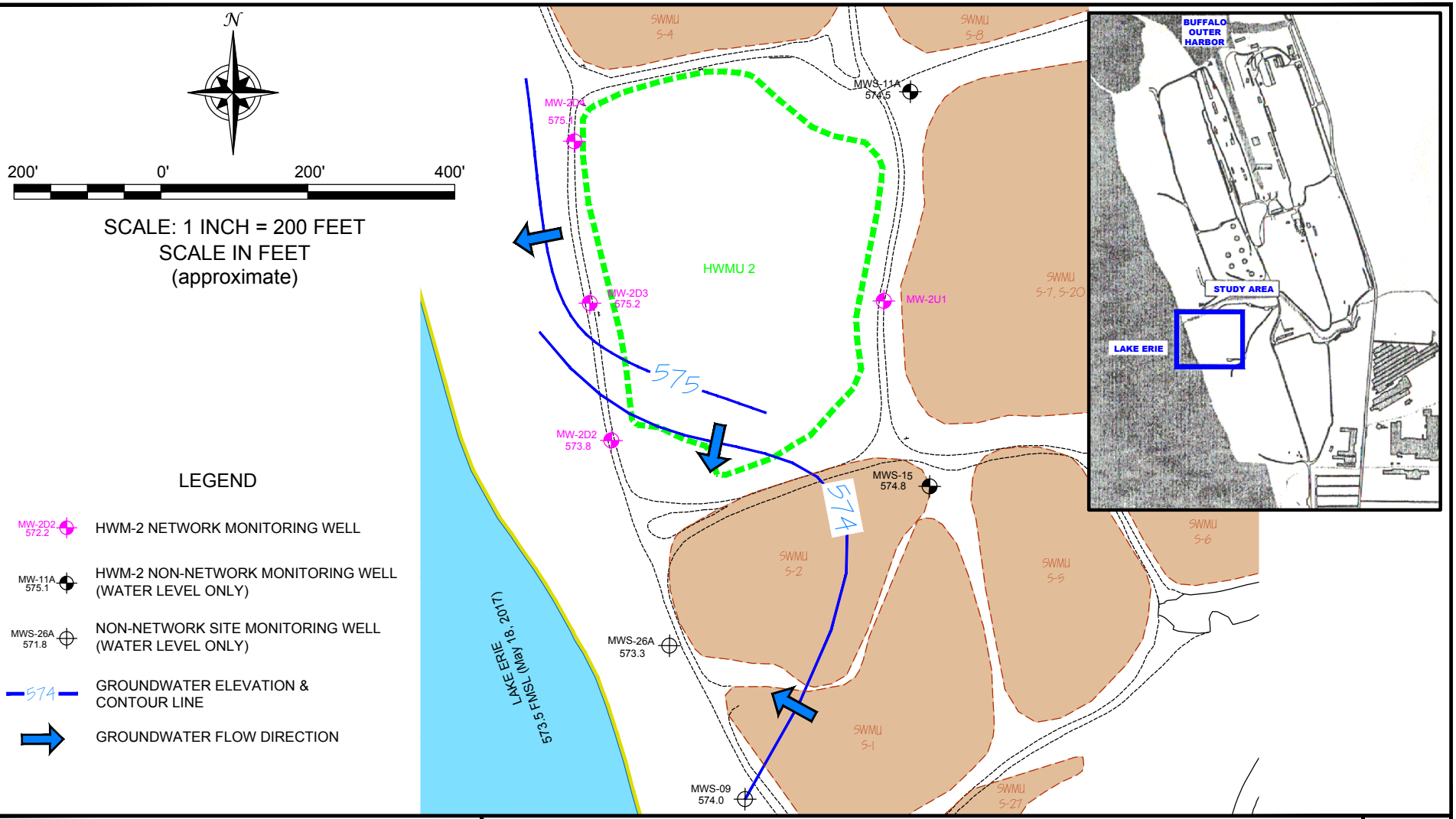
HWMU-1 & HWMU-2 ANNUAL GROUNDWATER MONITORING PROGRAM

FORMER BETHLEHEM STEEL LACKAWANNA COKE DIVISION SITE
LACKAWANNA, NEW YORK

PREPARED FOR

TECUMSEH REDEVELOPMENT INC.

FIGURE 2



TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0071-017-240

DATE: DECEMBER 2017

DRAFTED BY: BCH-CMC

HWMU-2 SHALLOW GROUNDWATER ISOPOTENTIAL MAP
May 18, 2017

HWMU-1 & HWMU-2 ANNUAL GROUNDWATER MONITORING PROGRAM

FORMER BETHLEHEM STEEL LACKAWANNA COKE DIVISION SITE
LACKAWANNA, NEW YORK

PREPARED FOR

TECUMSEH REDEVELOPMENT INC.

FIGURE 3

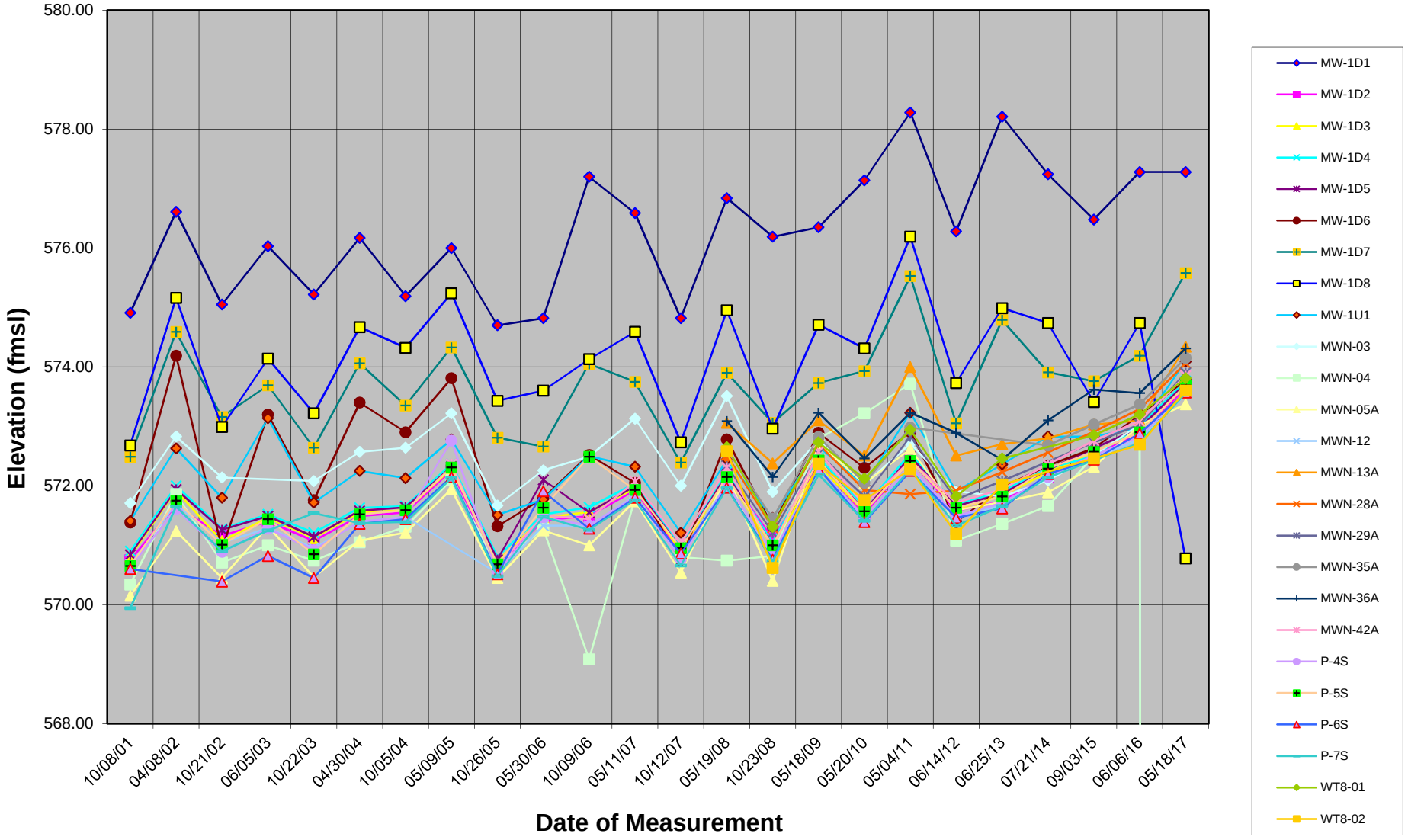
ATTACHMENT 1

HISTORICAL GROUNDWATER ELEVATION SUMMARY

ATTACHMENT 1

HISTORICAL GROUNDWATER ELEVATIONS
HWMU-1A & 1B

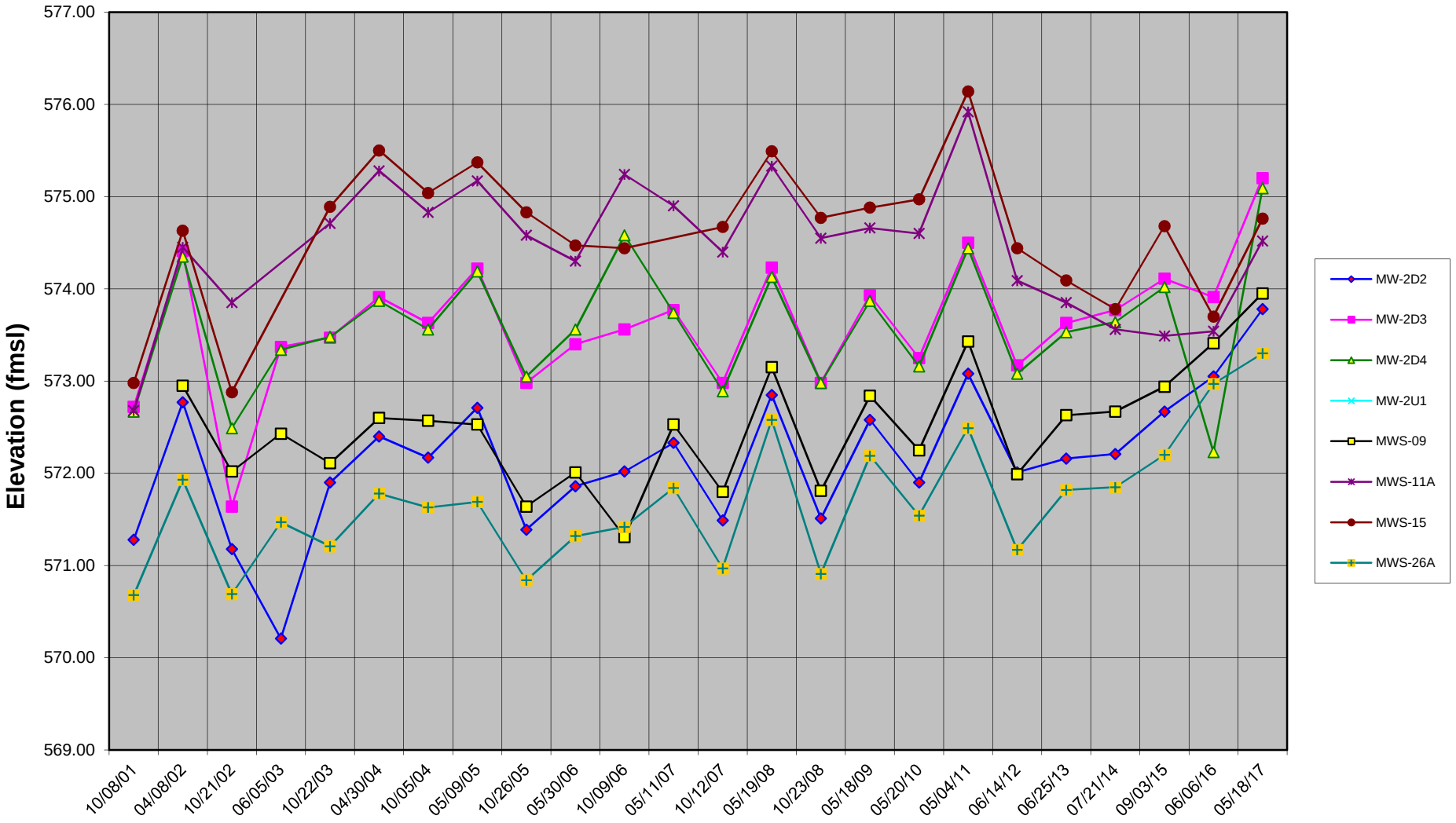
2001 to Present



ATTACHMENT 1

HISTORICAL GROUNDWATER ELEVATIONS
HWMU-2

2001 to Present

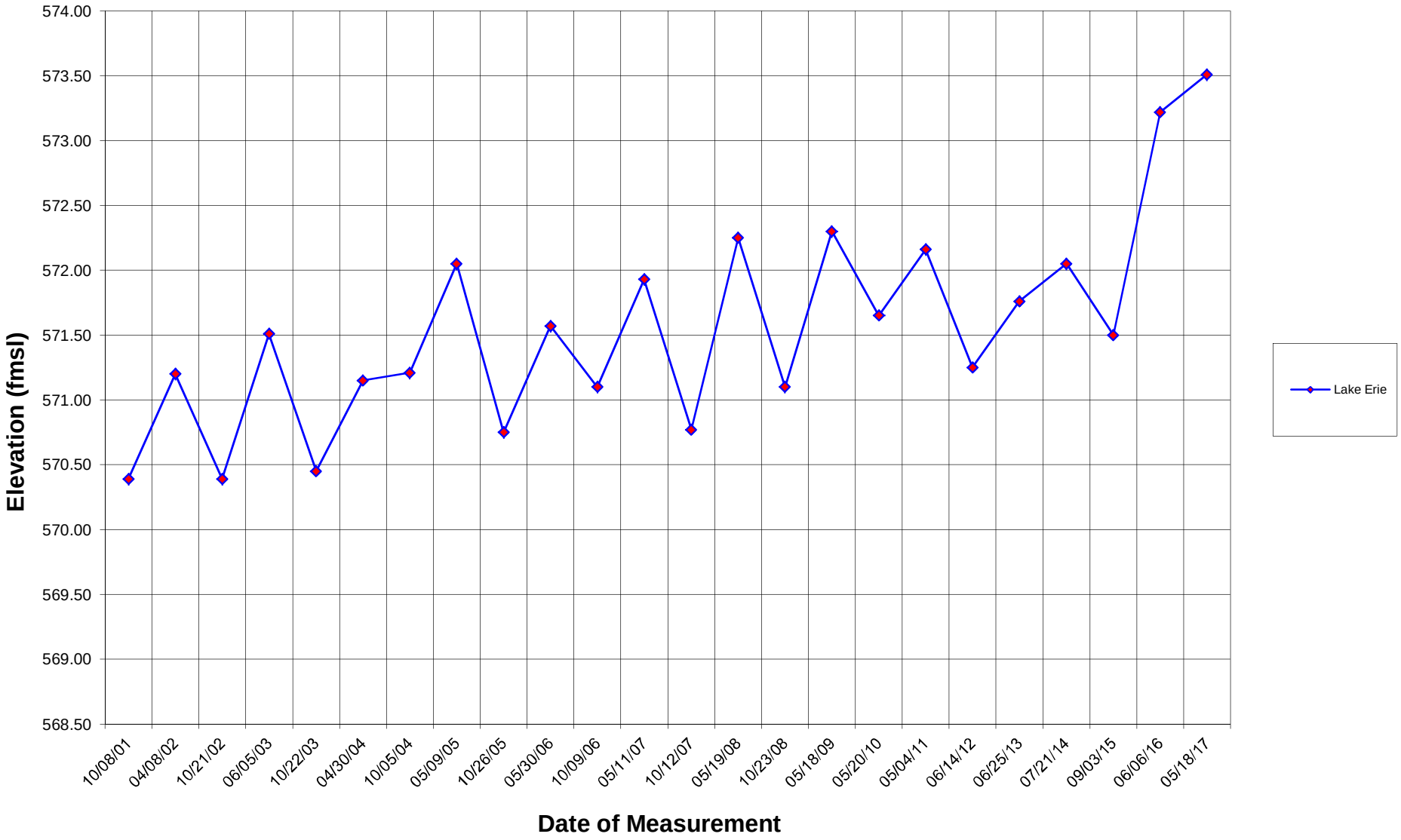


TurnKey Environmental Restoration, LLC

ATTACHMENT 1

HISTORICAL GROUNDWATER ELEVATIONS
LAKE ERIE

2001 to Present



ATTACHMENT 2

TIME-CONCENTRATION PLOTS

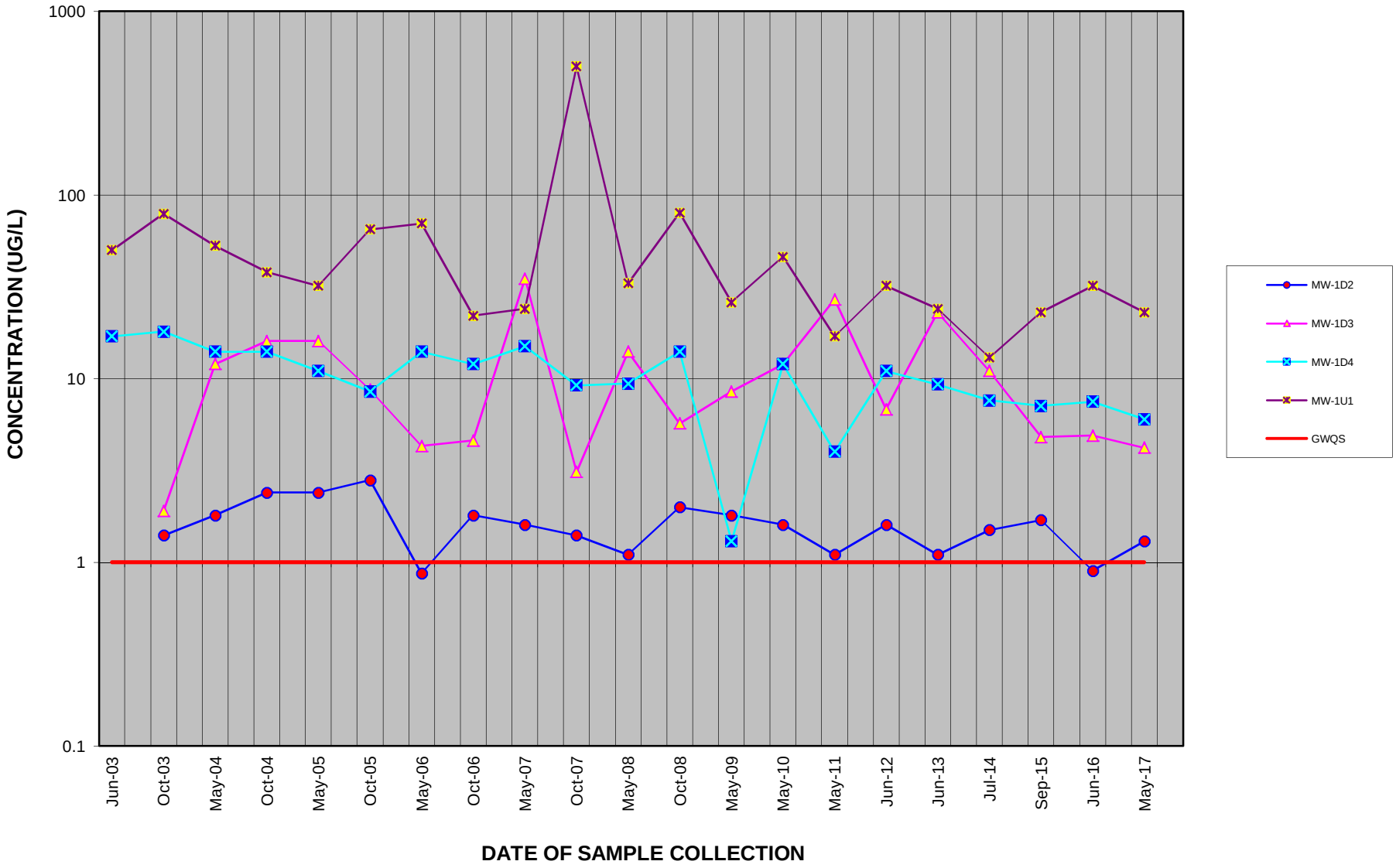
ATTACHMENT 2A

TIME-CONCENTRATION PLOTS

HWMU 1A

BENZENE

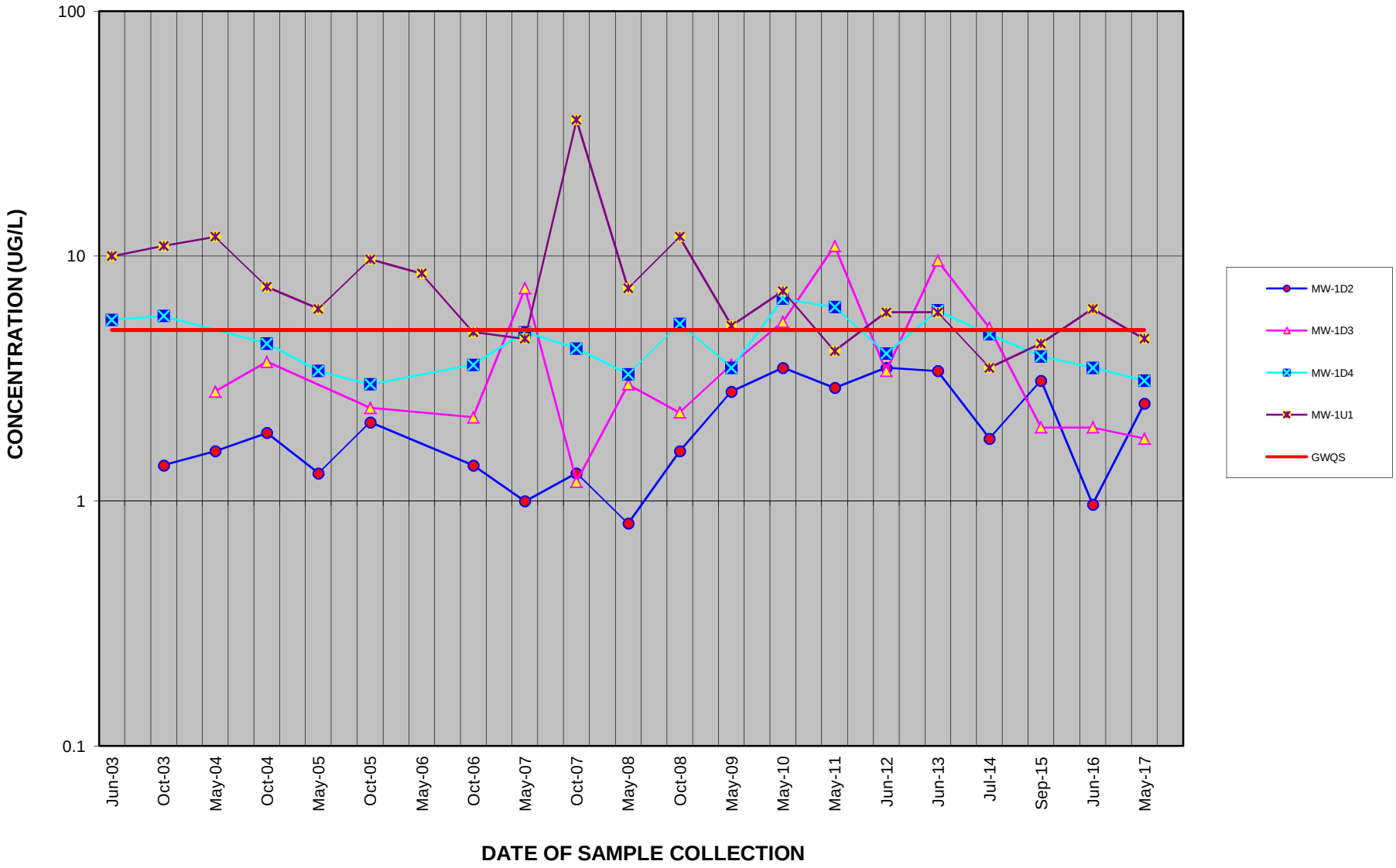
HAZARDOUS WASTE MANAGEMENT UNIT 1A
HISTORICAL ANALYTICAL SUMMARY



Notes:
1. Concentrations reported below method detection limits (i.e., non-detect) are presented at the reporting limit preceded with an "ND".
2. Concentrations are in micrograms per liter (ug/L).

TOLUENE

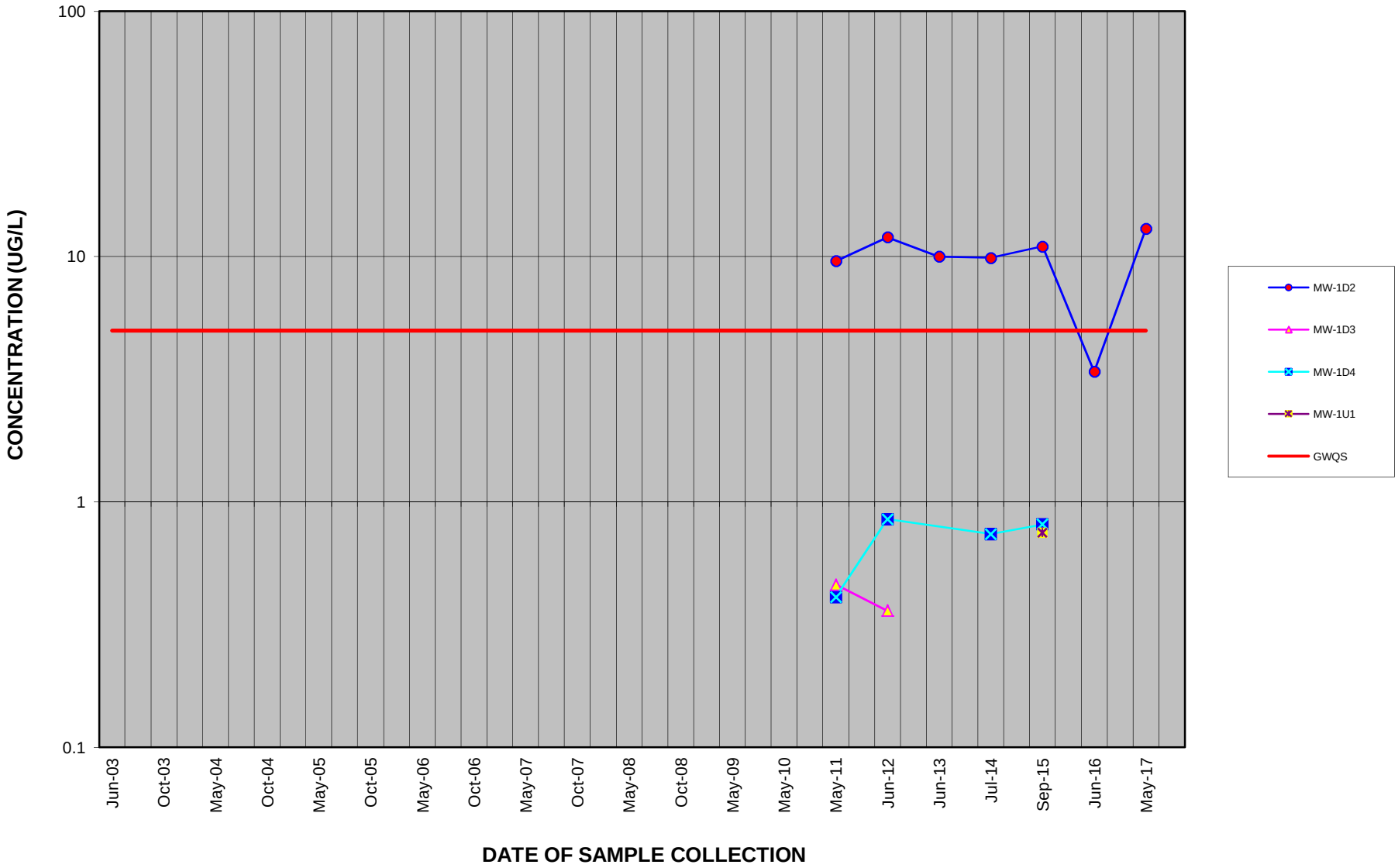
HAZARDOUS WASTE MANAGEMENT UNIT 1A
HISTORICAL ANALYTICAL SUMMARY



Notes:
1. Concentrations reported below method detection limits (i.e., non-detect) are presented at the reporting limit preceded with an "ND".
2. Concentrations are in micrograms per liter (ug/L).

1,2,4-TRIMETHYLBENZENE

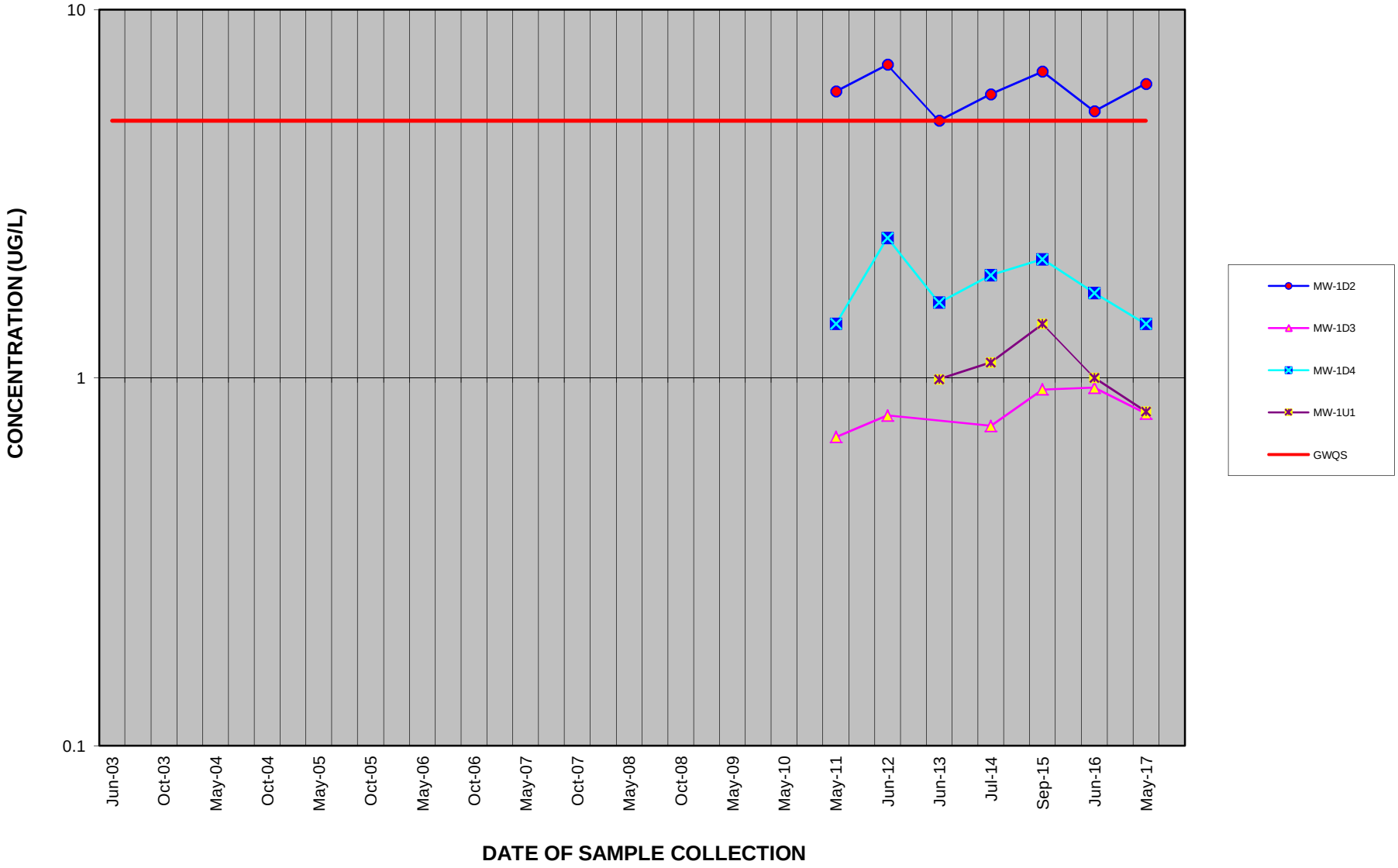
HAZARDOUS WASTE MANAGEMENT UNIT 1A
HISTORICAL ANALYTICAL SUMMARY



Notes:
1. Concentrations reported below method detection limits (i.e., non-detect) are presented at the reporting limit preceded with an "ND".
2. Concentrations are in micrograms per liter (ug/L).

1,3,5-TRIMETHYLBENZENE

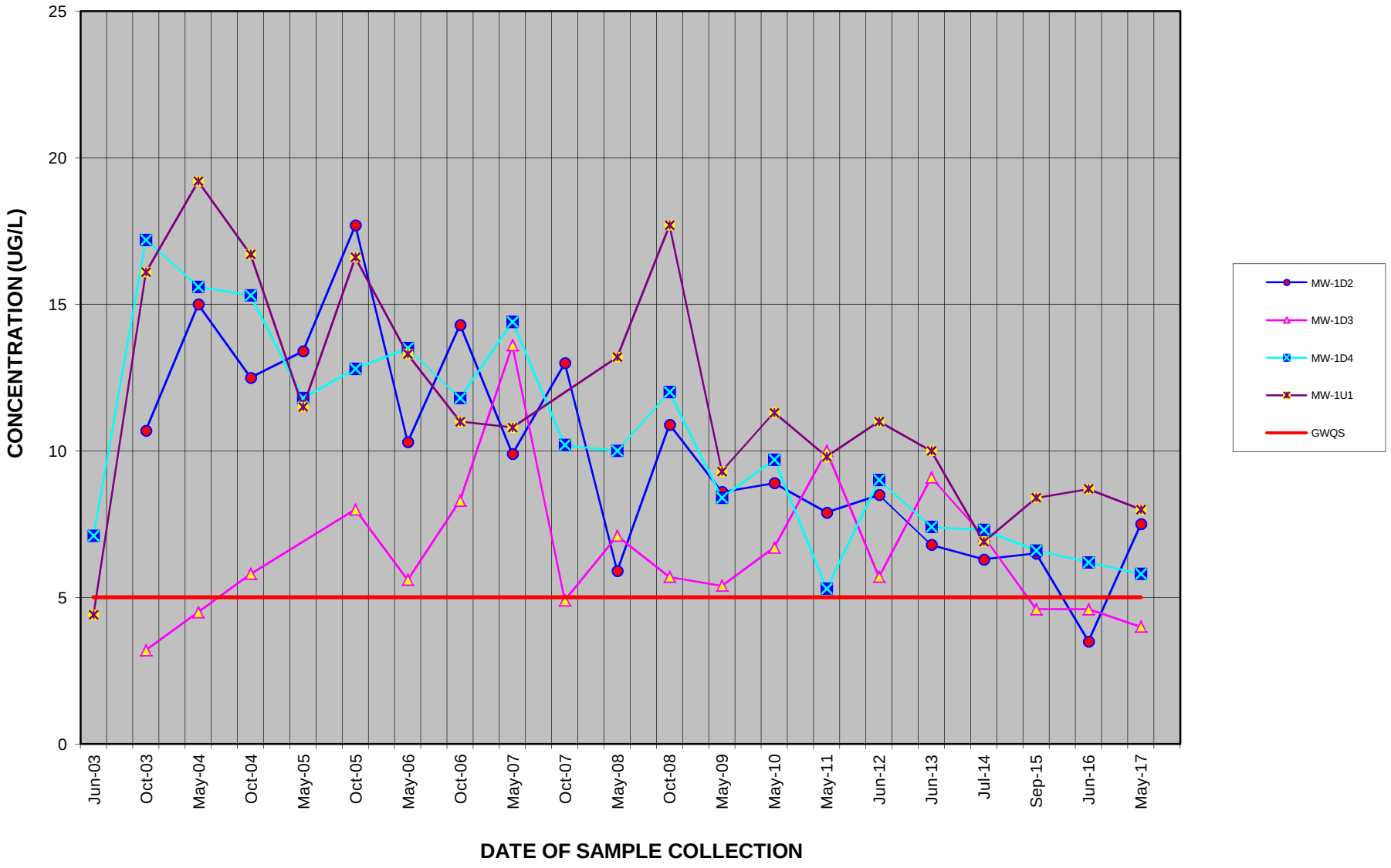
HAZARDOUS WASTE MANAGEMENT UNIT 1A
HISTORICAL ANALYTICAL SUMMARY



Notes:
1. Concentrations reported below method detection limits (i.e., non-detect) are presented at the reporting limit preceded with an "ND".
2. Concentrations are in micrograms per liter (ug/L).

TOTAL XYLENES

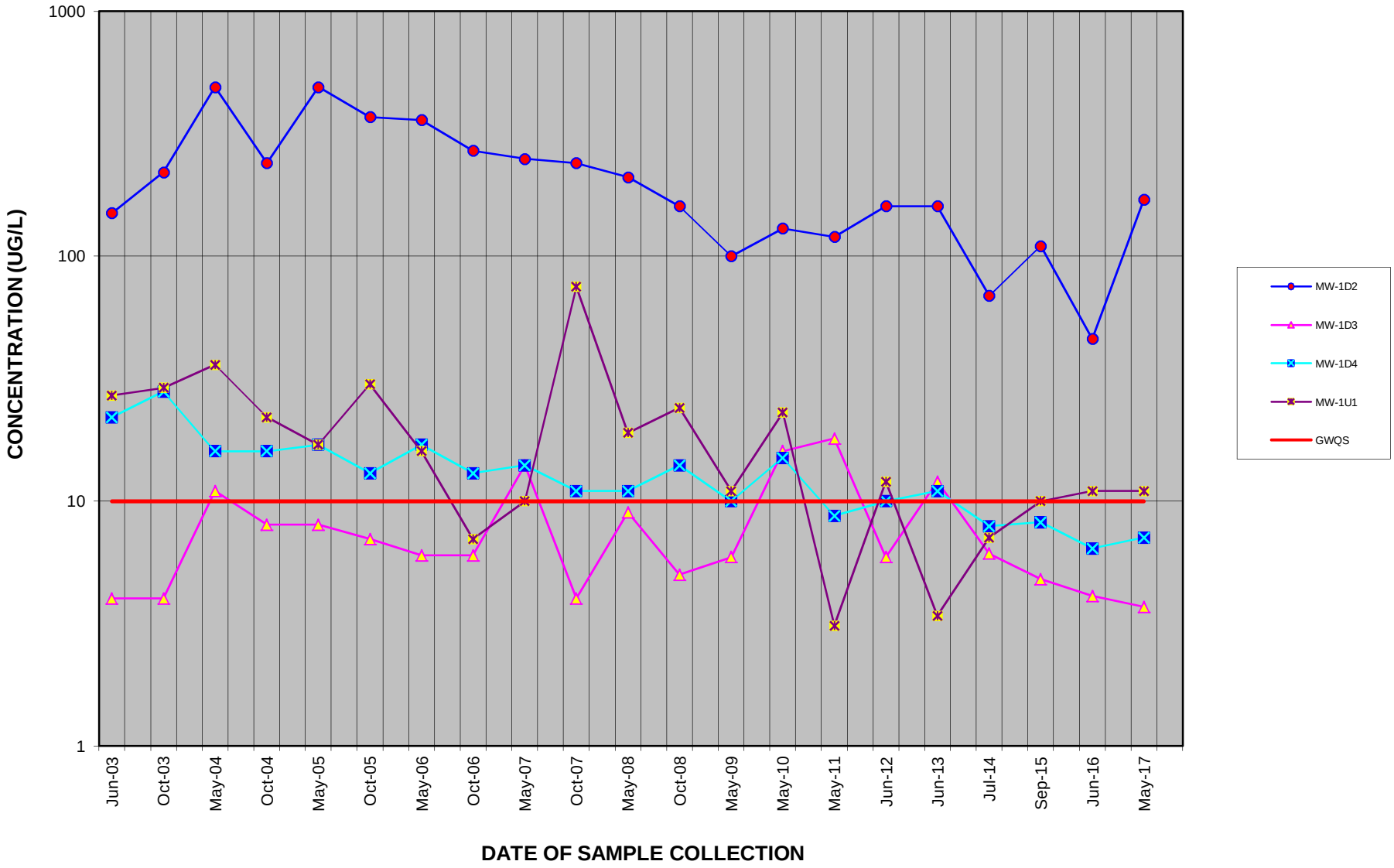
HAZARDOUS WASTE MANAGEMENT UNIT 1A
HISTORICAL ANALYTICAL SUMMARY



Notes:
1. Concentrations reported below method detection limits (i.e., non-detect) are presented at the reporting limit preceded with an "ND".
2. Concentrations are in micrograms per liter (ug/L).

NAPHTHALENE

HAZARDOUS WASTE MANAGEMENT UNIT 1A
HISTORICAL ANALYTICAL SUMMARY

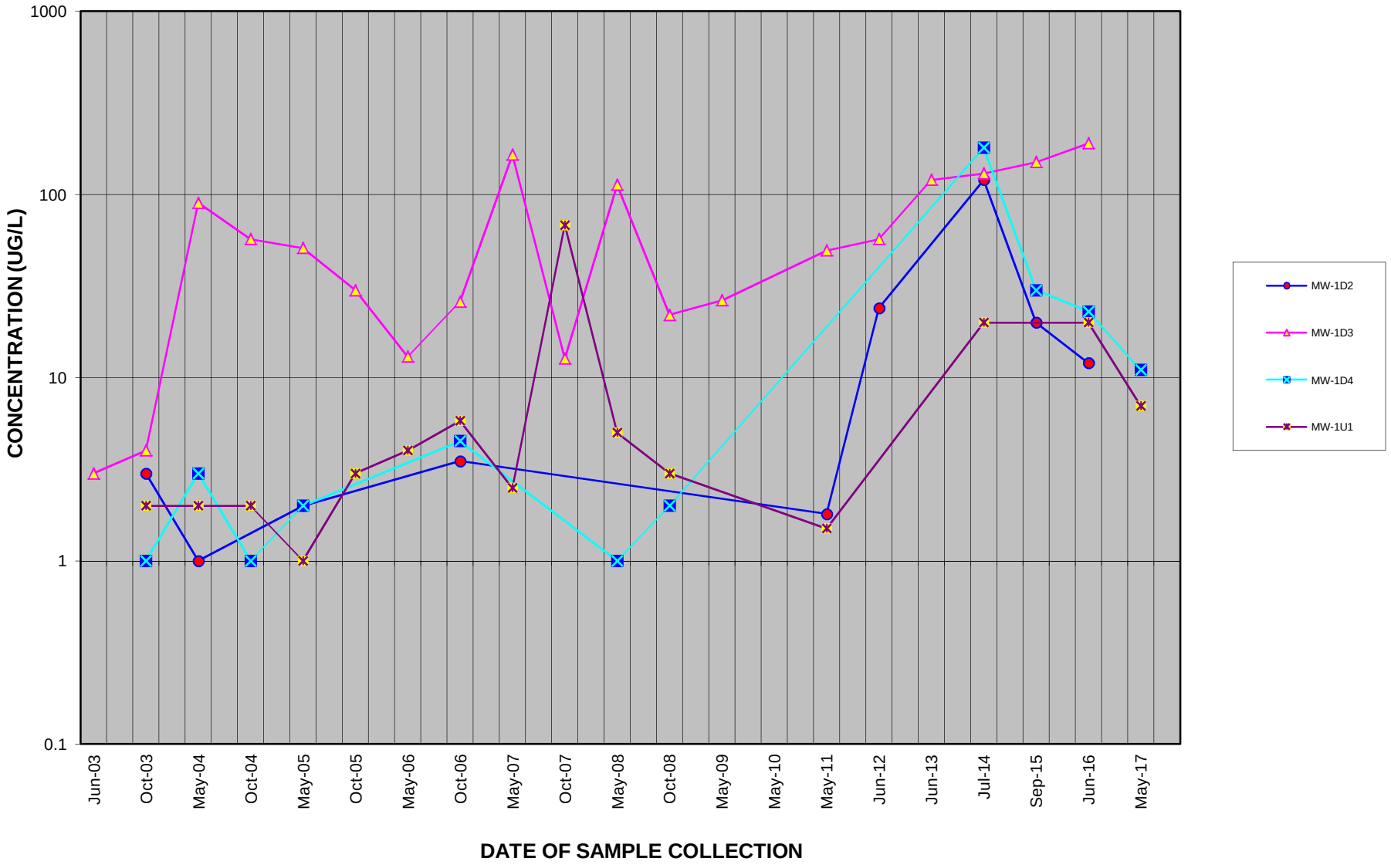


Notes:
1. Concentrations reported below method detection limits (i.e., non-detect) are presented at the reporting limit preceded with an "ND".
2. Concentrations are in micrograms per liter (ug/L).

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TOTAL RECOVERABLE PHENOLICS (TRP)

HAZARDOUS WASTE MANAGEMENT UNIT 1A
HISTORICAL ANALYTICAL SUMMARY



Notes:
1. Concentrations reported below method detection limits (i.e., non-detect) are presented at the reporting limit preceded with an "ND".
2. Concentrations are in micrograms per liter (ug/L).

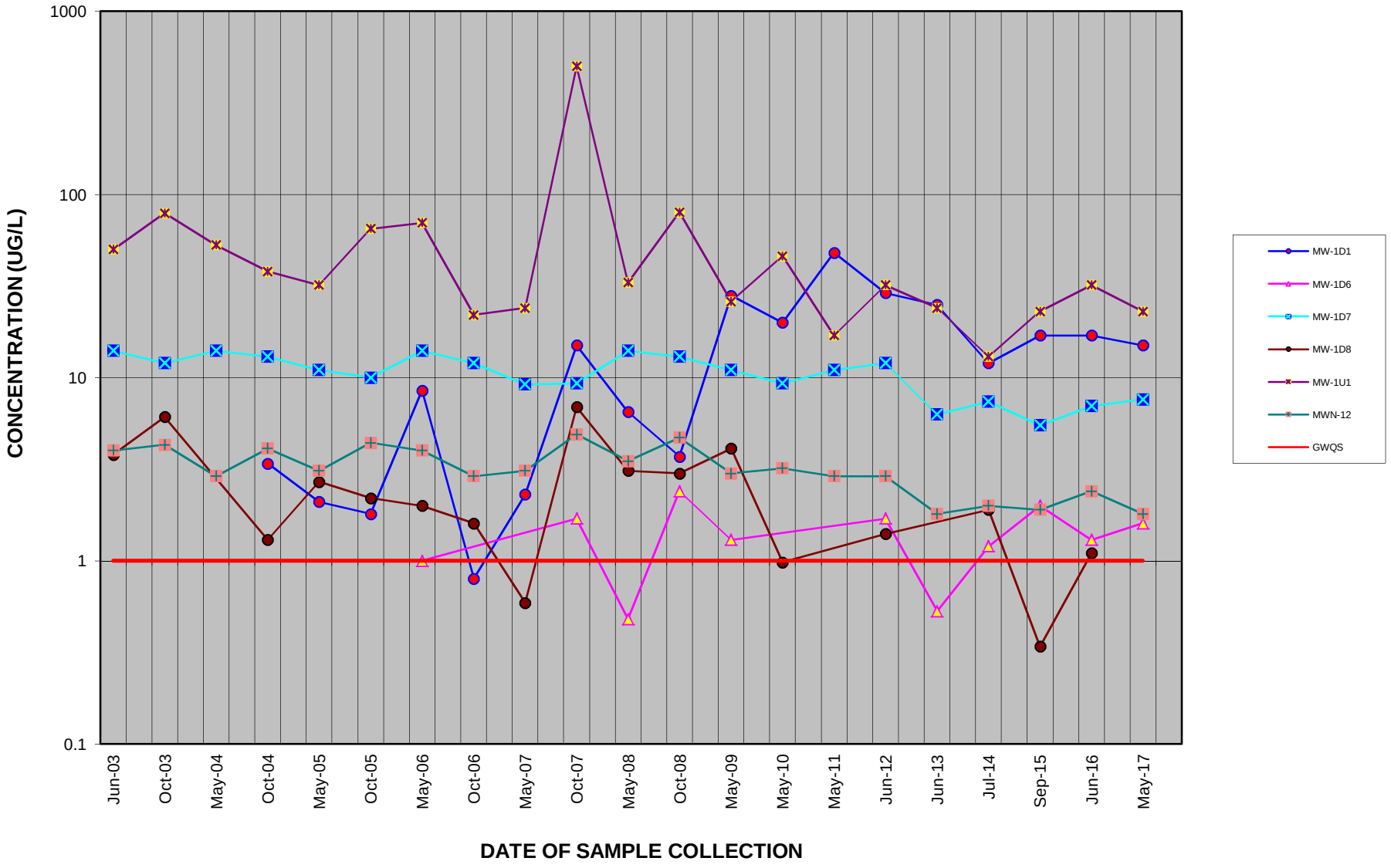
ATTACHMENT 2B

TIME-CONCENTRATION PLOTS

HWMU 1B

BENZENE

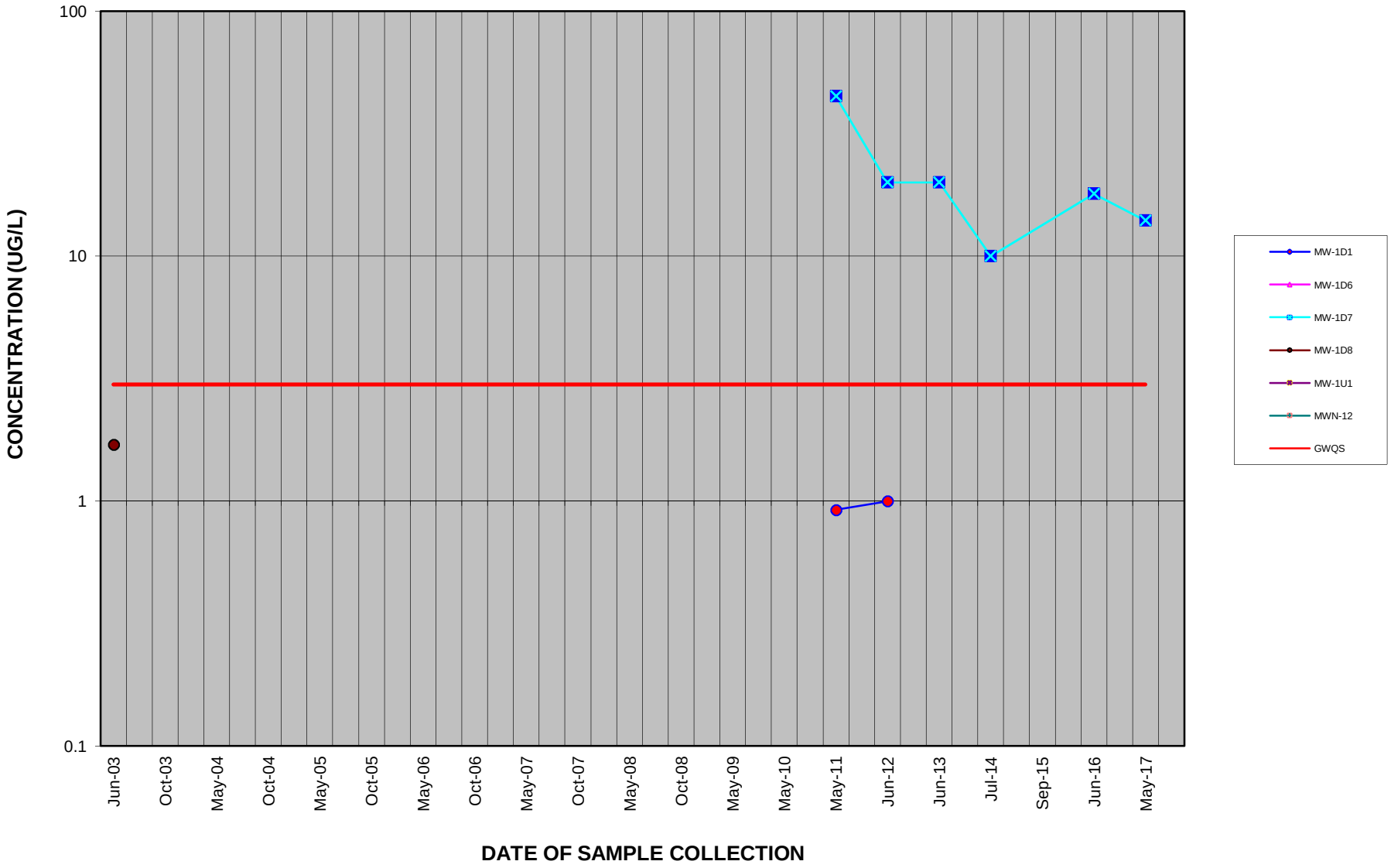
HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

cis-1,2-DICHLOROETHENE

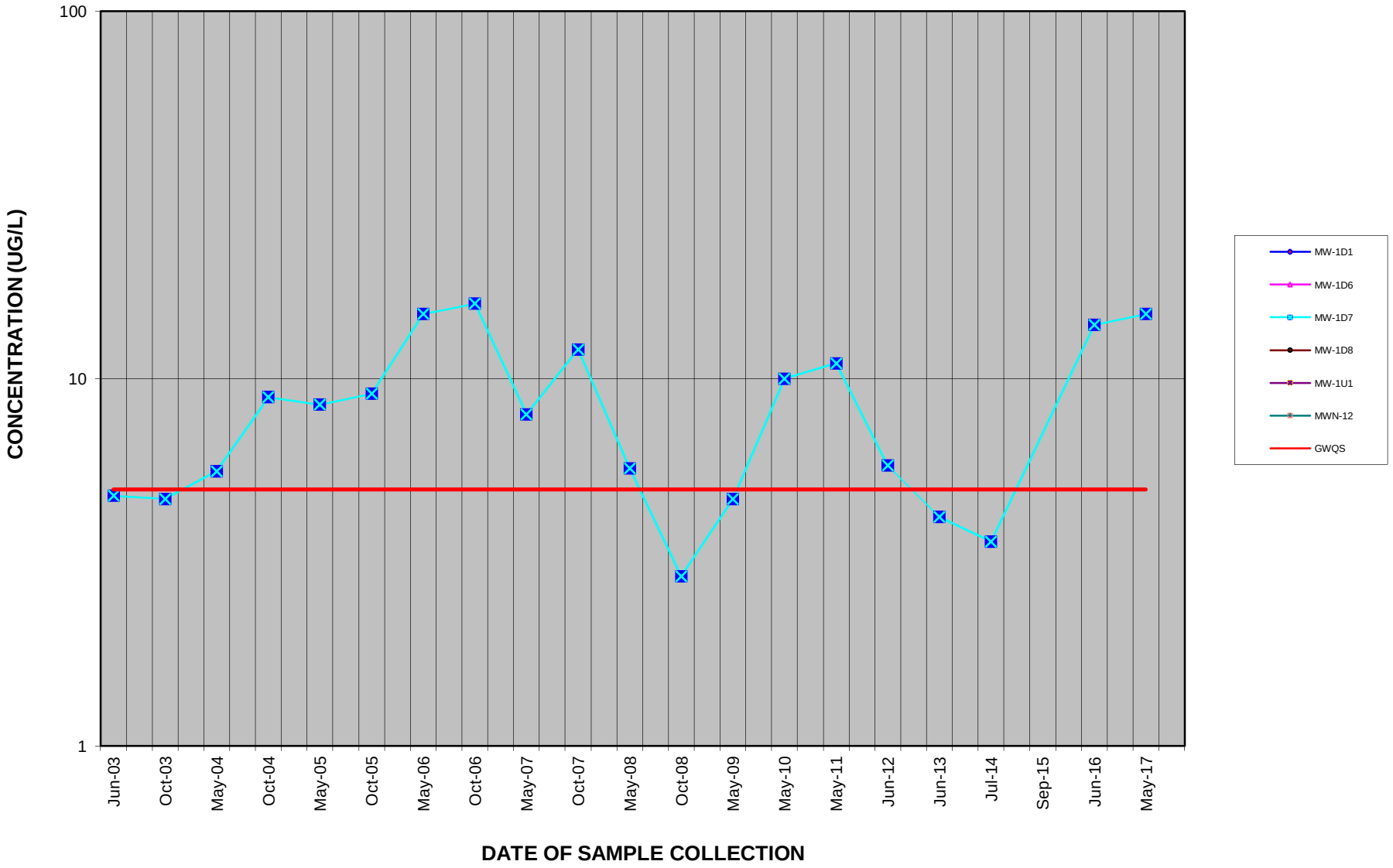
HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

trans-1,2-DICHLOROETHENE

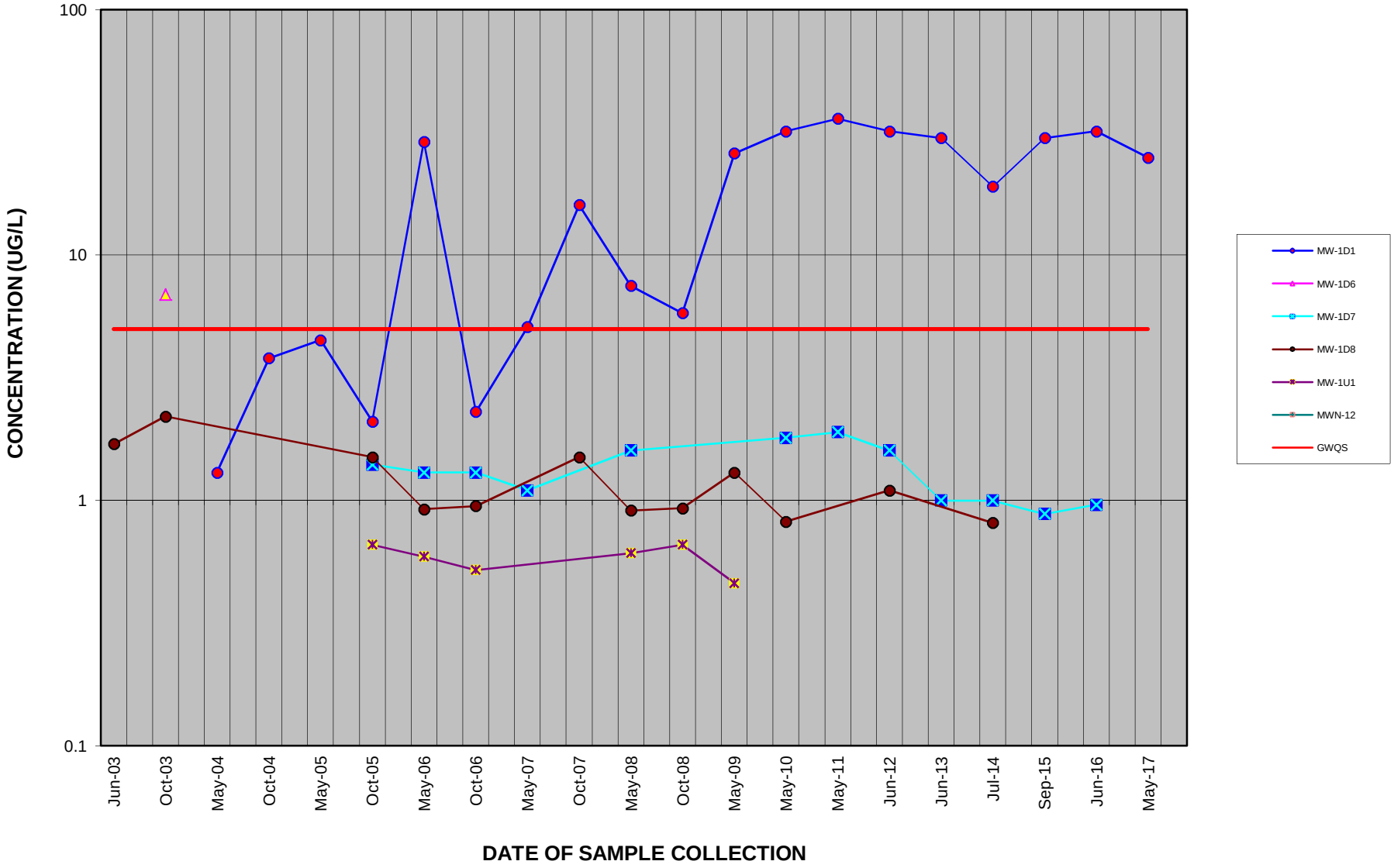
HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

ETHYLBENZENE

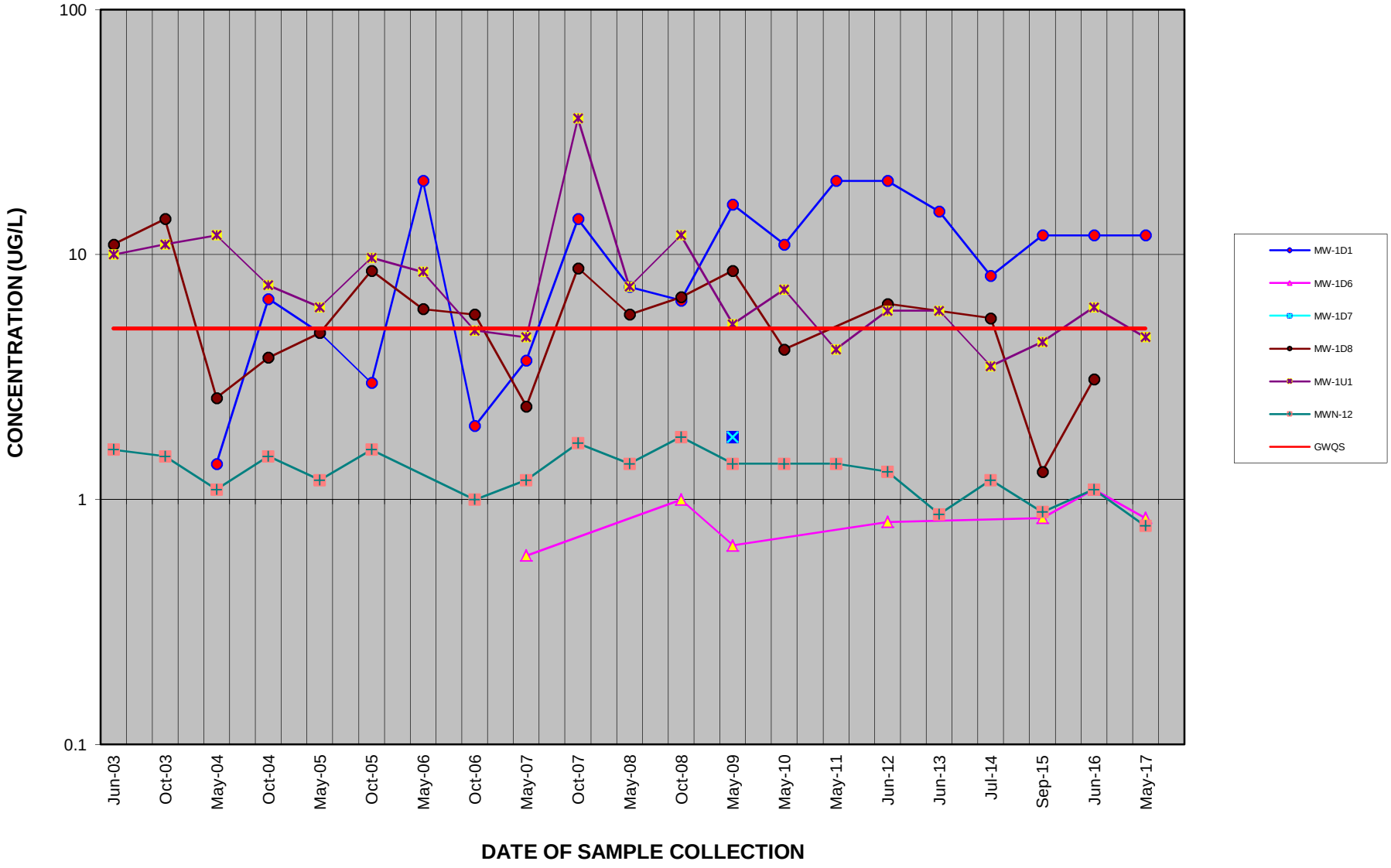
HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

TOLUENE

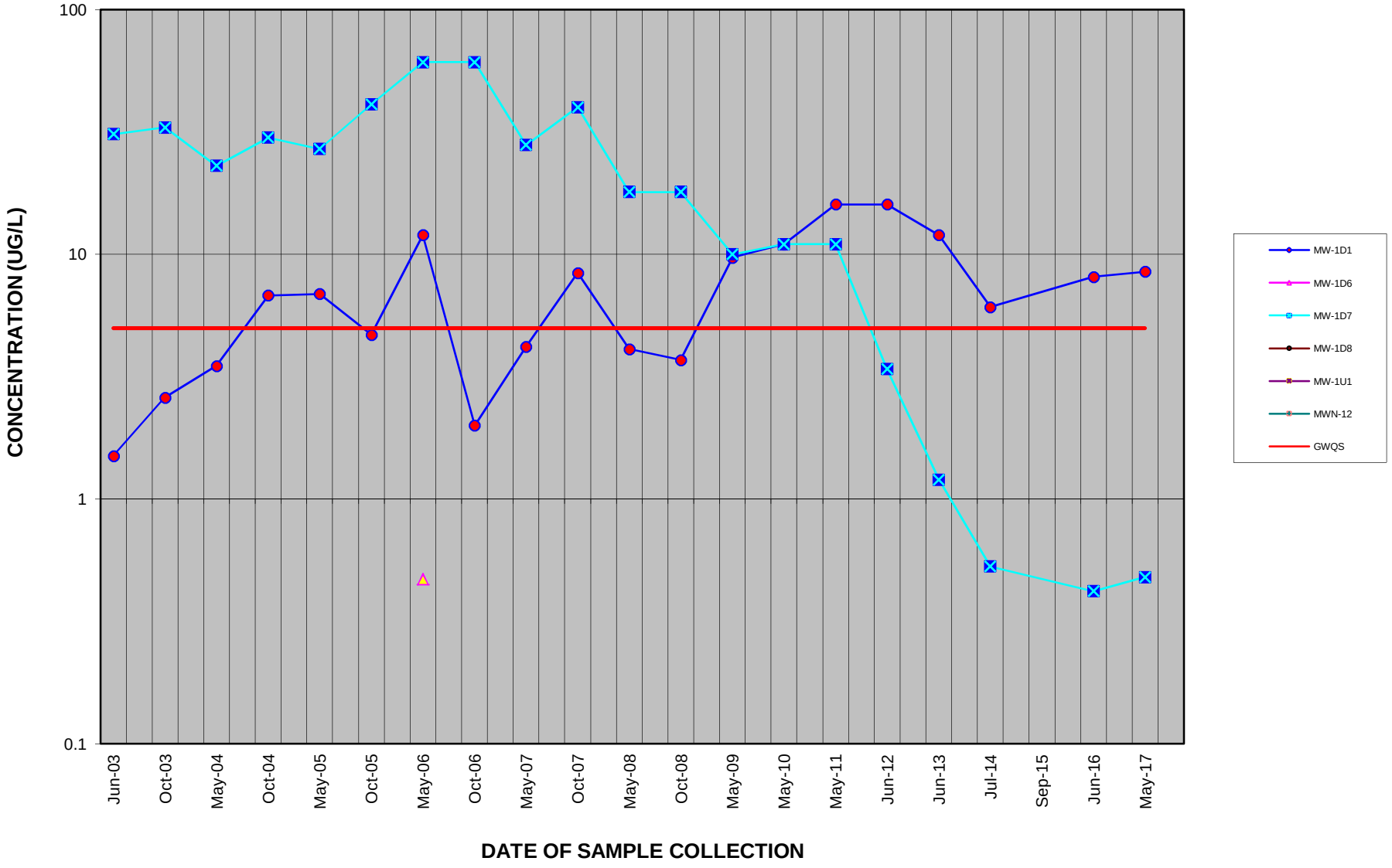
HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

TRICHLOROETHENE

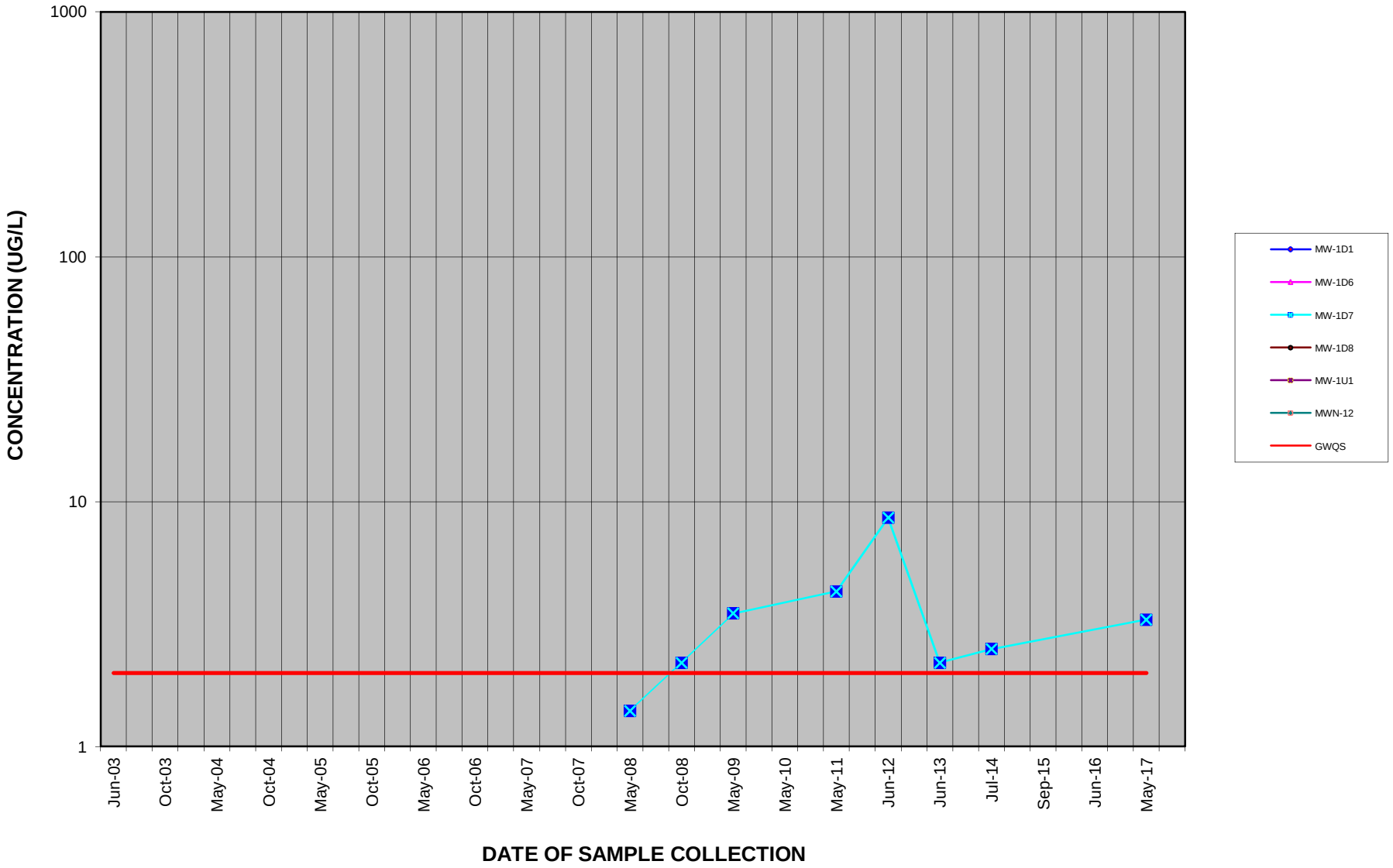
HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

VINYL CHLORIDE

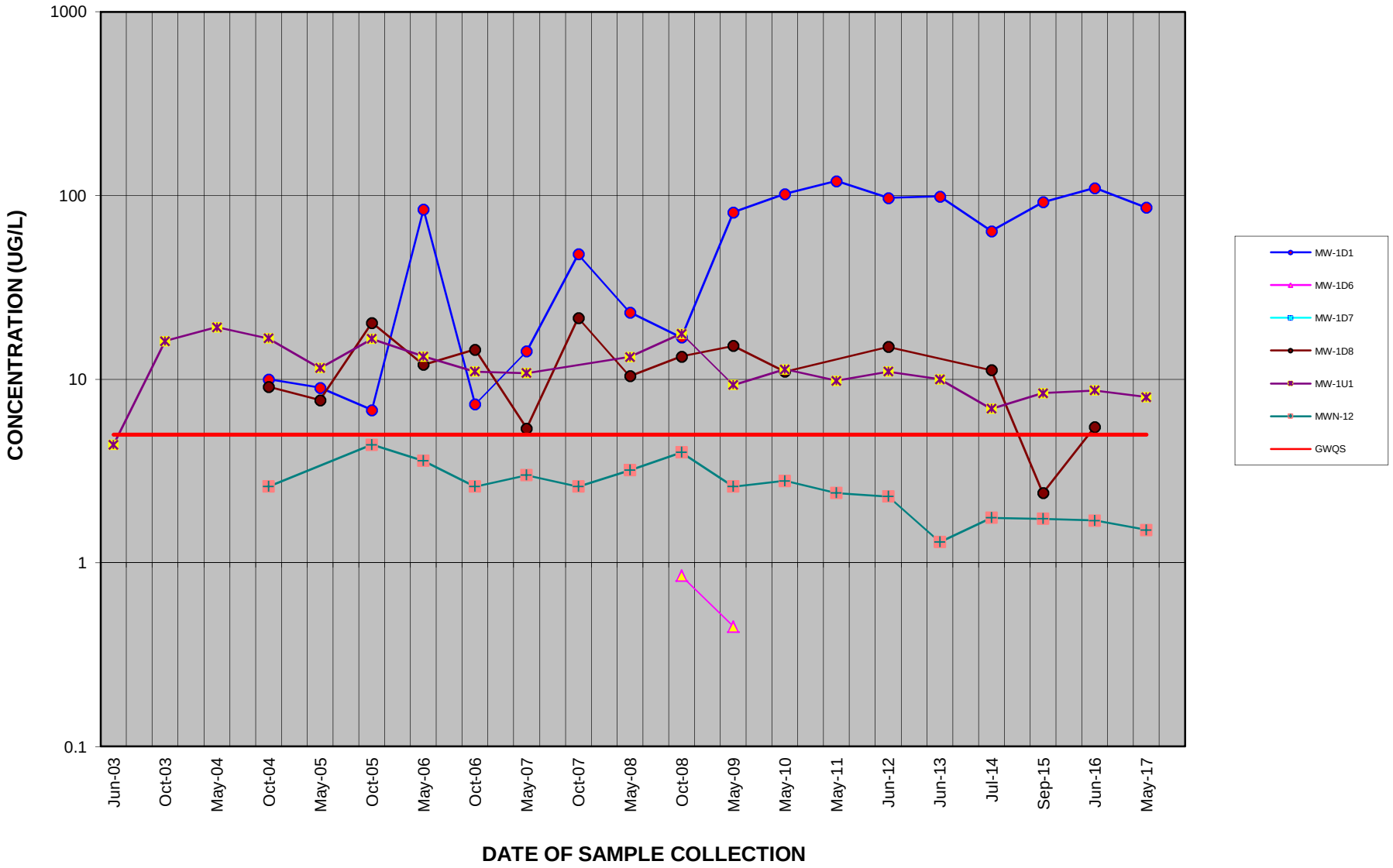
HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

TOTAL XYLENES

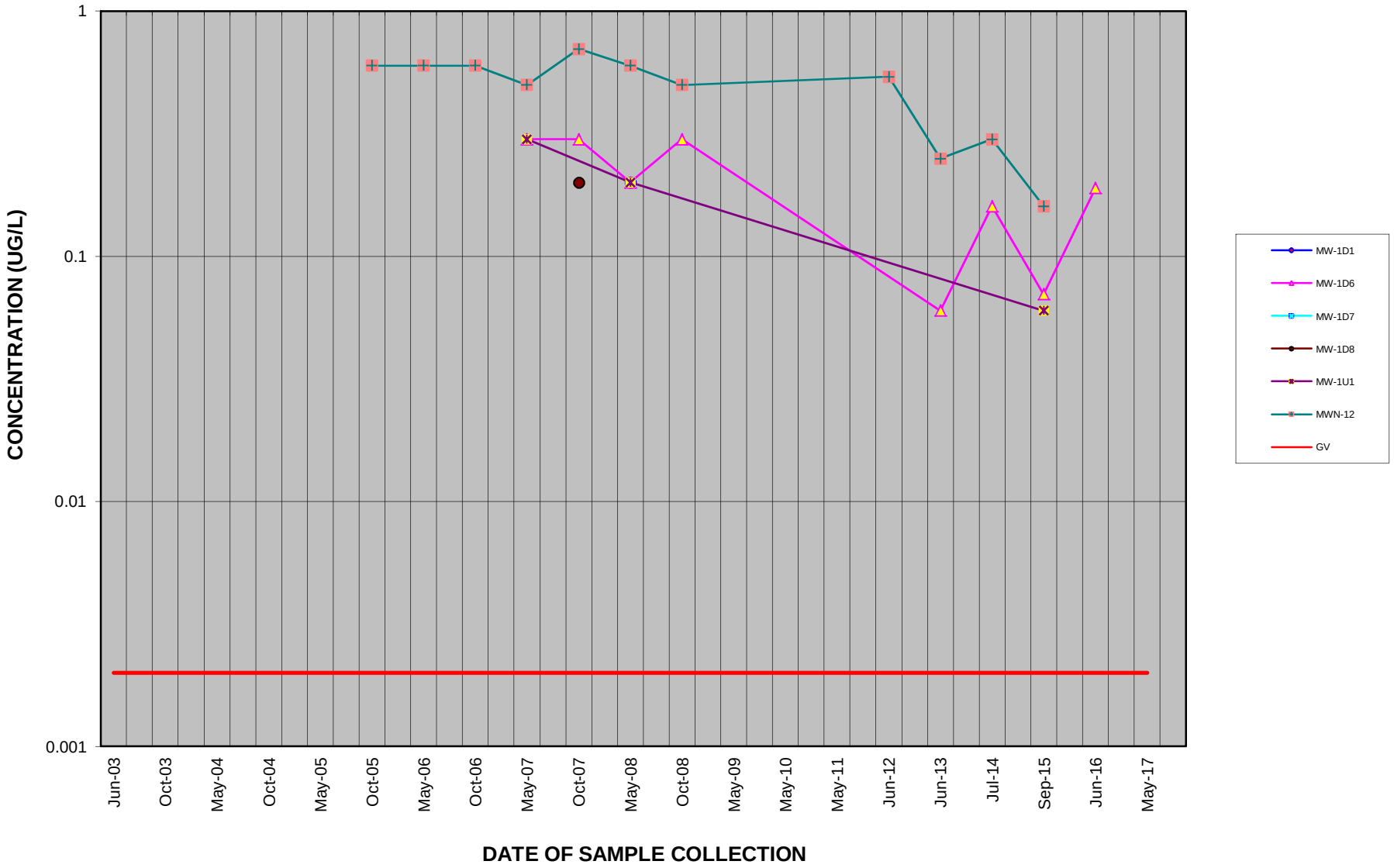
HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

BENZO(A)ANTHRACENE

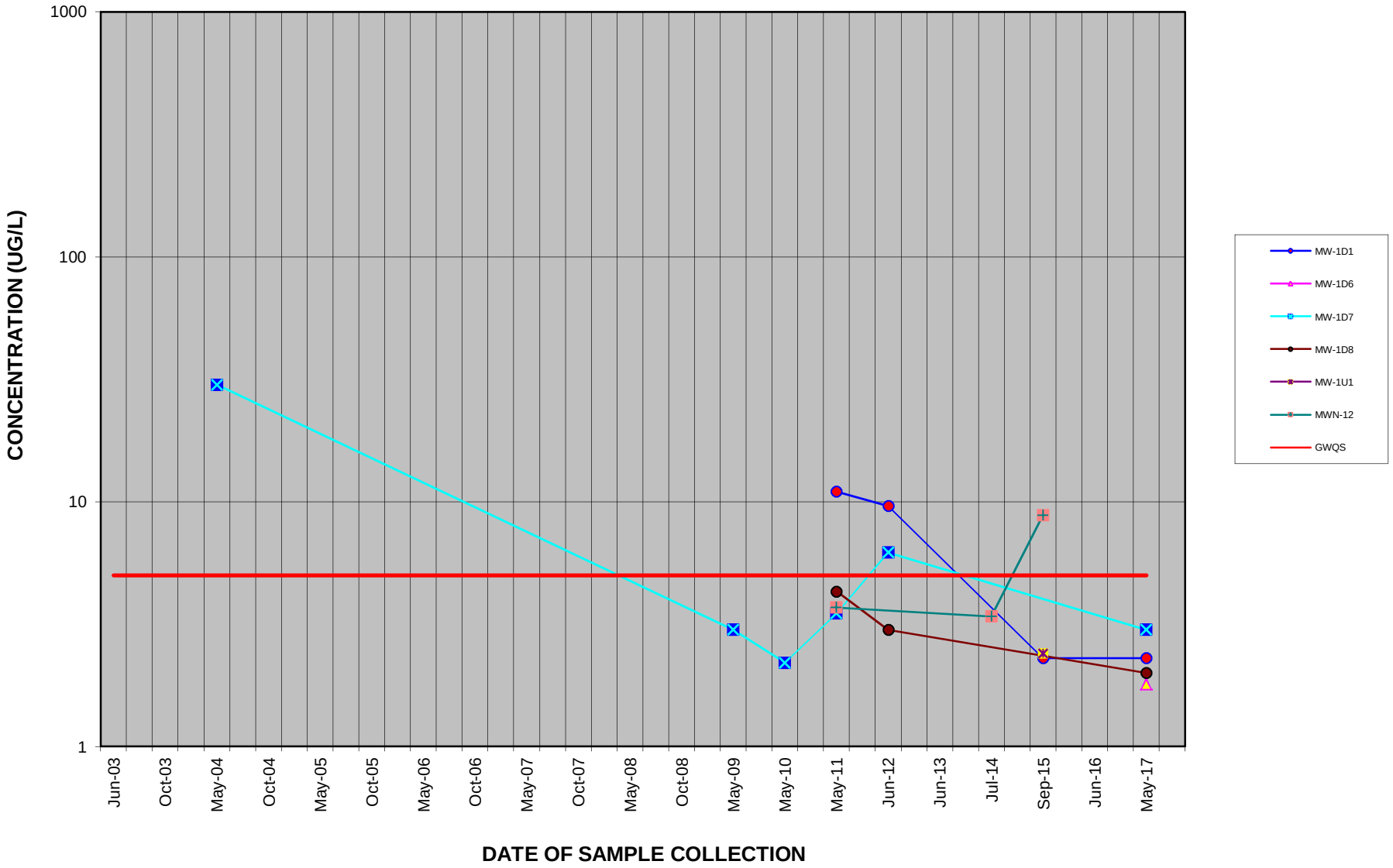
HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

BIS(2-ETHYLHEXYL)PHTHALATE

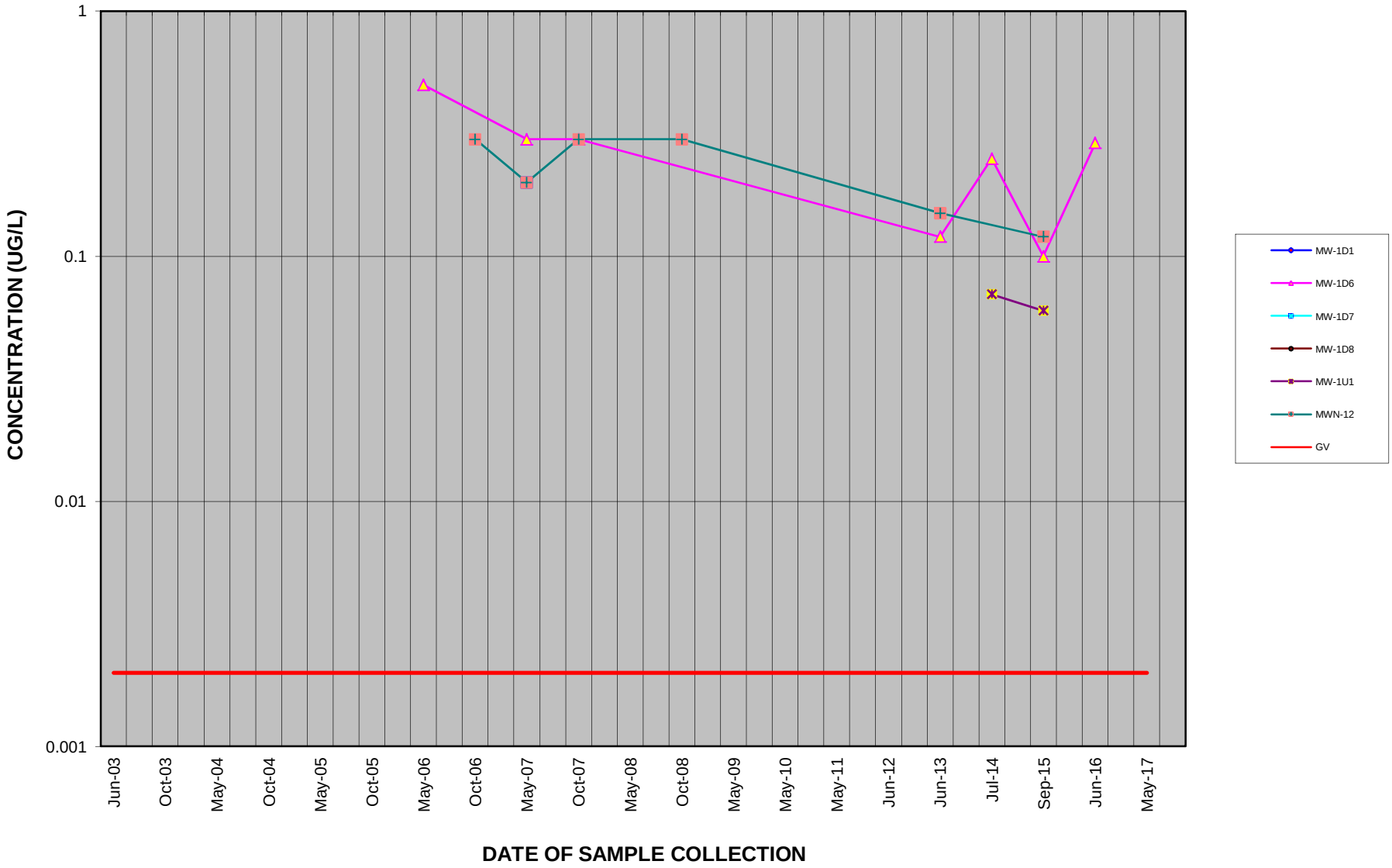
HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

CHRYSENE

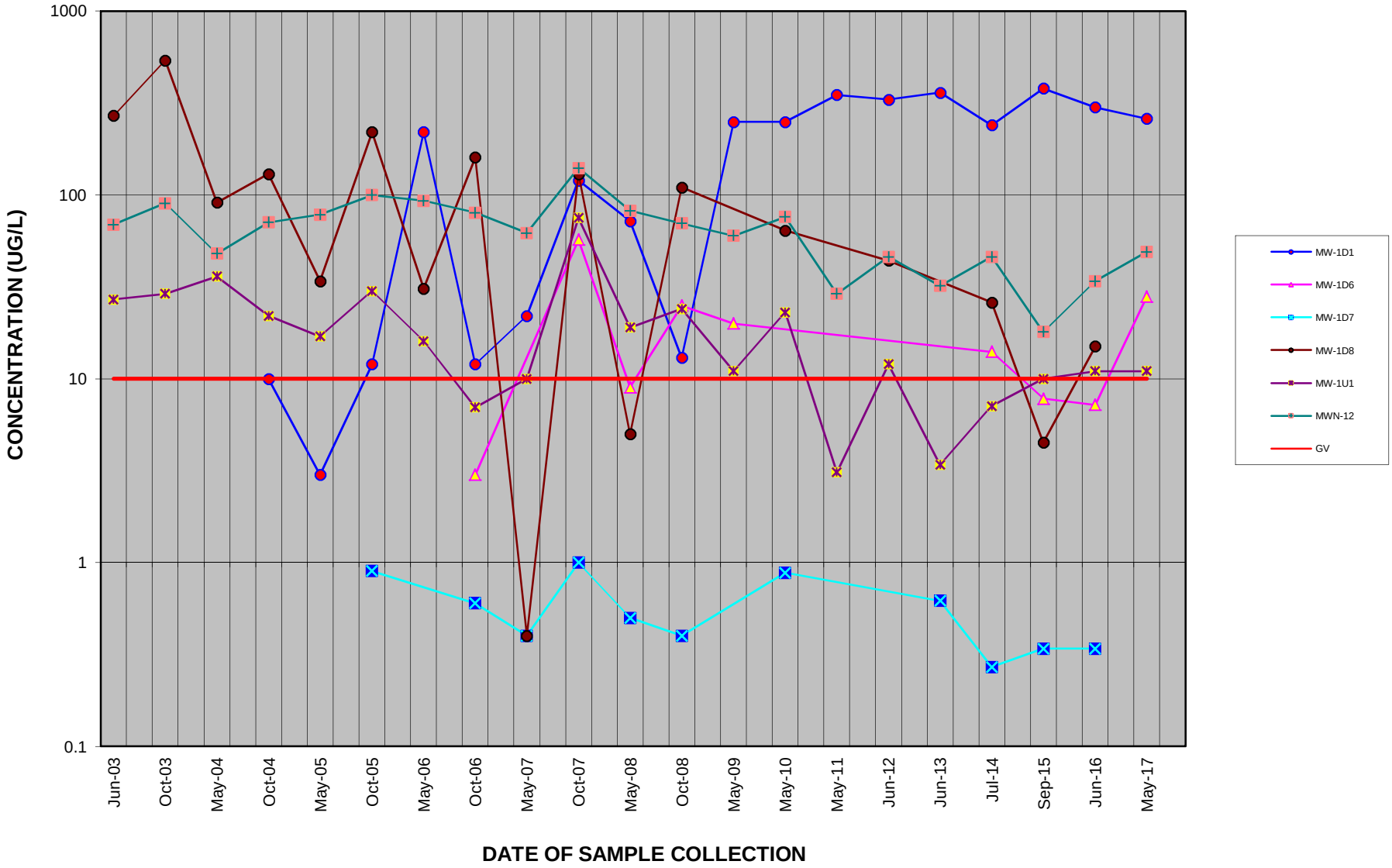
HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

NAPHTHALENE

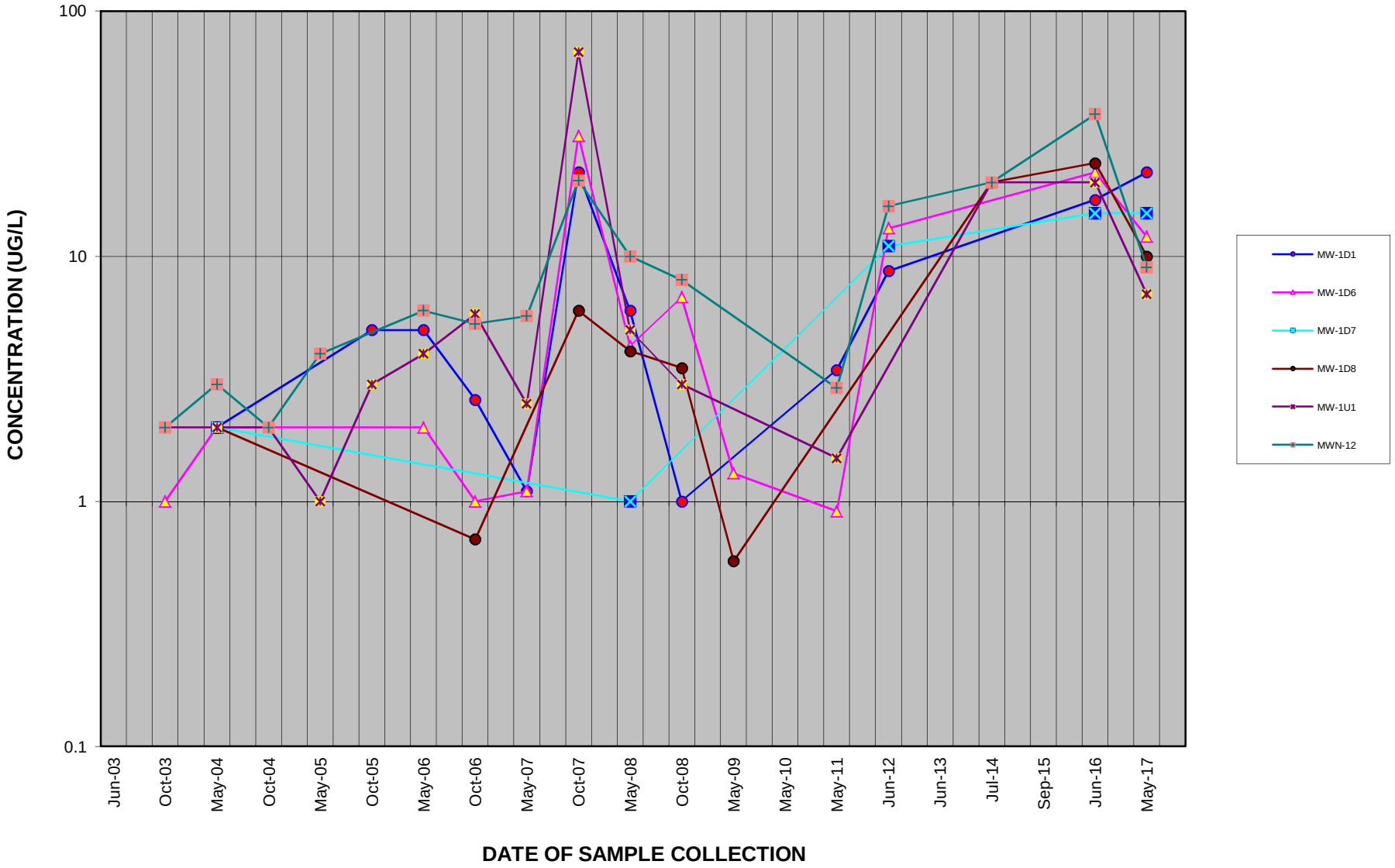
HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

TOTAL RECOVERABLE PHENOLICS (TRP)

HAZARDOUS WASTE MANAGEMENT UNIT 1B
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

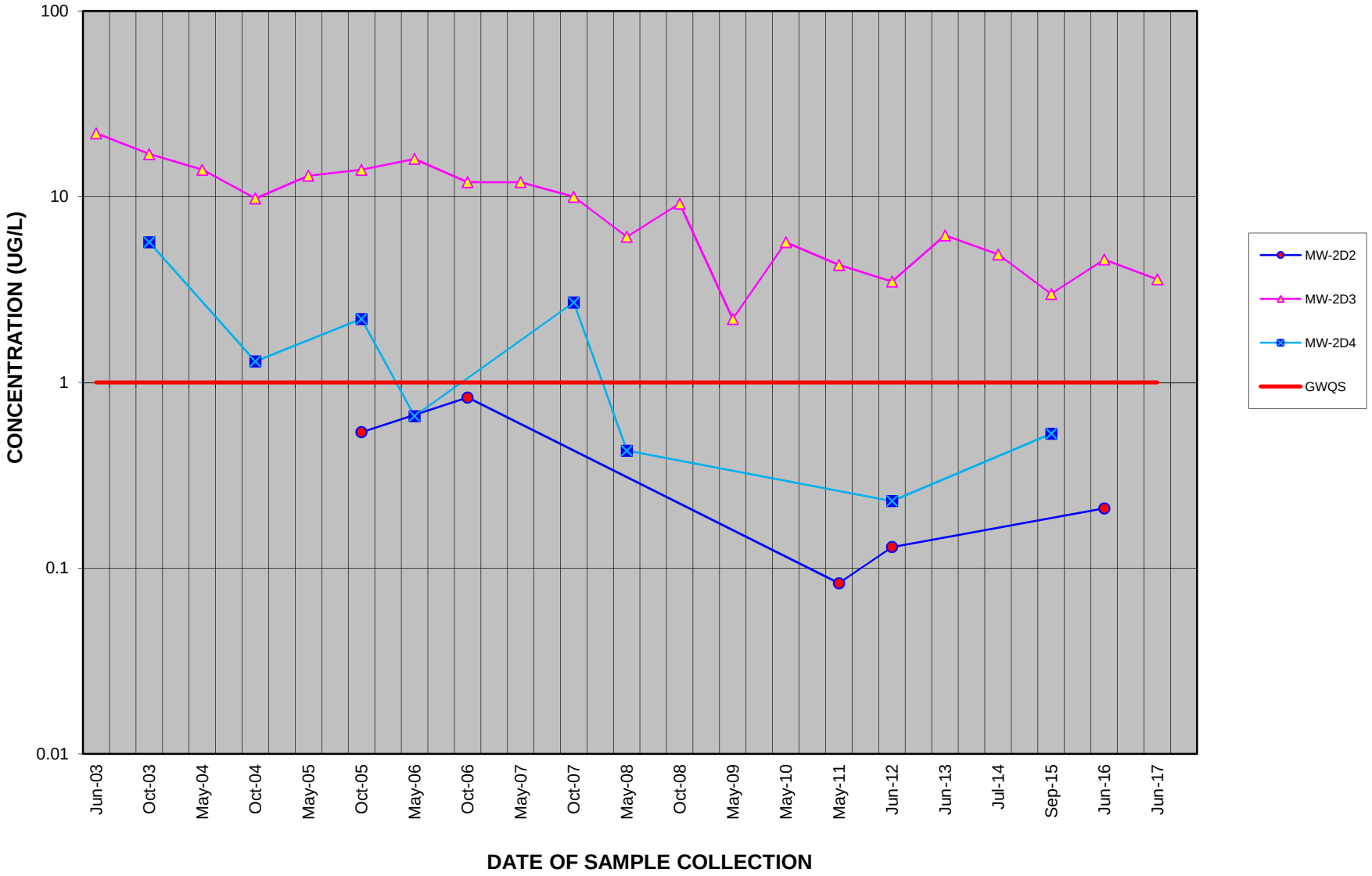
ATTACHMENT 2C

TIME-CONCENTRATION PLOTS

HWMU 2

BENZENE

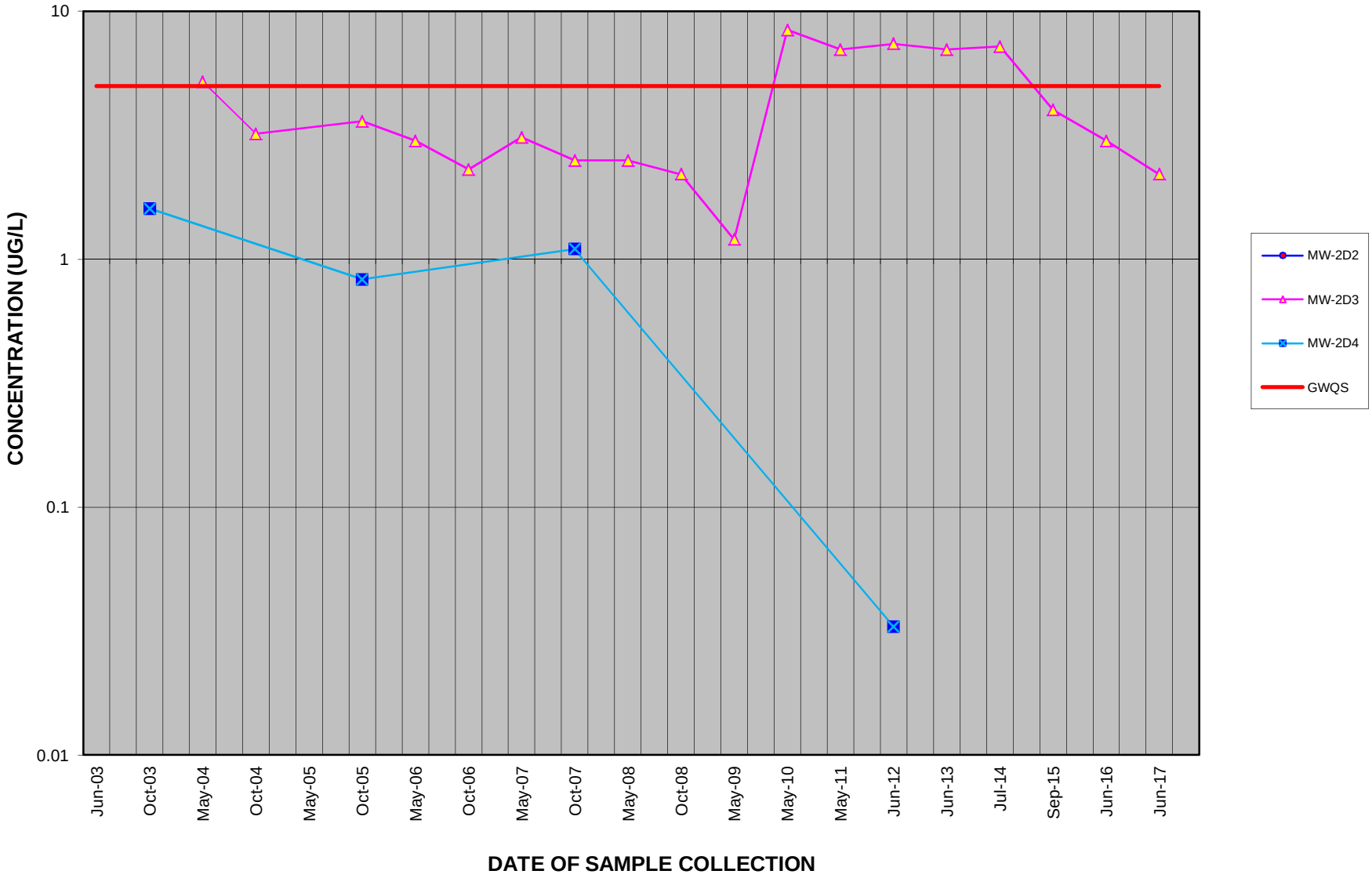
HAZARDOUS WASTE MANAGEMENT UNIT 2
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

ETHYLBENZENE

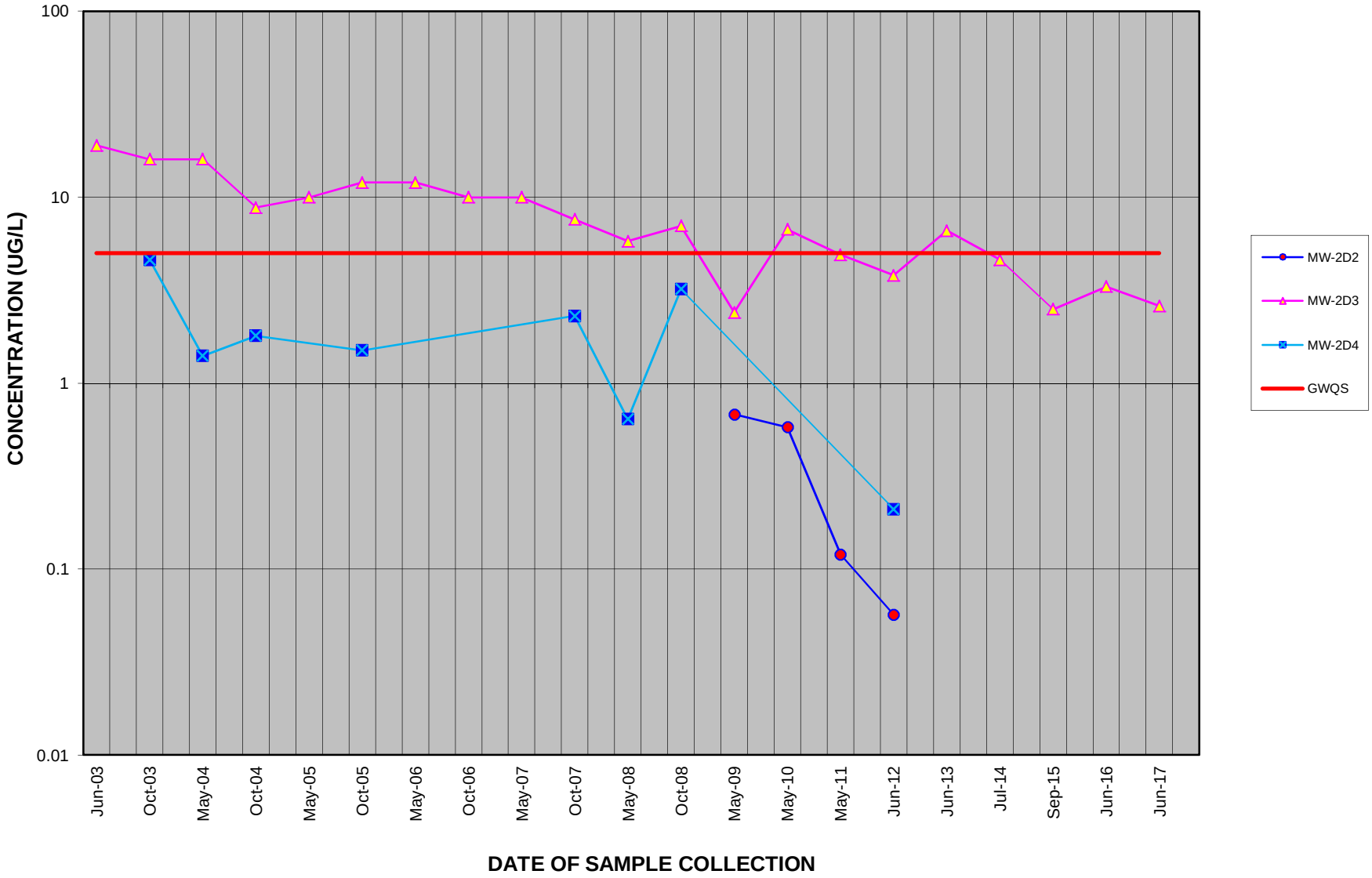
HAZARDOUS WASTE MANAGEMENT UNIT 2
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

TOLUENE

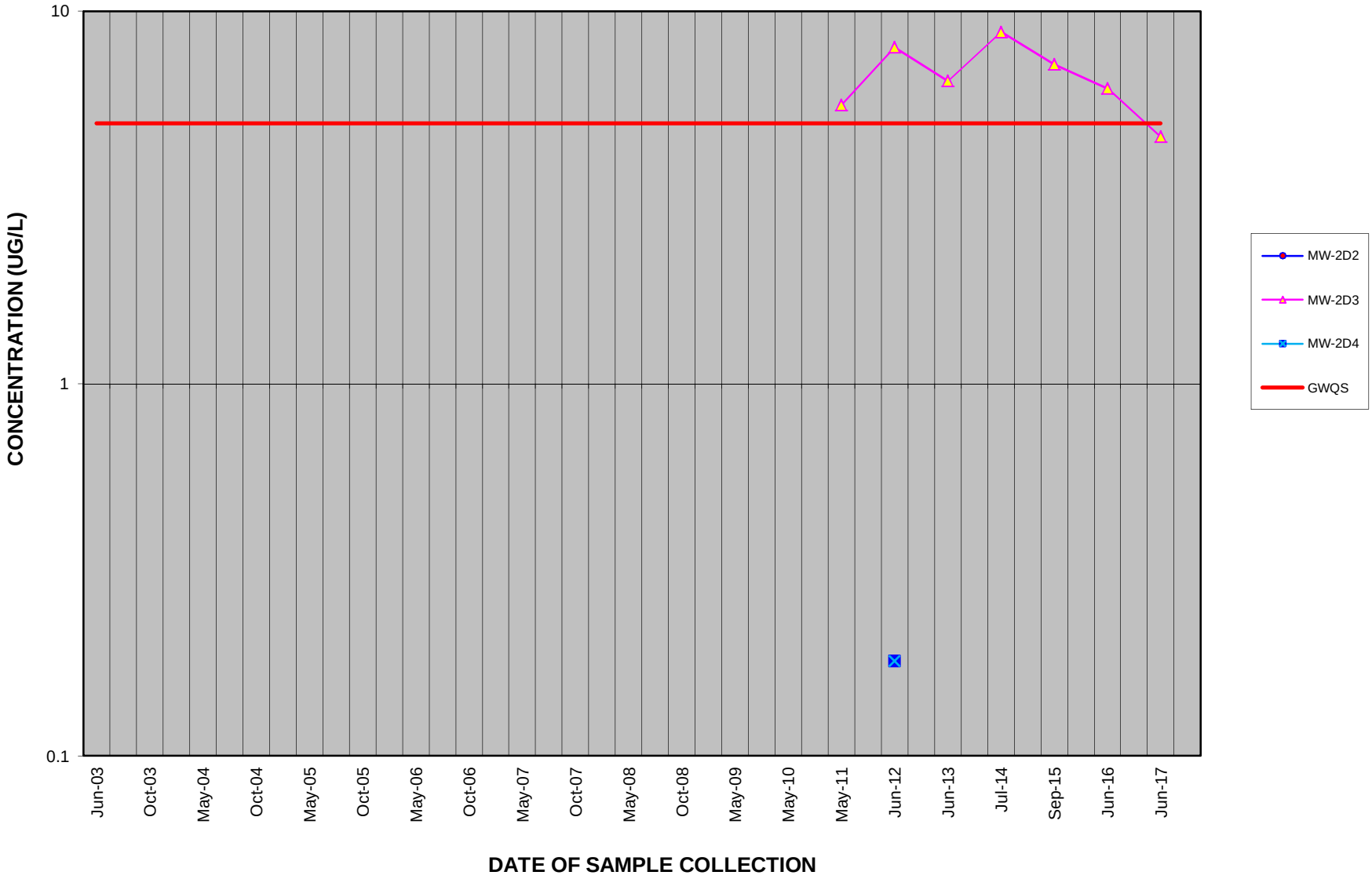
HAZARDOUS WASTE MANAGEMENT UNIT 2
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

1,2,4-TRIMETHYLBENZENE

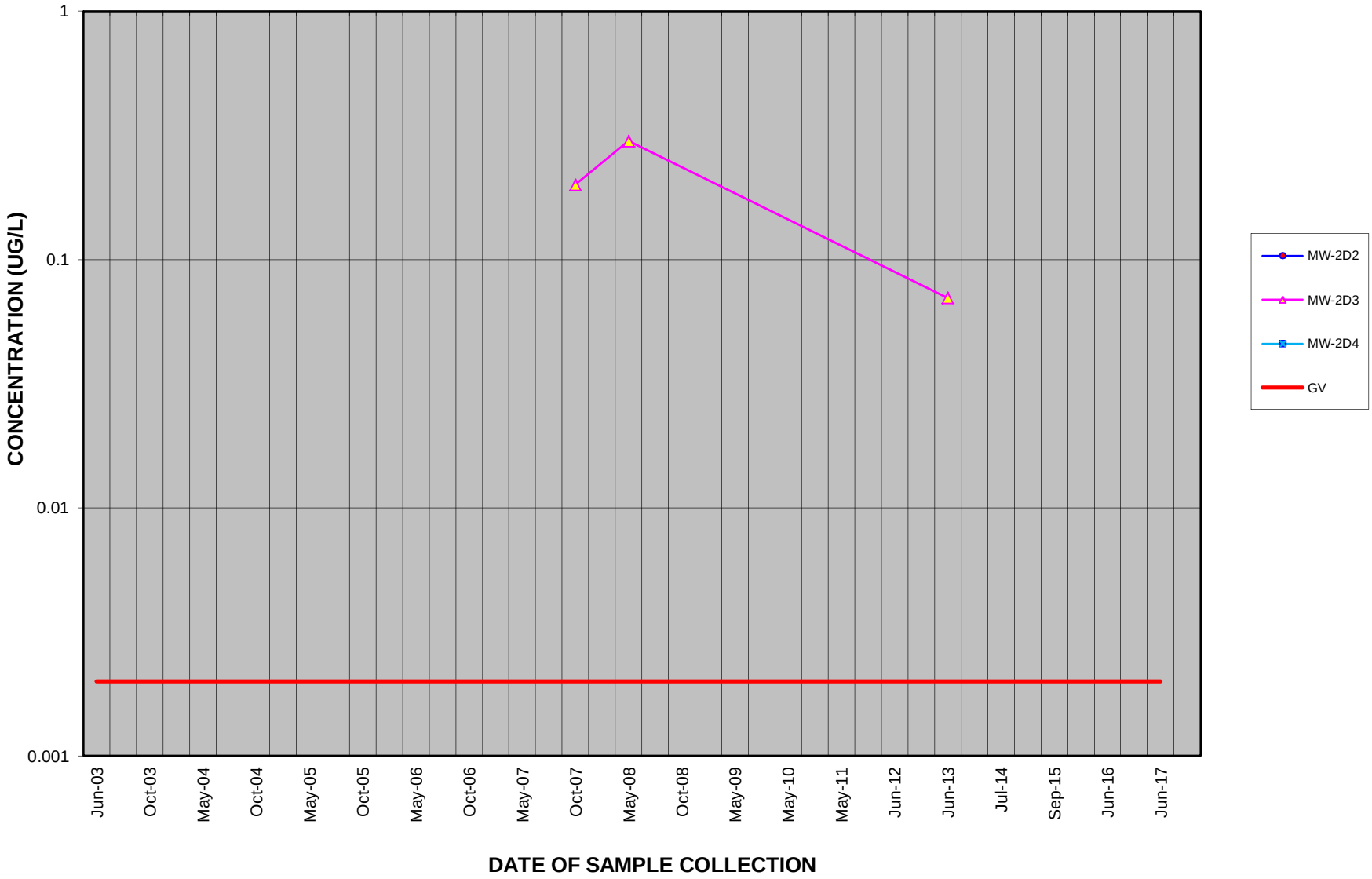
HAZARDOUS WASTE MANAGEMENT UNIT 2
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

CHRYSENE

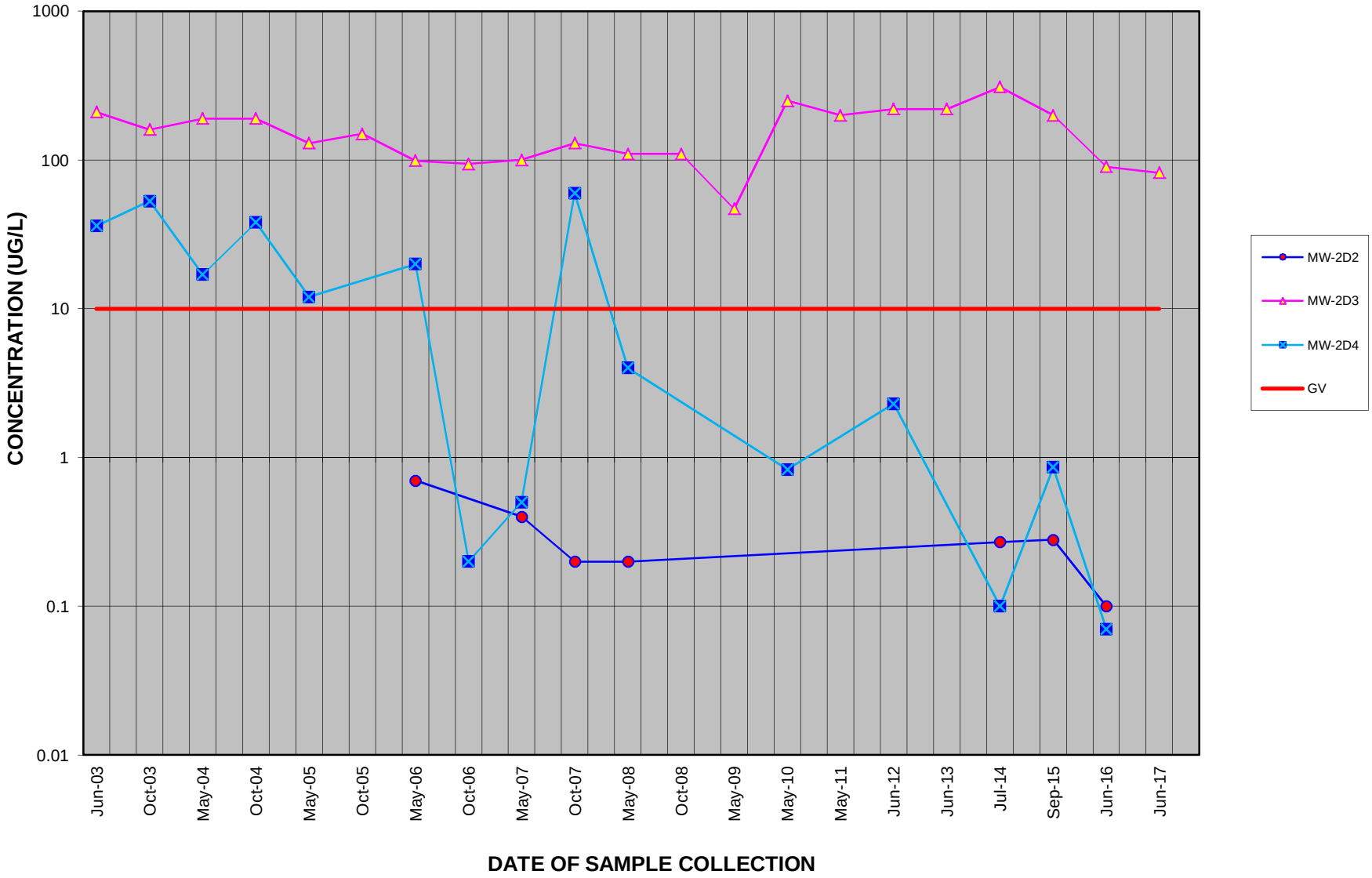
HAZARDOUS WASTE MANAGEMENT UNIT 2
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

NAPHTHALENE

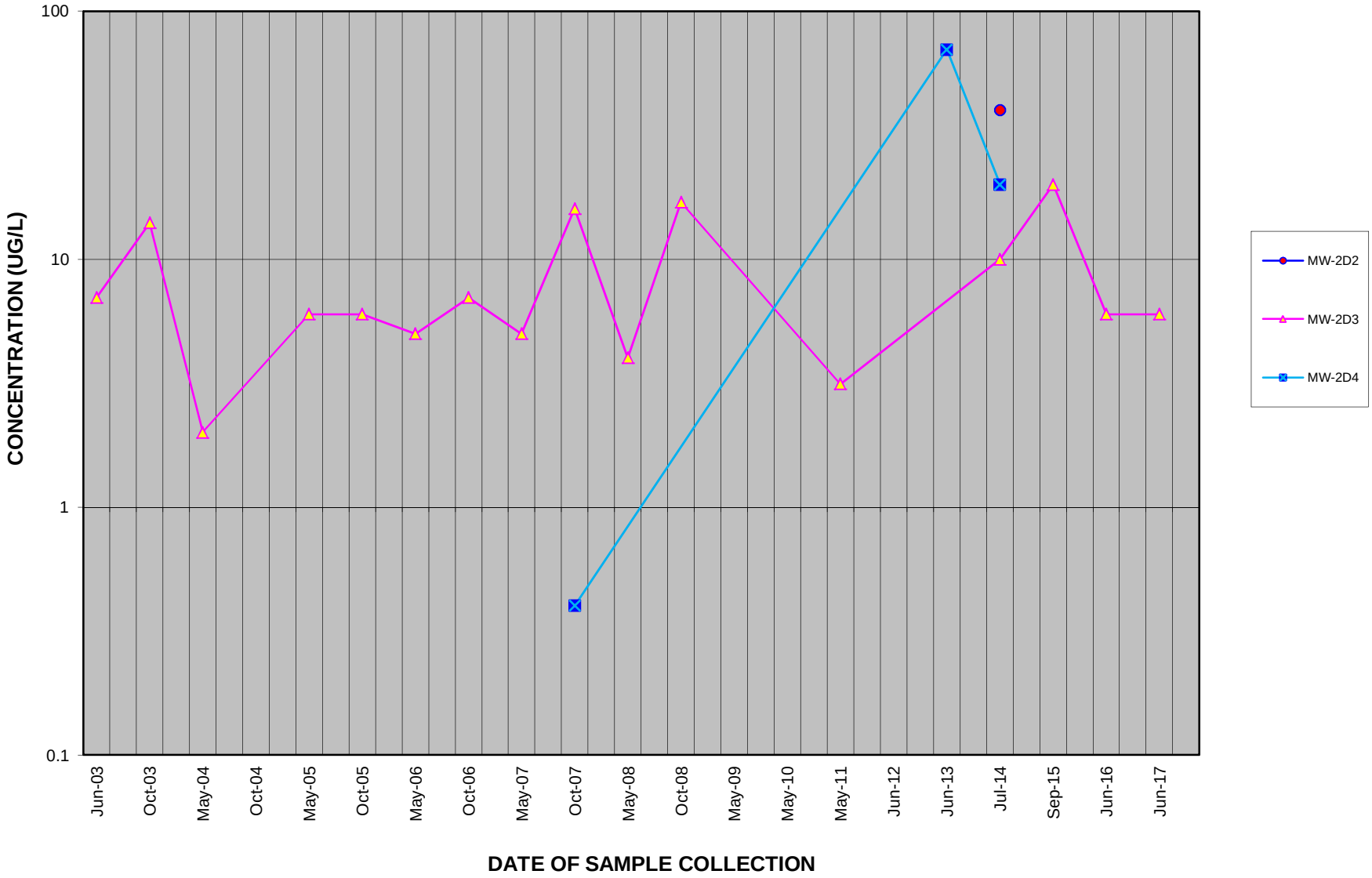
HAZARDOUS WASTE MANAGEMENT UNIT 2
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

TOTAL RECOVERABLE PHENOLICS (TRP)

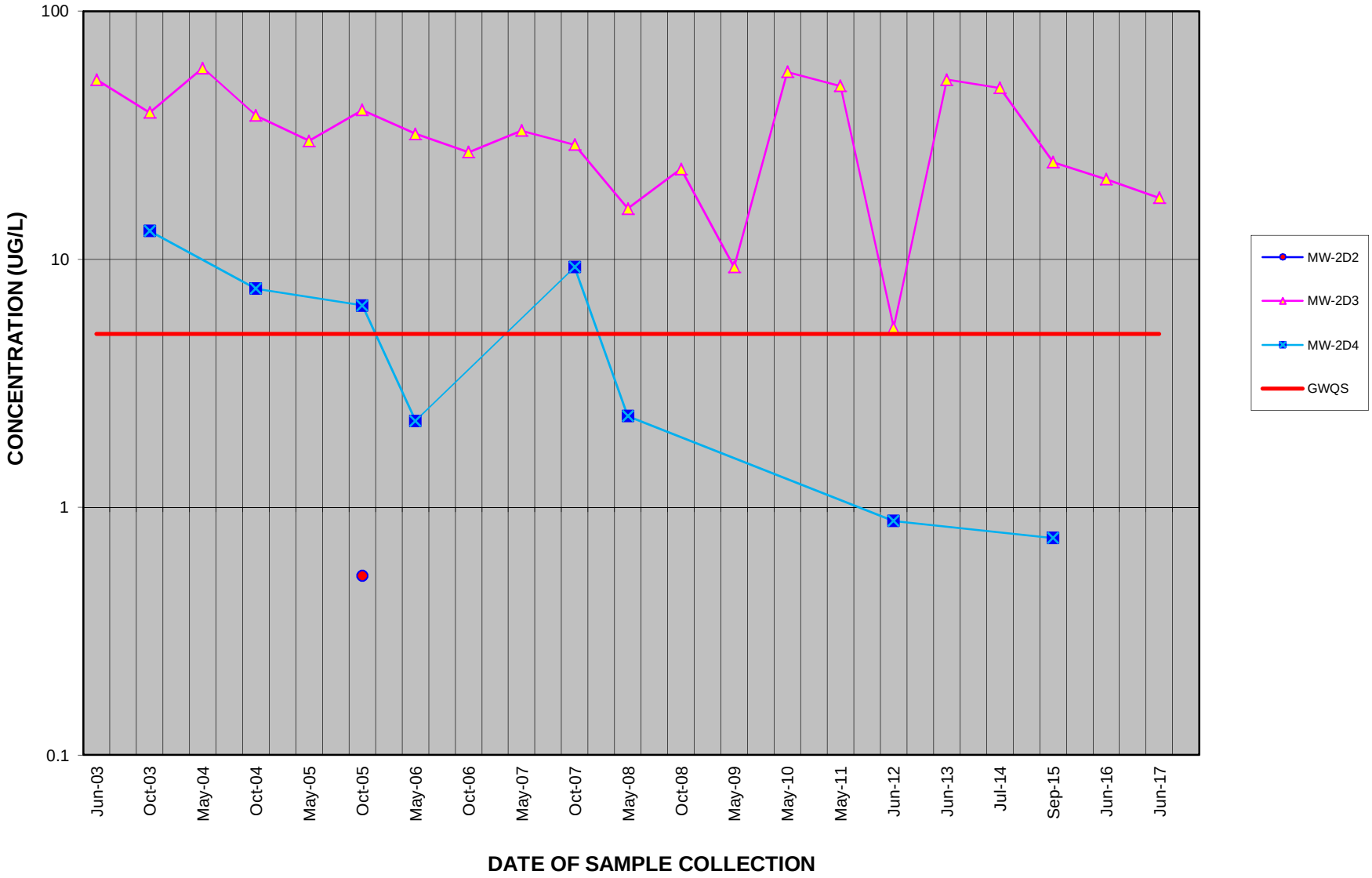
HAZARDOUS WASTE MANAGEMENT UNIT 2
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.

TOTAL XYLENES

HAZARDOUS WASTE MANAGEMENT UNIT 2
HISTORICAL ANALYTICAL SUMMARY



Note: Concentrations reported below method detection limits (i.e., non-detect) are not included in the plot.