Groundwater & Environmental Services, Inc.

MARYLAND OFFICE

February 19, 2021

Ms. Susan Bull
Oil Control Program
Maryland Department of the Environment
1800 Washington Blvd, Suite 620
Baltimore, Maryland 21230

RE: **INTERIM MONITORING REPORT FOR EVENT COMPLETED DECEMBER 22, 2020**
High's Store No. 86
3711 Federal Hill Road, Jarrettsville, Harford County, Maryland
MDE Case No. 2021-0221-HA

Dear Ms. Bull:

Groundwater & Environmental Services, Inc. (GES) was contracted by High's of Baltimore, LLC (High's) to review the historical monitoring record and complete an interim groundwater monitoring event for the High's Store No. 86, located at 3711 Federal Hill Road, Jarrettsville, MD (Site.) This correspondence will summarize GES's findings while also providing recommendations with respect to the MDE's most recent directive to High's regarding the Site dated January 27, 2021.

Background

A monitoring event, conducted by GES on December 22, 2020, was performed to support analytical results obtained by High's environmental consultant Advanced Environmental Concepts Inc. (AEC) who completed a series of monitoring events at the Site on October 9, November 19 and November 20, 2020. AEC completed the initial October 9, 2020 event to fulfil annual High-Risk Groundwater Use Area (HRGUA) requirements. Analytical results obtained from monitoring well MW-4, during AEC's October 9, 2020 event, demonstrated groundwater concentrations of benzene and methyl tert-butyl ether (MTBE) at 139 and 452 micrograms per liter (µg/L), respectively. These concentrations exceeded the MDE Groundwater Cleanup Standard for benzene at 5.0 µg/L and the MDE Action Level for MTBE at 20 µg/L. Based on the October 9, 2020 detections, MDE opened new case 2021-0221-HA for the Site.

On November 19 and November 20, 2020, AEC conducted follow-up monitoring events at the Site using two variations of the purge and grab sample technique, specifically, samples were collected during recharge and after recharge had completed. Analytical results for the two events demonstrated significant reductions to benzene and MTBE concentrations in MW-4 in comparison to results obtained during the October 9, 2020 event. On December 2, 2020, the MDE issued an Informational Notification Letter to property owners within a 0.5 mile of the Site.

On December 22, 2020, GES conducted monitoring at the Site which included the sampling of wells MW-1, MW-3 and MW-4 using low-flow sampling procedures. No potable wells, including the onsite supply well, were sampled by GES during the December 22, 2020 event.

A Site Location Map, which includes 0.5-mile and 1.0-mile radii surrounding the Site, is provided as **Figure 1**. A Local Area Map depicting the surrounding residential, commercial and agricultural properties within a 0.25-mile radius is attached as **Figure 2**. A Site Map, depicting pertinent onsite features, is attached as **Figure 3**.

Historical Trends of Benzene and MTBE for Onsite Monitoring Wells

GES has prepared and attached (**Appendix A**) concentration hydrographs for MW-1, MW-3 and MW-4 from the Site's historical dataset noting that benzene and MTBE are plotted separately for MW-4 to provide better clarity. Review of the hydrographs from MW-1 and MW-3 indicates a sustained history of non-detects since 2011 for both benzene and MTBE at these two wells.

For the MW-4 hydrographs, historical benzene and MTBE detections appear to demonstrate an inverse relationship with depth-to-water (DTW) measurements. In addition, well MW-4 demonstrates a particular sensitivity to water level height at the time of sampling. Specifically, review of the benzene and MTBE hydrographs for MW-4 indicates that a depth-to-water "threshold" exists at approximately 16.2 feet (ft) below top-of-casing (TOC) when water levels fall below this depth, concentrations of MTBE and benzene increase dramatically in the well. Conversely, when water levels rise above this threshold depth, concentrations diminish to near non-detect. This phenomenon may be related to a simple concentration effect caused by a localized "hotspot" of residual petreloum impact in proximity and/or in direct communication to monitoring well MW-4 (which is also in close proximity to the underground storage tank (UST) pit.)

Interim Monitoring Event – December 2020

GES elected to collect groundwater samples during the interim December 22, 2020 event from monitoring wells MW-1, MW-3 and MW-4 using low-flow sampling techniques. This method differs from the purge and grab sample technique performed during previous monitoring events at the Site. The low-flow sampling method was selected to minimize the reduction of well water levels during sampling. The GES Standard Operating Procedure (SOP) for low-flow sampling is included as **Appendix B**. The low-flow field logs generated during the December 22, 2020 event are included as **Appendix C**. The gauging data from the December 22, 2020 monitoring event was incorporated with the historical gauging database for the Site and included as **Table 1**. A groundwater monitoring map with constituent concentration boxes and groundwater elevation contouring for the December 22, 2020 event is attached as **Figure 4**.

A summary of gauging and well specification data obtained during the December 22, 2020 event is presented below.

Table A – Gauging Summary – December 22, 2020

Well	Casing Diameter (inches)	Measured DTB (ft below TOC)	Static DTW (ft below TOC)	DTW at Stabilization/ Sampling (ft below TOC)	Drawdown at time of Sample Collection (ft)	Volume of Water within Casing at time of Sample Collection * (gals)
MW-1	4	28.60	12.63	12.85	0.22	10.3
MW-3	4	29.04	14.73	14.88	0.15	9.2
MW-4	2	24.30	15.54	15.87	0.33	1.4

* Calculated well volumes do not account for filter pack but it is assumed a 2-inch well will have proportionately less filter pack volume than a 4-inch well.
2-inch well = 1 Ft of water is 0.163 gals
4-inch well = 1 Ft of water is 0.653 gals

ft = feet
TOC = below top-of-casing
DTB = depth-to-bottom
DTW = depth-to-water
gals = gallons

Review of **Table A** demonstrates that minimal drawdown was achieved during low-flow sampling of the three monitoring wells during the December 22, 2020 event. In addition, both the static and the stabilization DTW measurements for MW-4 remained above the approximate 16.2 ft below TOC water level "threshold" that GES has identified for this well, below which, benzene and MTBE concentrations can become sharply elevated.

Review of **Table A** also highlights the greatly reduced volume of water available to sample from well MW-4, a 2-inch well, in comparison to wells MW-1 and MW-3, both of which are 4-inch wells and installed several feet deeper than MW-4. Thus, well MW-4 has significantly less volume of water to buffer constituent concentrations in groundwater from a nearby, residual source, such as those that may be emanating from the adjacent UST pit. This is particularly apparent in the historical record when MW-4 is sampled during periods of low water.

For the December 2020 monitoring event, GES submitted the monitoring well samples for an analysis of full suite Volatile Organic Compounds (VOCs) with naphthalene and oxygenates, including MTBE, via USEPA Method 8260. The laboratory selected for the analysis was Eurofins Lancaster of Lancaster, Pennsylvania. A copy of the Lancaster analytical report is included as **Appendix D**. The analytical results from the December 22, 2020 event were tabulated with the historical analytical database and included as **Table 1** to this correspondence. GES has also prepared and included a report outline for the December 22, 2020 monitoring event that is similar in format to the routine monitoring reports submitted for the project.

A summary of benzene and MTBE concentration results from the December 22, 2020 monitoring event is presented below.

Table B – Analytical Summary – December 22, 2020

Well	Benzene (µg/L)	MTBE (µg/L)
MW-1	ND (0.05)	ND (0.05)
MW-3	ND (0.05)	ND (0.05)
MW-4	ND (0.05)	1.6

ND (0.05) = Non-Detect to Method Detection Limit (0.05 µg/L)

Review of **Table B** indicates that analytical results for benzene and MTBE obtained from well MW-4, during the December 2020 event, correspond to low-level detections for these constituents obtained during previous sampling events when samples were collected during periods (or instances) of higher groundwater levels at the Site. Results for wells MW-1 and MW-3, at non-detect for benzene and MTBE, also correlate to the historical record.

<u>Recommendations</u>

Per the MDE directive dated January 27, 2021, High's is now required to sample wells MW-1, 3 and 4 on a quarterly basis. Therefore, GES, on behalf of High's, proposes the following:

- Monitoring well sampling should be conducted using low-flow sampling techniques, as opposed to purge and grab techniques.
- A replacement monitoring well (MW-4R) should be installed in proximity to existing well MW-4. This replacement well would be constructed with similar specifications to existing wells MW-1 and MW-3, i.e. the replacement well should be constructed with a 4-inch casing, to a depth of approximately 30 ft below grade surface.
- Both historical well MW-4 and replacement well MW-4R should be sampled for several successive quarters (for those constituents specified in the January 27, 2021 directive) in order to establish gauging and analytical data for future comparison.
- After several quarters of sampling, an evaluation should be performed to determine if well MW-4R has demonstrated sufficient monitoring performance to serve as a replacement for historical well MW-4. If a successful demonstration is made, then historical well MW-4 would be abandoned, and replacement well MW-4R would serve to represent water quality conditions at the western site boundary for the Site's HRGUA monitoring network.

Please note that GES is also assisting High's with the completion of the additional directive requirements including the 0.5-mile sensitive receptor survey and the quarterly sampling of the onsite supply well. GES will respond to the MDE, regarding all directive requirements for the case, by the imposed deadline of March 9, 2021.

If you have any questions or would like additional information, please contact the undersigned at (800) 220-3606, extension 3726 or Herb Meade at (410) 261-5450.

Sincerely,

Pete Reichardt
Project Manager

Enclosures

cc: Susan Bull – MDE (2 additional hardcopies w/ CD, e-copy)
Lindley Campbell – MDE (e-copy)
Herb Meade – High's of Baltimore (e-copy)
Greg Beal – AEC (e-copy)
John Resline – Harford County Health Dept. (Hardcopy & CD)
File – GES, MD (PSID 862818)

Consultant Contact:	Pete Reichardt, Groundwater & Environmental Services, Inc. Greg Beal, Advanced Environmental Concepts, Inc.
Client Contact:	Herb Meade, High's of Baltimore
Site Use:	Active commercial store and service station that operates two 12,000-gallon compartmentalized gasoline/diesel USTs.
Surrounding Area:	Residential commercial and agricultural
Sensitive Receptors:	<u>Potable Wells</u>: This site is served by one onsite supply well. The surrounding commercial and residential properties are all served by potable wells. <u>Schools/Daycare/Hospitals</u>: Jarrettsville Elementary (0.5 mile to SW), Salem Lutheran Child Care (0.55 mile to WSW) <u>Surface Water/Wetlands</u>: East Branch (615 ft to N)
Date of Most Recent Regulatory Correspondence:	January 27, 2021 -Directive to begin quarterly groundwater monitoring with onsite supply well sampling and a 0.5-mile sensitive receptor survey

REGULATORY INTERACTION

Agency:	Maryland Department of the Environment – Oil Control Program
Agency Contact:	Susan Bull, Lindley Campbell
MDE Case #:	2021-0221-HA

SCHEDULE OF ROUTINE ACTIVITIES

Groundwater Sampling:	Three monitoring wells: MW-1, MW-3, MW-4 and two tank field observation pipes
Sampling Frequency:	Annual (revised to quarterly per 1/27/21 directive)
Sampling Methodology:	Low-Flow Sampling Procedures
Laboratory Analyses:	Full-suite volatile organic compounds (VOCs), including oxygenates and naphthalene via EPA Method 8260C (revised per 1/27/21 directive to include Total Petroleum Hydrocarbons (TPH) – Gasoline Range Organics (GRO) and TPH –Diesel Range Organics (DRO) via EPA Method 8015B)

GROUNDWATER DATA SUMMARY

Groundwater Sampling Date:	December 22, 2020
# of Wells / # Sampled (including TF wells):	5/3 (TF wells not sampled due to insufficient water)
Groundwater Elevation Range (ft):	629.40 feet (MW-3) to 629.63 feet (MW-1)
Maximum Benzene:	Non-Detect (MDL of 0.05 µg/L)
Maximum BTEX:	Non-Detect (MDL of 0.33 µg/L)
Maximum MTBE:	1.6 µg/L (MW-4)

"µg/L" = micrograms per liter
MDL = Method Detection Limit

FUTURE ACTIVITIES – First Quarter 2021

- GES to conduct a First Quarter 2021 groundwater monitoring event with onsite potable supply sampling
- GES to complete a 0.5-mile sensitive receptor survey

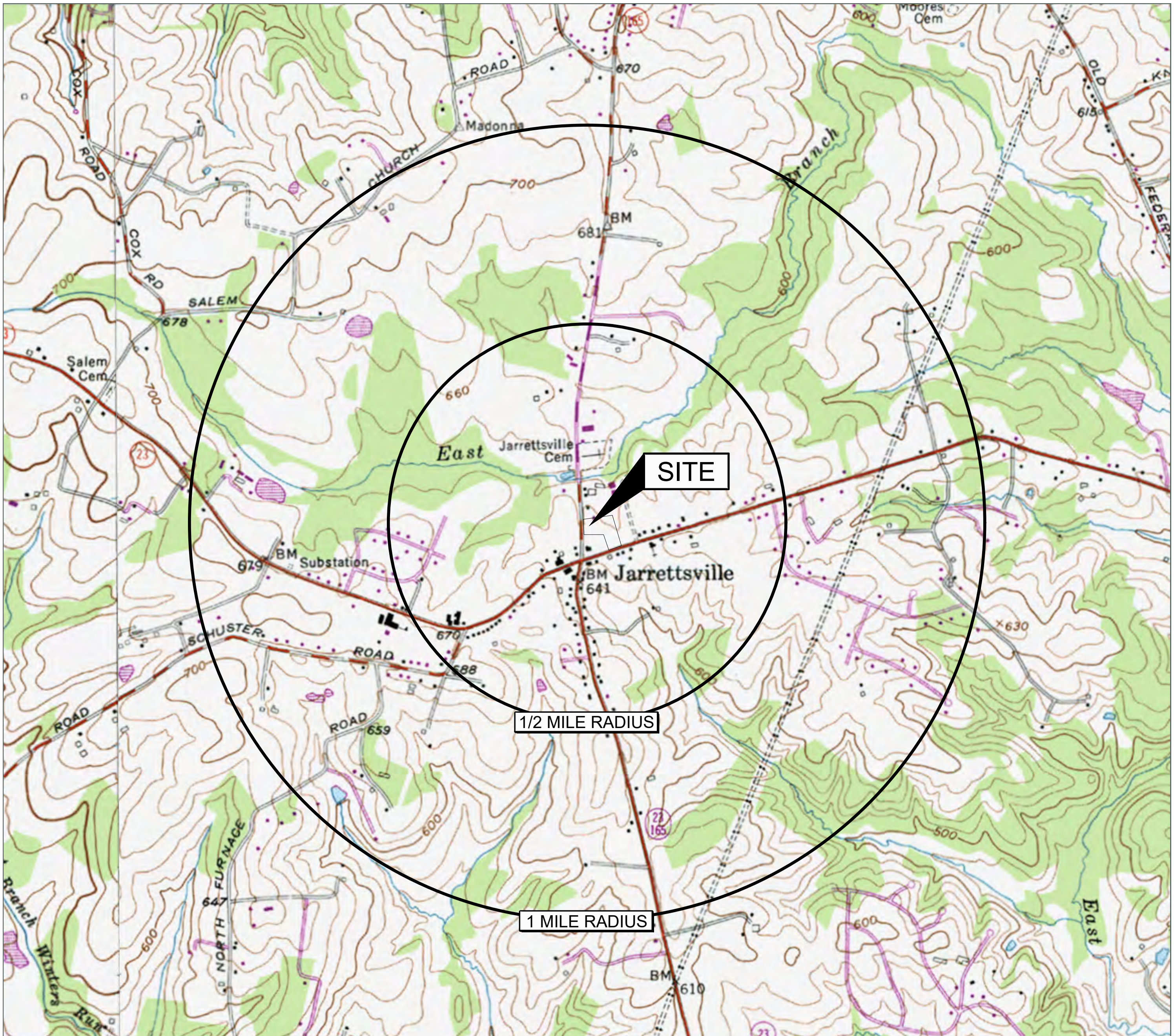
ATTACHMENTS

FIGURES

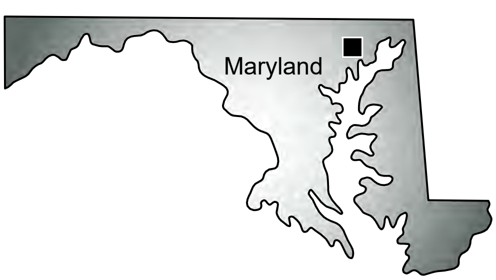
TABLES

APPENDIX

Figures



Source:
USGS 7.5 Minute Series
Topographic Quadrangle
Jarrettsville, Maryland
Contour Interval = 20 Feet



Quadrangle Location

Site Location Map

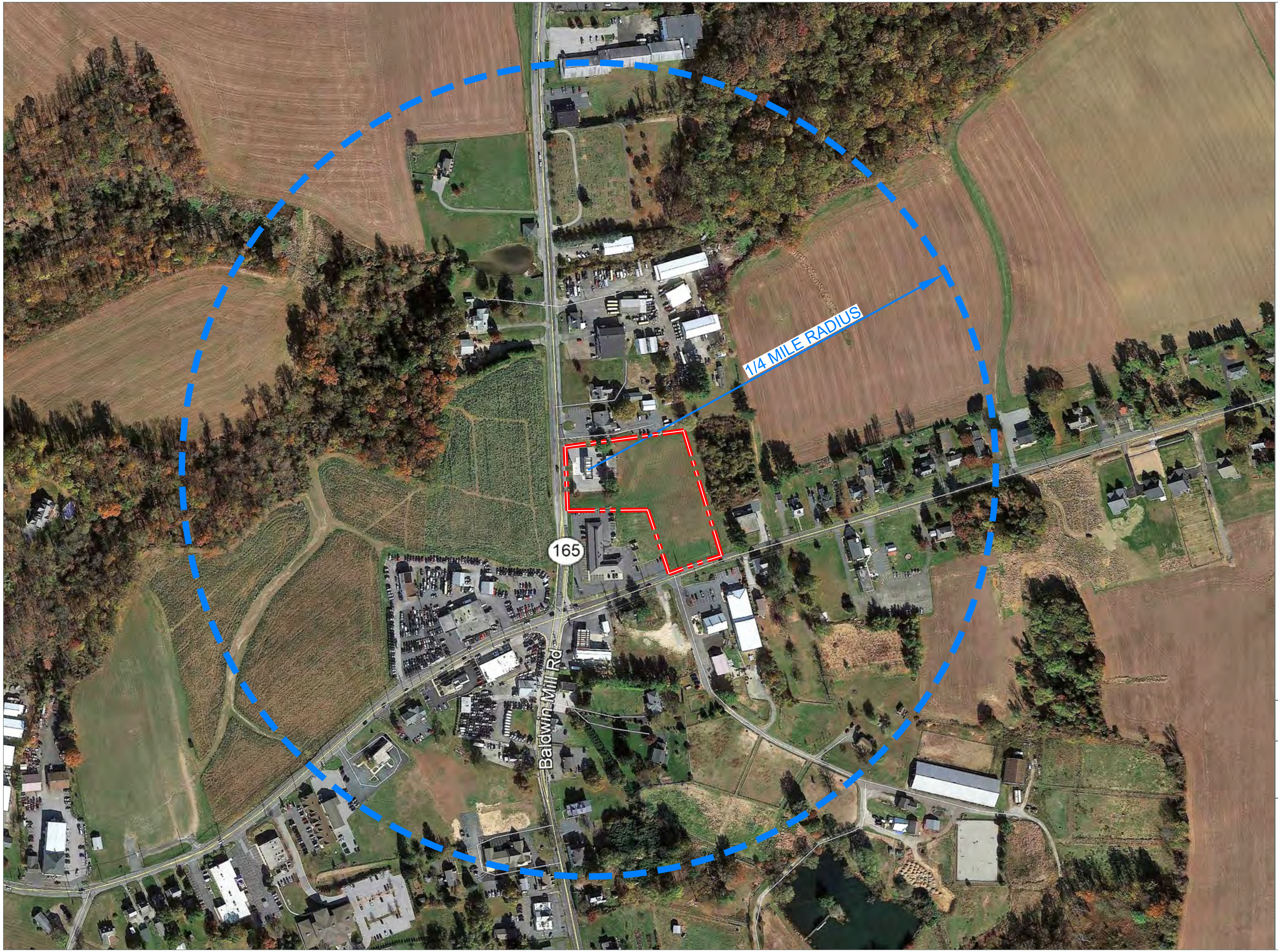
High's of Baltimore
Store #86
3711 Federal Hill Road
Jarrettsville, Maryland

Drawn E.V.	Date 01/15/21
Designed	Figure 1
Approved PR	

Scale In Feet
0 2,000

Groundwater & Environmental Services, Inc.

M:\Graphics\0400-Crofton\Misc\High's of Baltimore Jarrettsville (3711 Federal Hill Road)\Jarrettsville (3711 Federal Hill Road) SLM.dwg, SLM, EVega



LEGEND

PROPERTY BOUNDARY (APPROXIMATE)

Source:
©2020 Google Earth Imagery November 5, 2019.

Harford County WebGIS V3.0.

Local Area **Map**

High's of Baltimore
Store #86
3711 Federal Hill Road
Jarrettsville, Maryland

Drawn
E.V.
Designed

Approved
PR

Date
01/15/21
Figure
2

Scale In Feet (Approximate)
0 300

Groundwater & Environmental Services, Inc.

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LEGEND

PROPERTY BOUNDARY (APPROXIMATE)
MONITORING WELL
TANK FIELD WELL
POTABLE SUPPLY WELL

Site Map

High's of Baltimore
Store #86
3711 Federal Hill Road
Jarrettsville, Maryland

Drawn E.V.
Designed
Approved PR
Date 02/03/21
Figure 3

Scale In Feet (Approximate)
0 30

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LEGEND

PROPERTY BOUNDARY (APPROXIMATE)
MONITORING WELL
TANK FIELD WELL
POTABLE SUPPLY WELL

MW-1		WELL IDENTIFICATION
12/22/2020		SAMPLING DATE
629.63		GROUNDWATER ELEVATION (feet)
B	ND<0.05	BENZENE CONCENTRATION (ug/L)
T	ND<0.07	TOLUENE CONCENTRATION (ug/L)
E	ND<0.06	ETHYLBENZENE CONCENTRATION (ug/L)
X	ND<0.15	XYLENES CONCENTRATION (ug/L)
MTBE	ND<0.05	MTBE CONCENTRATION (ug/L)

ug/L MICROGRAMS PER LITER
MTBE METHYL *tert*-BUTYL ETHER
<# WHERE AN ANALYTE IS NOT DETECTED, A METHOD DETECTION LIMIT IS GIVEN
GROUNDWATER CONTOUR (feet) DASHED WHERE INFERRED

Groundwater Monitoring Map
December 22, 2020

High's of Baltimore
Store #86
3711 Federal Hill Road
Jarrettsville, Maryland

Drawn E.V.
Designed
Approved PR
Date 02/03/21
Figure 4
Scale In Feet (Approximate) 0 30

GES
Groundwater & Environmental Services, Inc.

Tables

Table 1

HISTORICAL GAUGING AND ANALYTICAL SUMMARY

High's Store No. 86
3711 Federal Hill Road
Jarrettsville, MD

Monitoring Well	Date	Top of Casing (ft)	Depth to Water (ft)	GW Elevation (ft)	Depth to Bottom (Measured Depth) (ft)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Total BTEX (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	Diisopropyl ether (µg/L)	tert-Amyl methyl ether (µg/L)	tert-Butyl alcohol (µg/L)	1,3,5-Trimethylbenzene (µg/L)	Chloromethane (µg/L)	ter-Amyl Alcohol (µg/L)	tert-Amyl Ethyl Ehter (µg/L)
GW Clean-up Standards*						**5.0**	**1,000**	**700**	**10,000**	**NL**	**20**	**0.17**	**NL**	**NL**	**NL**	**6**	**19**	**NL**	**NL**
MW-1	7/13/2005	642.26	11.35	630.91	-	ND	ND	ND	ND	ND	130	-	-	-	-	-	-	-	-
	12/16/2005	642.26	12.41	629.85	-	ND	ND	ND	ND	ND	43	-	-	-	-	-	-	-	-
	6/15/2006	642.26	12.83	629.43	-	ND	ND	ND	ND	ND	62	-	-	-	-	-	-	-	-
	1/15/2007	642.26	11.19	631.07	-	ND	ND	ND	ND	ND	15	-	-	-	-	-	-	-	-
	5/17/2007	642.26	11.22	631.04	-	ND	ND	2	ND	2	2.0	-	-	-	-	-	-	-	-
	9/26/2007	642.26	13.11	629.15	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	12/13/2007	642.26	14.81	627.45	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	3/31/2008	642.26	12.68	629.58	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	6/30/2008	642.26	12.74	629.52	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	9/24/2008	642.26	14.68	627.58	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	12/30/2008	642.26	14.36	627.90	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	3/12/2009	642.26	15.79	626.47	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	5/6/2009	642.26	12.69	629.57	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	9/14/2009	642.26	12.69	629.57	-	ND	ND	ND	ND	ND	1.0	-	-	-	-	-	-	-	-
	12/14/2009	642.26	10.01	632.25	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	3/26/2010	642.26	8.90	633.36	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	6/29/2010	642.26	11.92	630.34	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	10/16/2010	642.26	11.55	630.71	-	ND	ND	ND	ND	ND	2.0	-	-	-	-	-	-	-	-
	1/31/2011	642.26	14.39	627.87	-	ND	ND	ND	ND	ND	3.0	-	-	-	-	-	-	-	-
	4/17/2011	642.26	11.33	630.93	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	3/19/2012	642.26	12.21	630.05	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	6/4/2012	642.26	11.97	630.29	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	9/28/2012	642.26	14.44	627.82	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	12/14/2012	642.26	14.82	627.44	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	3/18/2013	642.26	12.14	630.12	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	7/5/2013	642.26	12.93	629.33	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	9/27/2013	642.26	14.85	627.41	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	1/8/2014	642.26	13.08	629.18	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	3/12/2014	642.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9/4/2014	642.26	11.45	630.81	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	12/16/2014	642.26	15.82	626.44	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	12/9/2015	642.26	11.83	630.43	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	10/3/2016	642.26	13.65	628.61	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	10/6/2017	642.26	13.94	628.32	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	10/2/2018	642.26	8.85	633.41	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	10/25/2019	642.26	14.80	627.46	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	10/9/2020	642.26	12.83	629.43	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	12/22/2020	642.26	12.63	629.63	28.60	ND (0.05)	ND (0.07)	ND (0.06)	ND (0.15)	ND (0.33)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.20)	ND (1.1)	ND (0.06)	0.20 J	-	-
MW-3	07/12/2005	644.13	13.88	630.25	-	ND	ND	ND	ND	ND	14.0	-	-	-	-	-	-	-	-
	12/16/2005	644.13	14.69	629.44	-	ND	ND	ND	ND	ND	3.0	-	-	-	-	-	-	-	-
	06/15/2006	644.13	14.50	629.63	-	ND	ND	ND	ND	ND	2.0	-	-	-	-	-	-	-	-
	01/15/2007	644.13	13.17	630.96	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	05/17/2007	644.13	13.22	630.91	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	09/26/2007	644.13	15.22	628.91	-	ND	ND	ND	ND	ND	4.6	-	-	-	-	-	-	-	-

HISTORICAL GAUGING AND ANALYTICAL SUMMARY

High's Store No. 86
3711 Federal Hill Road
Jarrettsville, MD

Monitoring Well	Date	Top of Casing (ft)	Depth to Water (ft)	GW Elevation (ft)	Depth to Bottom (Measured Depth) (ft)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Total BTEX (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	Diisopropyl ether (µg/L)	tert-Amyl methyl ether (µg/L)	tert-Butyl alcohol (µg/L)	1,3,5-Trimethylbenzene (µg/L)	Chloromethane (µg/L)	ter-Amyl Alcohol (µg/L)	tert-Amyl Ethyl Ehter (µg/L)
GW Clean-up Standards*						5.0	1,000	700	10,000	NL	20	0.17	NL	NL	NL	6	19	NL	NL
MW-3	12/13/2007	644.13	16.61	627.52	-	ND	ND	ND	ND	ND	2.0	-	-	-	-	-	-	-	-
(cont.)	03/31/2008	644.13	14.47	629.66	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	06/30/2008	644.13	14.19	629.94	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	09/24/2008	644.13	16.13	628.00	-	ND	ND	ND	ND	ND	4.0	-	-	-	-	-	-	-	-
	12/30/2008	644.13	16.94	627.19	-	ND	ND	ND	ND	ND	2.0	-	-	-	-	-	-	-	-
	03/12/2009	644.13	16.26	627.87	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	05/06/2009	644.13	15.35	628.78	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	09/14/2009	644.13	15.82	628.31	-	ND	ND	ND	ND	ND	2.0	-	-	-	-	-	-	-	-
	12/14/2009	644.13	12.96	631.17	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	03/26/2010	644.13	10.64	633.49	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	06/29/2010	644.13	13.89	630.24	-	ND	ND	ND	ND	ND	4.0	-	-	-	-	-	-	-	-
	10/16/2010	644.13	19.55	624.58	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	01/31/2011	644.13	15.77	628.36	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	04/17/2011	644.13	13.20	630.93	-	ND	1.0	ND	ND	1.0	ND	-	-	-	-	-	-	-	-
	03/19/2012	644.13	14.72	629.41	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	06/04/2012	644.13	19.47	624.66	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	09/28/2012	644.13	16.83	627.30	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	12/14/2012	644.13	15.64	628.49	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	03/18/2013	644.13	14.18	629.95	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	07/05/2013	644.13	14.89	629.24	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	09/27/2013	644.13	16.26	627.87	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	01/08/2014	644.13	14.59	629.54	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	03/12/2014	644.13	13.32	630.81	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	06/30/2014	644.13	12.39	631.74	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	09/04/2014	644.13	14.29	629.84	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	12/16/2014	644.13	15.60	628.53	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	12/09/2015	644.13	14.77	629.36	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	10/03/2016	644.13	16.16	627.97	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	10/06/2017	644.13	15.18	628.95	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	10/02/2018	644.13	10.62	633.51	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	10/25/2019	644.13	16.10	628.03	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	10/09/2020	644.13	16.52	627.61	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	12/22/2020	644.13	14.73	629.40	29.04	ND (0.05)	ND (0.07)	ND (0.06)	ND (0.15)	ND (0.33)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.20)	ND (1.1)	ND (0.06)	0.12 J	-	-
MW-4	09/26/2007	645.00	15.67	629.33	-	ND	ND	ND	ND	ND	320,000	-	-	-	-	-	-	-	-
	12/13/2007	645.00	17.53	627.47	-	ND	ND	ND	ND	ND	57,000	-	-	-	-	-	-	-	-
	03/31/2008	645.00	15.34	629.66	-	ND	ND	ND	ND	ND	12,000	-	-	-	-	-	-	-	-
	06/30/2008	645.00	15.28	629.72	-	ND	ND	ND	ND	ND	55,000	-	-	-	-	-	-	-	-
	09/24/2008	645.00	17.35	627.65	-	ND	ND	ND	ND	ND	310,000	-	-	-	-	-	-	-	-
	12/30/2008	645.00	16.94	628.06	-	ND	ND	ND	ND	ND	49,000	-	-	-	-	-	-	-	-
	03/12/2009	645.00	17.11	627.89	-	ND	ND	ND	ND	ND	13,000	-	-	-	-	-	-	-	-
	05/06/2009	645.00	16.09	628.91	-	ND	ND	ND	ND	ND	19,000	-	-	-	-	-	-	-	-
	09/14/2009	645.00	16.30	628.70	-	ND	ND	ND	ND	ND	84,000	-	-	-	-	-	-	-	-
	12/14/2009	645.00	13.68	631.32	-	ND	ND	ND	ND	ND	520	-	-	-	-	-	-	-	-
	03/26/2010	645.00	-	-	-	ND	ND	ND	ND	ND	4,400	-	-	-	-	-	-	-	-

HISTORICAL GAUGING AND ANALYTICAL SUMMARY

High's Store No. 86
3711 Federal Hill Road
Jarrettsville, MD

Monitoring Well	Date	Top of Casing (ft)	Depth to Water (ft)	GW Elevation (ft)	Depth to Bottom (Measured Depth) (ft)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Total BTEX (µg/L)	MTBE (µg/L)	Naphthalene (µg/L)	Diisopropyl ether (µg/L)	tert-Amyl methyl ether (µg/L)	tert-Butyl alcohol (µg/L)	1,3,5-Trimethylbenzene (µg/L)	Chloromethane (µg/L)	ter-Amyl Alcohol (µg/L)	tert-Amyl Ethyl Ehter (µg/L)
GW Clean-up Standards*						**5.0**	**1,000**	**700**	**10,000**	**NL**	**20**	**0.17**	**NL**	**NL**	**NL**	**6**	**19**	**NL**	**NL**
MW-4	06/29/2010	645.00	-	-	-	ND	ND	ND	ND	ND	160,000	-	-	-	-	-	-	-	-
(cont.)	06/10/2010	645.00	16.48	628.52	-	ND	ND	ND	ND	ND	19,000	-	-	-	-	-	-	-	-
	01/31/2011	645.00	16.82	628.18	-	ND	ND	ND	ND	ND	58,000	-	-	-	-	-	-	-	-
	04/17/2011	645.00	14.30	630.70	-	ND	ND	ND	ND	ND	46,000	-	-	-	-	-	-	-	-
	03/19/2012	645.00	15.72	629.28	-	88.1	24.8	ND	53.5	166.4	19,920	-	-	-	-	-	-	-	-
	06/04/2012	645.00	15.96	629.04	-	94.1	20.5	30.1	23.6	168.3	43,560	-	-	-	-	-	-	-	-
	09/28/2012	645.00	17.87	627.13	-	111	17.8	7.08	69.2	198.0	33,680	-	-	-	-	-	-	-	-
	12/14/2012	645.00	16.58	628.42	-	ND	ND	ND	ND	ND	8,140	-	-	-	-	-	-	-	-
	03/18/2013	645.00	15.08	629.92	-	ND	ND	ND	ND	ND	1,920	-	-	-	-	-	-	-	-
	07/05/2013	645.00	15.99	629.01	-	32.8	14.2	ND	ND	47.0	5,800	-	-	-	-	-	-	-	-
	09/27/2013	645.00	17.36	627.64	-	70.5	5.28	ND	38.20	113.98	46,100	-	-	-	-	-	-	-	-
	01/08/2014	645.00	15.38	629.62	-	ND	ND	ND	ND	ND	63	-	-	-	-	-	-	-	-
	03/12/2014	645.00	14.13	630.87	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	06/30/2014	645.00	13.60	631.40	-	ND	ND	ND	ND	ND	416	-	-	-	-	-	-	-	-
	09/04/2014	645.00	15.54	629.46	-	86.0	ND	10.0	10.0	106	5,600	-	-	-	-	-	-	-	-
	12/16/2014	645.00	16.49	628.51	-	ND	ND	ND	ND	ND	83	-	-	-	-	-	-	-	-
	12/09/2015	645.00	15.55	629.45	-	ND	ND	ND	ND	ND	1,700	-	-	-	-	-	-	-	-
	10/03/2016	645.00	17.22	627.78	-	90.4	ND	ND	ND	90.4	3,610	-	-	-	-	-	-	-	-
	10/06/2017	645.00	16.20	628.80	-	ND	ND	ND	ND	ND	164	-	-	-	-	-	-	-	-
	10/02/2018	645.00	12.66	632.34	-	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-
	10/25/2019	645.00	17.10	627.90	-	235	ND	ND	ND	ND	507	-	-	-	-	-	-	-	-
	10/9/2020[A]	645.00	16.57	628.43	-	139	ND	ND	ND	ND	452	ND	128	ND	7,140	7.41	ND	5,720	73.1
	11/19/2020[B]	645.00	-	-	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/20/2020[A]	645.00	-	-	-	ND	ND	ND	ND	ND	34.5	ND	ND	ND	169	ND	ND	ND	ND
	11/20/2020[B]	645.00	-	-	-	ND	ND	ND	ND	ND	6.95	ND	ND	ND	41.4	ND	ND	ND	ND
	12/22/2020	645.00	15.54	629.46	24.30	ND (0.05)	ND (0.07)	ND (0.06)	ND (0.15)	ND (0.33)	1.6	ND (0.05)	0.19 J	ND (0.20)	2.6 J	ND (0.06)	0.13 J	-	-
TF-1	12/22/2020	-	DRY	-	13.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TF-2	12/22/2020	-	DRY	-	9.35	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
* GW Cleanup Standards are the Maryland Department of the Environment (MDE) Groundwater Clean-up Standards for Type I and II Aquifers (2018)

Analytical and gauging data prior to December 2020 was obtained by Advanced Environmental Concepts, Inc.

11/19/20[A] = sample collected during recharge

11/19/20[B] = sample collected after recharge

ND (#) = Not detected, concetration below Method Detection Limit (#)

µg/L = micrograms per liter

MTBE = Methyl Tertiary Butyl Ether

BTEX = Benzene, toluene, ethylbenzene, xylenes

ft = feet

\- = No data available

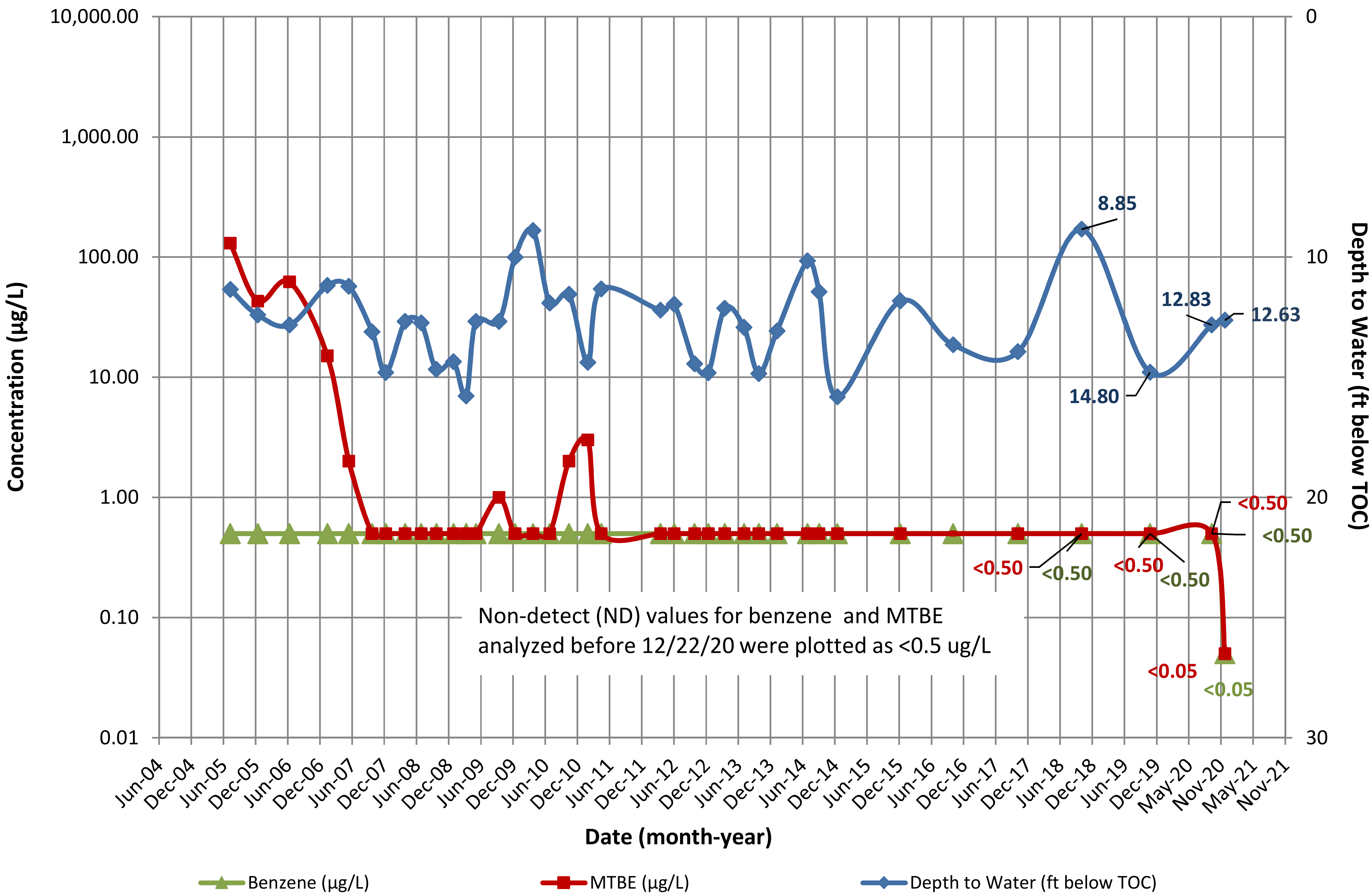
J = Detected between the Method Detection Limit (MDL) and Reporting Limit (RL); therefore the result is an estimated value.

NL =No Limit established

Appendix A – Concentration Hydrographs

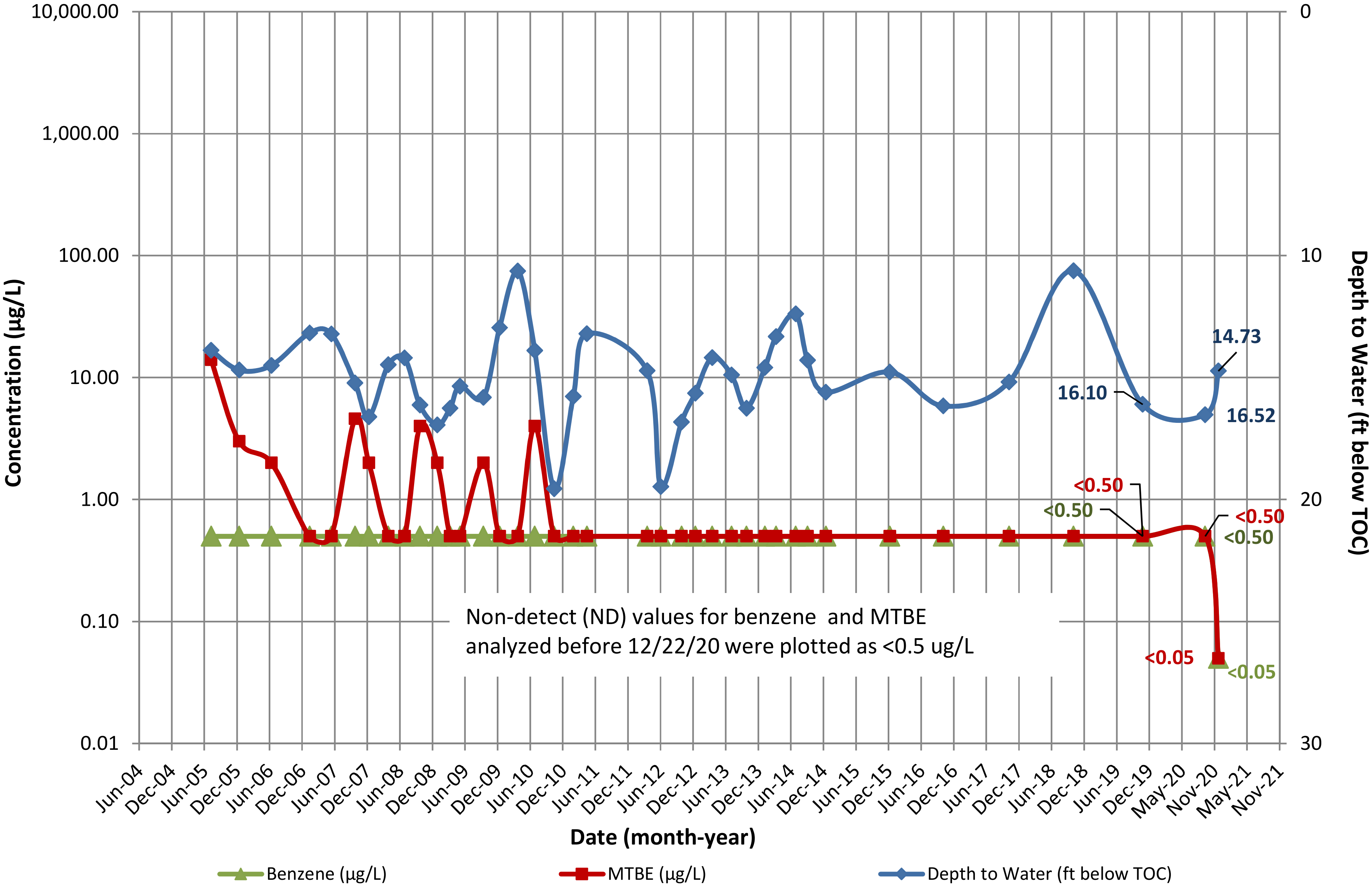
CONCENTRATION HYDROGRAPH FOR BENZENE & MTBE - MW-1

High's Store No. 86
3711 Federal Hill Rd.
Jarrettsville, MD



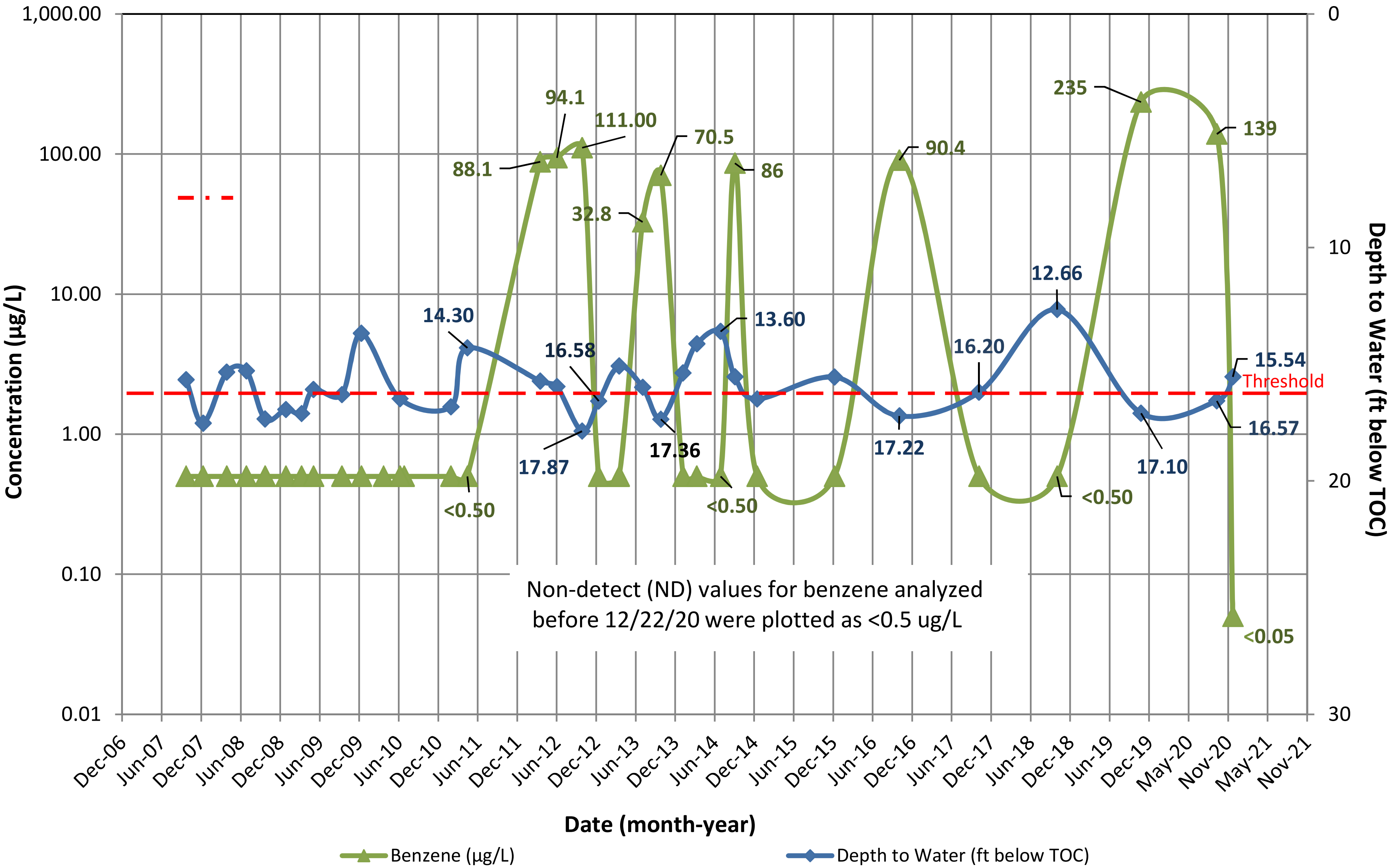
CONCENTRATION HYDROGRAPH FOR BENZENE & MTBE - MW-3

High's Store No. 86
3711 Federal Hill Rd.
Jarrettsville, MD



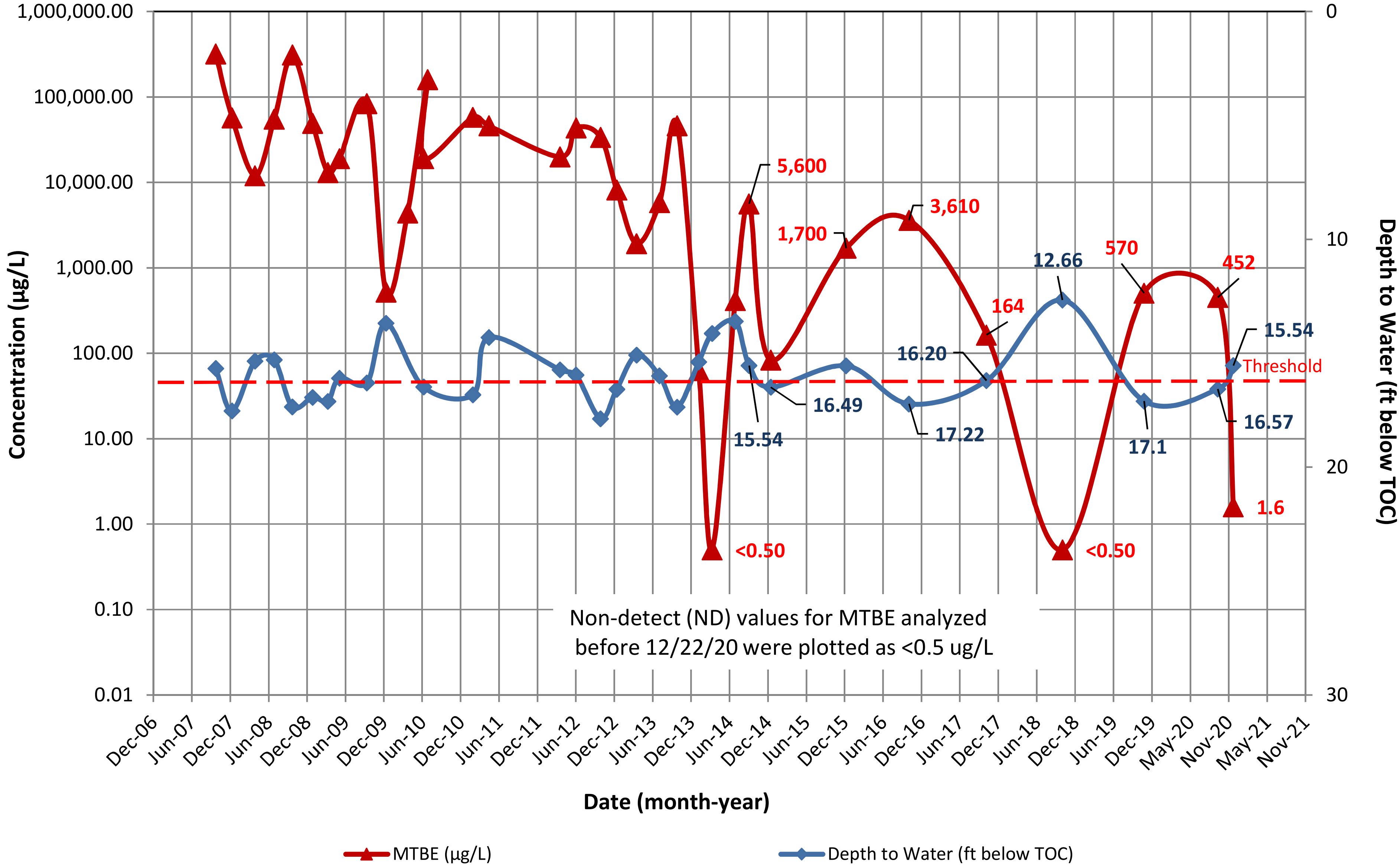
CONCENTRATION HYDROGRAPH FOR BENZENE - MW-4

High's Store No. 86
3711 Federal Hill Rd.
Jarrettsville, MD



CONCENTRATION HYDROGRAPH FOR MTBE - MW-4

High's Store No. 86
3711 Federal Hill Rd.
Jarrettsville, MD



Appendix B – GES Low-Flow Sampling SOP

Standard Operating Procedure

Section:	FM-8.5
Revision #:	003
Date:	05/26/2020

Title: Low-Flow Groundwater Sampling

1. Purpose/Scope

This SOP describes procedures for sampling groundwater using low-flow purging and sampling techniques. The objective is to pump in a manner that minimizes stress (drawdown) to the system to the extent practical, taking into account established site sampling objectives. This method involves sampling intake-zone water without disturbing any stagnant water above the intake by pumping the well at low flow rates while maintaining minimal drawdown of the water column within the well. Improper sampling and transport procedures may cause compounds of interest to be removed from or added to the sample prior to analysis.

The importance of proper and consistent field sampling methods, as well as proper documentation, cannot be over-emphasized.

This SOP shall be used in conjunction with an approved Health and Safety Plan (HASP). Also, consult the HASP for information on the selection and use of PPE.

2. References

ASTM D4448 – 01(2019): Standard Guide for Sampling Groundwater Wells

ASTM D4750: Standard Guide for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Withdrawn in 2010 with no replacement, per ASTM.org)

ASTM D5903- 96(2017)e1: Standard Guide for Planning and Preparing for a Groundwater Sampling Event

ASTM D6089-19: Standard Guide for Documenting a Ground-Water Sampling Event

ASTM D6452-18: Standard Guide for Purging Methods for Wells Used for Groundwater Quality Investigations

ASTM D6564: Standard Guide for Field Filtration of Ground-Water Samples

ASTM D6634: Standard Guide for the Selection of Purging and Sampling Devices for Groundwater Monitoring Wells

EPA, Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, (ORD/ OSWER, Washington D.C., 1996) (EPA-540/S-95/504).

EPA Region I, Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. (Quality Assurance Unit, EQASOP-GW 001, July 30, 1996, Revised January 19, 2010).

3. Equipment/Materials

A basic checklist of suggested equipment and supplies needed to implement this SOP include, but is not limited to:

- Personnel protective equipment as outlined in the site-specific HASP
- Project-specific quality assurance and/or sampling plan
- Project-specific waste management plan
- Well construction log details and historical groundwater gauging data
- Location maps(s)
- Adjustable rate, submersible pump (e.g., centrifugal, bladder) capable of pumping at a low flow rate. A pump constructed with stainless steel or Teflon is preferred. The pump selected should be appropriate for use both in purging and sampling the analytes of interest.
- Electronic, audible (or visual identification) water-level measurement equipment with ± 0.01-foot accuracy (i.e., oil/water interface probe or water level indicator)
- Tubing of the appropriate diameter (based on pump selection) and of the appropriate material for sampling the analytes of interest.
  - Teflon or Teflon-lined polyethylene tubing are preferred when sampling is to include VOCs, SVOCs, pesticides, PCBs, and inorganics.
  - PVC, polypropylene, or polyethylene tubing may be used when collecting samples for metal and other inorganic analyses.
  - Tubing constructed of other materials may be used if adequate information can be provided to show that the materials do not leach contaminants or cause interferences to the analytical procedures to be used.
- Flow measurement supplies (e.g., graduated cylinder, graduated bucket, stop watch).
- Proper power source based on pump selection (battery, generator, nitrogen tank, etc.)
- In-line flow-through cell with water quality meter capable of measuring pH, specific conductance, temperature, oxidation-reduction potential (ORP), turbidity, and dissolved oxygen (DO).
- Decontamination supplies

- Distilled water or deionized water (dependent on project requirements)
- Cloth/paper towels/garbage bags
- Transportable, purged water storage container
- Secondary containment for the flow-through cell
- Photoionization detector (PID) (dependent on project requirements)
- Record keeping supplies, including logbook(s) or field book, well purging forms, chain-of-custody forms, field instrument calibration forms, etc.
- Sample bottles, preservation supplies, and labels.

  Note: Any gas powered equipment at sampling sites require special care to ensure that personnel handling these units do not contaminate down-hole equipment. Frequent disposable glove changes are required, as well as strict separation of sampling crew tasks (e.g., those handling pumps and hoses do not conduct fueling activities).

4. Preparation

The scope of the sampling and analysis program must be evaluated prior to mobilization for sampling event, including reviewing the project-specific quality assurance and/or sampling plan, project-specific waste management plan, site HASP, and sampling protocol. These documents will provide information on the following:

- Required sampling procedures
- Wells to be sampled
- Data to be collected in the field
- Depth range within the well the samples will be collected
- The handling of purged water and decontamination water
- Field quality control procedures and documentation to be utilized
- Available well construction details and historical well performance
- Accessibility of the wells and special equipment needed
- Estimated time to complete the sample collection and associated field work
- Laboratory analytical information including the analyses to be performed on each well, sample volume, required bottleware and preservatives, sample hold times, required laboratory documentation (project identifiers, sample identifiers, and forms), and sample shipping and handling requirements.

5. Procedure

Prior to low-flow purging and sampling activities, all measuring devices (with the exclusion of oil/water interface probes or water-level indicators) must be calibrated daily in accordance with equipment vendor recommendations, and the calibration must be recorded. Purging and sampling activities should occur according to the project-specific quality assurance and/or sampling plan. At the end of each day, a calibration check should be performed and recorded to verify that instruments remained in calibration throughout the day. This check is performed while the instruments are in measurement mode, not calibration mode.

5.1 Well Set-Up Activities

The following steps are required to properly set up for sampling:

1. Properly identify and inspect each well.
2. Wear appropriate PPE as specified in the Job Loss Analysis (JLA) forms(s) during set-up activities.
3. Remove the well cap slowly (positive pressure inside may blow cap off).
4. If a project specific requirement, measure the VOC concentration at the top of the casing and in the breathing zone using a PID and record the readings.
5. Measure and record the initial depth to water from the established reference point (i.e., a notch or indelible mark on the well casing).
6. To minimize turbidity in the well, use total well depth and screened interval information obtained from the well construction logs to determine pump intake depth.
7. Attach and secure tubing to low-flow sampling pump. A secondary method should also be used to secure the pump. All non-dedicated equipment should be properly decontaminated prior to use.
8. Lower the pump slowly and gently into the monitor well to minimize aquifer agitation and mixing of the stagnant well casing water. Place the intake of the submersible pump in the middle, or slightly above the middle, of the saturated screen interval or 2 feet above the well bottom/sediment level. The intake of the pump should be placed at an elevation above dense non-aqueous phase liquid (DNAPL), if applicable. Record the pump intake depth.
9. Plumb the in-line flow-through cell to the discharge tubing from the well.
10. Plumb a discharge line from the effluent of the flow-through cell to a transportable, purged water storage container.

5.2 Low-Flow Purging and Sampling

Once you have completed the well set up activities above, follow these steps to purge and sample using low-flow techniques:

1. Put on new nitrile gloves. Change nitrile gloves at a minimum between each well sampled and any time the integrity of the glove is compromised during the purging and sampling activities (i.e., torn, dirty, product stained).
2. Before starting the pump, measure and record the depth to water from the established reference point (i.e., a notch or indelible mark on the well casing).

   Note: After the low-flow sampling equipment is set up, alternate equipment may be needed to collect depth to water measurements (i.e., water level indicator instead of oil/water interface probe). If the equipment set up prohibits the collection of depth to water measurements (e.g., insufficient space for water level equipment, pump interference), the reason must be recorded.

3. Activate the low-flow submersible pump and begin extracting groundwater. Start the pump at low speed and slowly increase the speed until discharge occurs. Typically, flow rates on the order of 100 to 500 mL/min are used; however, this is dependent on site-specific hydrogeology. The pump speed should be adjusted until there is little or no water level drawdown. A stable drawdown of 0.3 feet or less is recommended. Record the initial flow.
4. Measure and record the water level approximately every minute and adjust extraction rate to obtain minimal drawdown in the well (i.e., no more than 0.3 feet is recommended). Measure and record the flow rate for each time interval.
5. Once drawdown is stabilized and the volume of the sampling equipment (pump, tubing, and flow through cell) has been purged, begin monitoring and recording water quality indicators (pH, specific conductance, temperature, ORP, DO, and turbidity as required) using the in-line flow-through cell.

   Note: While purging, the pumping rate and groundwater level are measured and recorded every 5 minutes (or as appropriate).

6. Monitor the water level and extraction rate, in addition to monitoring water quality indicators, and make periodic adjustments to flow rates to ensure steady flow and minimal drawdown. Measure and record the flow rate immediately following each adjustment.
7. Water quality readings will be monitored and recorded every five minutes (or as appropriate) until stabilization criteria are achieved.
8. Stabilization is achieved when three consecutive readings for each parameter are within the following criteria:

Water Quality Indicator Parameter	Stabilization Criteria (EPA Region I, 2010)
pH	±0.1 s.u.
Specific Conductance	±3%
Temperature	±3%
Oxidation-Reduction Potential (ORP)	± 10 mV
Dissolved Oxygen	±10% for values greater than 0.5 mg/L; if three values are < 0.5 mg/L, consider the values stabilized
Turbidity (if required)	±10% for values greater than 5 NTU; if three values are < 5 NTU, consider the values stabilized

Achievement of turbidity levels of less than 5 NTU and stable drawdowns of less than 0.3 feet, while ideal, are not required. If stabilization of these or other field parameters are not met within a reasonable timeframe (EPA recommends 2 hours, otherwise refer to project-specific quality assurance and/or sampling plan), pumping may be discontinued and samples either collected or not collected based on the project data quality objectives and discussion with project stakeholders (e.g., project manager, client or regulator).

9. Collect the necessary samples once purging activities are complete and the groundwater stabilization/clarity is acceptable according to applicable protocol described above. Record the water quality readings prior to sampling. During purging and sampling, the pump tubing must remain filled with water to avoid aeration of the groundwater.

- If the pump tubing is not completely filled to the sampling point, the sampling procedure may need to be adjusted to collect non-VOC/dissolved gases samples first, then slightly increase the flow rate until water completely fills the tubing, collect the VOC/dissolved gases samples, and record new drawdown depth and flow rate. Changes in the sampling procedure must be recorded.
- For bladder pumps that will be used to collect VOC/dissolved gas samples, it is recommended that the pump be set to deliver long pulses of water so that one pulse will fill a 40 mL VOC vial.

10. Disconnect or bypass the flow-through cell prior to sampling.

11. Collect samples directly from the pump into the appropriate sample container under typical circumstances. Fill all sampling containers for each well in a manner that minimizes aeration and turbulence. Flow rate may need to be adjusted (slowed) while collecting volatile organic compound (VOC) samples to reduce volatilization. This change in flow rate must be recorded. Take care to avoid handling the interior of the bottle or cap. Do not place the bottle cap on the ground or in a pocket to avoid contamination. Please refer to the project-specific quality assurance and/or sampling plan for sampling order of various analyses (i.e., collect VOC first, SVOC second, metals third).

    Note: All field quality control samples must be prepared the same as regular investigation samples.

12. Label each sample as collected. Place samples immediately on ice to maintain temperatures at or below laboratory requirements.
13. Filtered water samples should be collected using the same low-flow procedures. Initiate and gradually increase the flow of water through the filter to reach the appropriate rate and pressure, not to exceed the maximum recommended by the filtration equipment manufacturer. The use of an in-line filter is required and the filter size should be based on the sampling objective, as detailed in the project-specific quality assurance and/or sampling plan. The filter should be pre-rinsed with groundwater prior to sample collection. Make sure the filter is free of air bubbles before samples are collected. Filtration should be completed in as short a time as possible while minimizing sample aeration, agitation, pressure changes, temperature changes, and prolonged contact with ambient air. Preserve the filtered water sample immediately.
14. Obtain final water level and flow rate measurements and record the measurements.

5.3 Decontamination Procedures

Clean all equipment that will enter the well or come into contact with groundwater prior to use in the first well and then following the sampling of each well with the appropriate decontaminating solutions. The use of dedicated equipment will reduce the amount of time spent on decontamination of the equipment. Decontamination fluids and material will be disposed of in accordance with the project-specific waste management plan.

5.4 Documentation

Document all the events, equipment used, and measurements collected during the sampling activities in the field book and/or on the well purging forms. Make all entries in indelible ink and strike out any corrections with a single line. Initial and date corrections.

Record all manually-measured data and procedural descriptions in the field book and/or on the well purging forms. Maintain detailed notes regarding field calibration events, purging or PID anomalies, and volumes of extracted groundwater. An example well purging form is included in **Attachment A**. Well purging forms for low-flow groundwater sampling events will be provided in the project-specific quality assurance and/or sampling plan.

For each well sampled, the following information should be documented in the field book and/or on the well purging forms:

- Name of collector(s)
- Date of field event
- Facility or site name
- Climatic conditions including air temperature
- Purge/sampling equipment used
- Equipment calibration
- Equipment configuration for purging and sampling
- Well ID
- Any changes in the physical conditions of the well
- Well depth and screened interval (based on well log)
- Initial static water level
- Presence of immiscible layers and detection/collection method
- Pump intake depth
- Static water level prior to pumping
- Pumping rate
- Flow rates and drawdown measurements
- Times for all measurements
- Measured field parameters
- Sample name, number, date, and time
- Sample appearance
- Sample odors (if respiratory protection is not required)
- Field observations on sampling event
- Equipment decontamination

- Problems encountered and any deviations made from the established sampling protocol
- Sample preparation, shipping/handling, and laboratory submittal details

5.5 Waste Management

Refer to and follow any State specific guidance on treatment of purged groundwater. Determination of treatment (i.e., carbon treatment discharged to ground surface or containerization), should be included in the project-specific quality assurance and/or sampling plan. Porous materials (PPE, rags, etc.) contaminated with groundwater and non-porous materials that cannot be decontaminated will also be managed according to the project-specific waste management plan.

6. Records

The field book and well purging forms must document all the events, equipment used, and measurements collected during the sampling activities. The recorded notes and readings must be legible and concise so that the entire sample event can be reconstructed later for future reference. The field book and well purging forms will become part of the permanent project file.

Record field notes in a standard bound survey-type field book issued for general note taking/field records and available from all GES equipment administrators. Make all field book entries in indelible ink and make any changes/corrections with a single strikethrough line. Initial and date to indicate who made the change/ correction and when it was made.

7. Follow-Up Activities

Perform the following once field activities are complete.

- Review the project-specific quality assurance and/or sampling plan to ensure all samples have been collected and confirm this with the project manager.
- Clean and return equipment to the equipment administrator and sign and date the appropriate forms.
- Complete purge water and cleaning fluid disposal requirements per the project-specific waste management plan.
- Notify the laboratory as to when to expect the samples. Enclose the chain of custody documentation.
- Compile the field deliverable package and copy to the project file.
- Return site/well keys.

Attachments

Attachment A – Example (Minimum Requirements) Well Purging-Field Water Quality Measurements Form

Field Water Quality Measurements Form

Example (Minimum Requirements)
Well Purging – Field Water Quality Measurements Form

Date		Depth to top of screen (ft)	
Client/Site Location		Depth to bottom of screen (ft)	
Company Name		Pump Intake Depth (ft below MP)	
Field Personnel		Purging Device (pump type)	
Weather Conditions		Total Volume Purged (gallons)	

Time	Pump Dial Setting*	Depth to Water	Purge Rate	Cumulative Volume Purged	Water Quality Indicator Parameters						Comments (appearance, color, odor, etc.)
					Temp.	Specific Conductance	pH	ORP	DO	Turbidity	
		ft below MP	mL/min	gallons	°C	µS/cm	s.u.	mV	Mg/L	NTU	
				Stabilization Criteria	± 3%	± 3%	± 0.1 s.u.	± 10 mV	± 10% **	± 10% ***	

NOTES:

C = DEGREES CENTIGRADE
DO = DISSOLVED OXYGEN
FT = FEET
MP = MEASURING POINT
µS/CM = MICROSIEMENS PER CENTIMETER
MG/L = MICROGRAMS PER LITER
ML/MN = MILLILITERS PER MINUTE
MV = MILLIVOLTS
NTU = NEPHLOMETRIC TURBIDITY UNITS
ORP = OXIDATION REDUCTION POTENTIAL
S.U. = STANDARD UNITS

* = PUMP DIAL SETTING (FOR EXAMPLE: HETZ, CYCLES/MIN, ETC.)
** = ±10% FOR VALUES GREATER THAN 0.5 MG/L; IF THREE VALUES ARE <0.5 MG/L, CONSIDER THE VALUES STABILIZED
*** = ±10% FOR VALUES GREATER THAN 5 NTU; IF THREE VALUES ARE <5 NTU, CONSIDER THE VALUES STABILIZED

Appendix C – Low-Flow Field Logs

Groundwater Sampling Data Collection Sheet

GES

Well ID:	MW-1		Site ID:	Carroll-Highs #86 — Sample Date: 2-22-20
Initial DTW / Time:			Address:	3711 Federal Hill Rd.
Well Diameter:	4"	Sample Method (cicle one)		Jarrettsville Md.
Total Well Depth:	2860	Low Flow	Sampling Tech(s):	J. Plummer
Water Column Length:		Purge/sample	Weather Conditions:	Sunny
Pump Intake depth:	25'	Grab/No Pruge	Air Temp =	40

Data Collection: Low Flow

Time	DTW	Temp (___ Unit, ± 0.3 °C)	Conductivity (ms/cm Unit, ± 3%)	D.O. (mg/L Unit, ± 10%)	pH (NA, ± 0.1)	ORP (___ Unit, ± 10)	Flow Rate	Cumulative Purge Volume	Appearance of Purge Water	Comment
1040	1263	Just prior to lowering any equipment into well								
1050	12.57	After lowering equipment into the well & before turning on the pump								
1050	Purge Start Time									
1055	12.92	15.82	1.159	8.50	5.69	175.1	200ml/min		clear	
1100	12.91	15.55	1.180	8.49	5.70	170.9				
1105	12.89	15.54	1.186	8.35	5.68	171.4				
1110	12.87	15.55	1.190	8.35	5.65	174.5				
1115	12.85	15.53	1.191	8.16	5.65	174.9		1 1/4 gallons		
1120	Sample Collection Time									
	Purge Stop Time									

Data Collection: Purge and Sample / Grab Sampling

If Applicable

Time	DTW	Temp (___ Unit, ± 0.3 °C)	Conductivity (___ Unit, ± 3%)	D.O. (___ Unit, ± 10%)	pH (NA, ± 0.1)	ORP (___ Unit, ± 10)	Flow Rate	Cumulative Purge Volume	Appearance of Purge Water	Method Of Sampling
		Just prior to lowering any equipment into well								
	Sample Collection Time			Note: Unless otherwise stated, field parameters collected during purge and sample or grab sampling were collected from the well with a sonde before purging or sampling						

General Comment & Type of Equipment Used (pumps/YSI meter/ect./caibration info):

PID headspace = 0.0 ppm

Stabilization is achieved when three successive readings are within
- ± 0.3 °C for temperature,
- ± 0.1 for pH,
- ± 3% for specific conductivity,
- ± 10 for reduction-oxidation potential

Purge Volumes:
2-inch diameter well:
0.16 gal./ft x ____ (linear feet of water) = gallons of water
4-inch diameter well:
0.65 gal./ft x ____ (linear feet of water) = gallons of water

Groundwater Sampling Data Collection Sheet

GES

Well ID:	MW-3	Site ID:	Carroll-Highs #36
Initial DTW / Time:	14.73	Address:	3711 Federal Hill Rd. Jarrettsville Md.
Well Diameter:	4"	Sample Method (cicle one): Low Flow / Purge/sample / Grab/No Pruge	
Total Well Depth:	29.04	Sampling Tech(s):	Jeff Plummer
Water Column Length:		Weather Conditions:	Partly Cloudy
Pump Intake depth:	25'	Air Temp =	40°

Sample Date: 12-22-20

Data Collection: Low Flow

Time	DTW	Temp ___ Unit ± 0.3 °C	Conductivity mS/cm Unit ± 3%	D.O. mg/L Unit ± 10%	pH NA ± 0.1	ORP ___ Unit ± 10	Flow Rate	Cumulative Purge Volume	Appearance of Purge Water	Comment
0945	14.73	Just prior to lowering any equipment into well								
0953	14.72	After lowering equipment into the well & before turning on the pump								
0953	Purge Start Time									
0958	14.78	15.56	0.526	9.66	6.31	128.7	200 ml/min		clear	
1003	14.80	16.25	0.524	9.13	5.94	137.8	↓			
1008	14.82	16.52	0.510	8.86	5.80	148.4				
1013	14.84	16.50	0.503	8.76	5.73	156.5				
1018	14.86	16.56	0.499	9.03	5.70	160.9				
1023	14.88	16.68	0.493	9.03	5.68	163.8		1 1/2 gallon	↓	
1025	Sample Collection Time									
	Purge StopTime									

Data Collection: Purge and Sample / Grab Sampling

If Applicable

Time	DTW	Temp ___ Unit ± 0.3 °C	Conductivity ___ Unit ± 3%	D.O. ___ Unit ± 10%	pH NA ± 0.1	ORP ___ Unit ± 10	Flow Rate	Cumulative Purge Volume	Appearance of Purge Water	Method Of Sampling
		Just prior to lowering any equipment into well								
	Sample Collection Time			Note: Unless otherwise stated, field parameters collected during purge and sample or grab sampling were collected from the well with a sonde before purging or sampling.						

General Comment & Type of Equipment Used (pumps/YSI meter/ect./caibration info):

MW-3 = PID headspace = 0.0 ppm

TF1 = dry @ 13.13 0.0 ppm
TF2 dry @ 9.35 0.0 ppm

Stabilization is achieved when three successive readings are within
- ± 0.3 °C for temperature,
- ± 0.1 for pH,
- ± 3% for specific conductivity,
- ± 10 for reduction-oxidation potential

Purge Volumes:
- 2-inch diameter well:
  0.16 gal./ft x _____ (linear feet of water) = gallons of water
- 4-inch diameter well:
  0.65 gal./ft x _____ (linear feet of water) = gallons of water

Groundwater Sampling Data Collection Sheet

GES

Well ID:	MW-4		Site ID:	Carroll-High #86	Sample Date: 2-22-20
Initial DTW / Time:			Address:	3711 Federal Hill Rd.	
Well Diameter:	2"	Sample Method (cicle one)		Jarrettsville Md.	
Total Well Depth:	24.30	Low Flow	Sampling Tech(s):	J. Plummer	
Water Column Length:		Purge/sample	Weather Conditions:	Partly Cloudy - Windy	
Pump Intake depth:	20'	Grab/No Pruge	Air Temp =	42	

Data Collection: Low Flow

Time	DTW	Temp ___ Unit ± 0.3 °C	Conductivity mS/cm^c Unit ± 3%	D.O. mg/L Unit ± 10%	pH NA ± 0.1	ORP ___ Unit ± 10	Flow Rate	Cumulative Purge Volume	Appearance of Purge Water	Comment
1135	15.54	Just prior to lowering any equipment into well								
1145	15.54	After lowering equipment into the well & before turning on the pump								
1145	Purge Start Time									
1150	15.89	14.74	0.220	8.26	5.23	185.0	200ml/min		clear	
1155	15.89	14.61	0.220	7.96	5.10	200.7				
1200	15.91	14.84	0.221	7.41	5.02	212.5				
1205	15.90	14.58	0.226	7.38	4.96	221.1				
1210	15.88	14.70	0.230	7.16	4.93	225.8				
1215	15.87	14.87	0.234	7.03	4.95	226.1		1 1/2 gallons		
1220	Sample Collection Time									
	Purge Stop Time									

Data Collection: Purge and Sample / Grab Sampling

Time	DTW	Temp ___ Unit ± 0.3 °C	Conductivity ___ Unit ± 3%	D.O. ___ Unit ± 10% (If Applicable)	pH NA ± 0.1	ORP ___ Unit ± 10	Flow Rate	Cumulative Purge Volume	Appearance of Purge Water	Method Of Sampling
		Just prior to lowering any equipment into well								
	Sample Collection Time			Note: Unless otherwise stated, field parameters collected during purge and sample or grab sampling were collected from the well with a sonde before purging or sampling						

General Comment & Type of Equipment Used (pumps/YSI meter/ect./caibration info):

PID headspace = 0.0 ppm

Stabilization is achieved when three successive readings are within
- ± 0.3 °C for temperature,
- ± 0.1 for pH,
- ± 3% for specific conductivity,
- ± 10 for reduction-oxidation potential

Purge Volumes:

2-inch diameter well:
0.16 gal./ft x ____ (linear feet of water) = gallons of water

4-inch diameter well:
0.65 gal./ft x ____ (linear feet of water) = gallons of water

Appendix D – Lab Analytical Report and COC Documentation

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Lancaster Laboratories Env, LLC
2425 New Holland Pike
Lancaster, PA 17601
Tel: (717)656-2300

Laboratory Job ID: 410-24912-1
Client Project/Site: Carroll - High's #86, Jarrettsville MD

For:
Groundwater & Environmental Services Inc
1350 Blair Drive
Suite A
Odenton, Maryland 21113

Attn: Peter Reichardt

Authorized for release by:
1/5/2021 7:22:30 AM

Amek Carter, Project Manager
(717)556-7252
Loran.Carter@eurofinset.com

The test results in this report meet all 2003 NELAC, 2009 TNI, and 2016 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Analytical test results meet all requirements of the associated regulatory program (e.g., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis. Data qualifiers are applied to note exceptions. Noncompliant quality control (QC) is further explained in narrative comments.
· QC results that exceed the upper limits and are associated with non-detect samples are qualified but further narration is not required since the bias is high and does not change a non-detect result. Further narration is also not required with QC blank detection when the associated sample concentration is non-detect or more than ten times the level in the blank.
· Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD is performed, unless otherwise specified in the method.
· Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.
Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Measurement uncertainty values, as applicable, are available upon request.

Test results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" and tested in the laboratory are not performed within 15 minutes of collection.

This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. The foregoing express warranty is exclusive and is given in lieu of all other warranties, expressed or implied, except as otherwise agreed. We disclaim any other warranties, expressed or implied, including a warranty of fitness for particular purpose and warranty of merchantability. In no event shall Eurofins Lancaster Laboratories Environmental, LLC be liable for indirect, special, consequential, or incidental damages including, but not limited to, damages for loss of profit or goodwill regardless of (A) the negligence (either sole or concurrent) of Eurofins Lancaster Laboratories Environmental and (B) whether Eurofins Lancaster Laboratories Environmental has been informed of the possibility of such damages. We accept no legal responsibility for the purposes for which the client uses the test results. Except as otherwise agreed, no purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

Amek Carter

Amek Carter
Project Manager
1/5/2021 7:22:30 AM

Table of Contents

Definitions/Glossary

Client: Groundwater & Environmental Services Inc — Job ID: 410-24912-1
Project/Site: Carroll - High's #86, Jarrettsville MD

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
1C	Result is from the primary column on a dual-column method.
2C	Result is from the confirmation column on a dual-column method.
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 410-24912-1

Laboratory: Eurofins Lancaster Laboratories Env, LLC

Narrative

Job Narrative
410-24912-1

Receipt
The samples were received on 12/23/2020 6:39 PM; the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 0.7°C

Receipt Exceptions
A trip blank was not submitted for analysis with the sample shipment and was not listed on the Chain of Custody (COC).

GC/MS VOA
Method 8260C_LL: The preservative used in the sample containers provided is not compatible with one of the Method 8260 analytes requested. The following samples were received preserved with hydrochloric acid: MW-3 (410-24912-1), MW-1 (410-24912-2) and MW-4 (410-24912-3). The requested target analyte list includes Acrylonitrile, an acid-labile compound that degrades in an acidic medium.

Method 8260C_LL: The continuing calibration verification (CCV) associated with batch 410-81468 recovered outside acceptance criteria, low biased, for t-Butyl alcohol and trans-1,4-Dichloro-2-butene. A reporting limit (RL) standard was analyzed, and the target analyte was detected. Non-detections are reported. Any detection is considered estimated.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Client Sample ID: MW-3 — Lab Sample ID: 410-24912-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloromethane	0.12	J	0.50	0.060	ug/L	1		8260C LL	Total/NA

Client Sample ID: MW-1 — Lab Sample ID: 410-24912-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloromethane	0.20	J	0.50	0.060	ug/L	1		8260C LL	Total/NA

Client Sample ID: MW-4 — Lab Sample ID: 410-24912-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methyl tertiary butyl ether	1.6		0.50	0.050	ug/L	1		8260C LL	Total/NA
Chloromethane	0.13	J	0.50	0.060	ug/L	1		8260C LL	Total/NA
di-Isopropyl ether	0.19	J	0.50	0.050	ug/L	1		8260C LL	Total/NA
t-Butyl alcohol	2.6	J	10	1.1	ug/L	1		8260C LL	Total/NA

This Detection Summary does not include radiochemical test results.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Client Sample ID: MW-3
Lab Sample ID: 410-24912-1
Date Collected: 12/22/20 10:25
Matrix: Water
Date Received: 12/23/20 18:39

Method: 8260C LL - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.070	ug/L			01/01/21 01:13	1
cis-1,3-Dichloropropene	ND		0.50	0.050	ug/L			01/01/21 01:13	1
trans-1,3-Dichloropropene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
Ethylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
Styrene	ND		0.50	0.050	ug/L			01/01/21 01:13	1
1,4-Dichlorobenzene	ND		0.50	0.070	ug/L			01/01/21 01:13	1
1,2-Dibromoethane	ND		0.50	0.060	ug/L			01/01/21 01:13	1
1,1-Dichloropropene	ND		0.50	0.050	ug/L			01/01/21 01:13	1
1,2-Dichloroethane	ND		0.50	0.050	ug/L			01/01/21 01:13	1
1,2,3-Trichlorobenzene	ND		0.50	0.050	ug/L			01/01/21 01:13	1
1,2,3-Trichloropropane	ND		1.0	0.10	ug/L			01/01/21 01:13	1
Toluene	ND		0.50	0.070	ug/L			01/01/21 01:13	1
Chlorobenzene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
1,2,4-Trimethylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
1,2,4-Trichlorobenzene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
Dibromochloromethane	ND		0.50	0.070	ug/L			01/01/21 01:13	1
Xylenes, Total	ND		1.0	0.15	ug/L			01/01/21 01:13	1
Tetrachloroethene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
cis-1,2-Dichloroethene	ND		0.50	0.050	ug/L			01/01/21 01:13	1
trans-1,2-Dichloroethene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
Methyl tertiary butyl ether	ND		0.50	0.050	ug/L			01/01/21 01:13	1
1,3,5-Trimethylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
1,3-Dichlorobenzene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
1,3-Dichloropropane	ND		0.50	0.070	ug/L			01/01/21 01:13	1
Chloroform	ND		0.50	0.090	ug/L			01/01/21 01:13	1
Benzene	ND		0.50	0.050	ug/L			01/01/21 01:13	1
1,1,1-Trichloroethane	ND		0.50	0.060	ug/L			01/01/21 01:13	1
Bromomethane	ND		0.50	0.070	ug/L			01/01/21 01:13	1
Chloromethane	**0.12**	**J**	0.50	0.060	ug/L			01/01/21 01:13	1
Chloroethane	ND		0.50	0.070	ug/L			01/01/21 01:13	1
2,2-Dichloropropane	ND		0.50	0.050	ug/L			01/01/21 01:13	1
Vinyl chloride	ND		0.50	0.10	ug/L			01/01/21 01:13	1
Methylene Chloride	ND		0.50	0.070	ug/L			01/01/21 01:13	1
Carbon disulfide	ND		1.0	0.060	ug/L			01/01/21 01:13	1
Bromoform	ND		1.0	0.30	ug/L			01/01/21 01:13	1
Bromodichloromethane	ND		0.50	0.050	ug/L			01/01/21 01:13	1
1,1-Dichloroethane	ND		0.50	0.070	ug/L			01/01/21 01:13	1
2-Chlorotoluene	ND		0.50	0.070	ug/L			01/01/21 01:13	1
1,1-Dichloroethene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
Trichlorofluoromethane	ND		0.50	0.050	ug/L			01/01/21 01:13	1
4-Chlorotoluene	ND		0.50	0.070	ug/L			01/01/21 01:13	1
Dichlorodifluoromethane	ND		0.50	0.050	ug/L			01/01/21 01:13	1
1,2-Dichloropropane	ND		0.50	0.060	ug/L			01/01/21 01:13	1
1,1,2-Trichloroethane	ND		0.50	0.060	ug/L			01/01/21 01:13	1
Acrylonitrile	ND		5.0	0.40	ug/L			01/01/21 01:13	1
Trichloroethene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.070	ug/L			01/01/21 01:13	1
1,2-Dichlorobenzene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
1,2-Dibromo-3-Chloropropane	ND		0.50	0.10	ug/L			01/01/21 01:13	1

Client: Groundwater & Environmental Services Inc
Project/Site: Carroll - High's #86, Jarrettsville MD

Job ID: 410-24912-1

Client Sample ID: MW-3

Lab Sample ID: 410-24912-1

Date Collected: 12/22/20 10:25

Matrix: Water

Date Received: 12/23/20 18:39

Method: 8260C LL - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromobenzene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
Bromochloromethane	ND		0.50	0.050	ug/L			01/01/21 01:13	1
Isopropylbenzene	ND		0.50	0.050	ug/L			01/01/21 01:13	1
Dibromomethane	ND		0.50	0.060	ug/L			01/01/21 01:13	1
di-Isopropyl ether	ND		0.50	0.050	ug/L			01/01/21 01:13	1
Ethyl t-butyl ether	ND		0.50	0.050	ug/L			01/01/21 01:13	1
Hexachlorobutadiene	ND		0.50	0.070	ug/L			01/01/21 01:13	1
Naphthalene	ND		0.50	0.050	ug/L			01/01/21 01:13	1
n-Butylbenzene	ND		0.50	0.050	ug/L			01/01/21 01:13	1
N-Propylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
p-Isopropyltoluene	ND		0.50	0.050	ug/L			01/01/21 01:13	1
sec-Butylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:13	1
t-Amyl methyl ether	ND		0.50	0.20	ug/L			01/01/21 01:13	1
t-Butyl alcohol	ND		10	1.1	ug/L			01/01/21 01:13	1
tert-Butylbenzene	ND		0.50	0.070	ug/L			01/01/21 01:13	1
trans-1,4-Dichloro-2-butene	ND		5.0	2.0	ug/L			01/01/21 01:13	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*99*		*80 - 120*		*01/01/21 01:13*	*1*
Dibromofluoromethane (Surr)	*97*		*80 - 120*		*01/01/21 01:13*	*1*
4-Bromofluorobenzene (Surr)	*98*		*80 - 120*		*01/01/21 01:13*	*1*
Toluene-d8 (Surr)	*100*		*80 - 120*		*01/01/21 01:13*	*1*

Client Sample ID: MW-1

Lab Sample ID: 410-24912-2

Date Collected: 12/22/20 11:20

Matrix: Water

Date Received: 12/23/20 18:39

Method: 8260C LL - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.070	ug/L			01/01/21 01:35	1
cis-1,3-Dichloropropene	ND		0.50	0.050	ug/L			01/01/21 01:35	1
trans-1,3-Dichloropropene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
Ethylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
Styrene	ND		0.50	0.050	ug/L			01/01/21 01:35	1
1,4-Dichlorobenzene	ND		0.50	0.070	ug/L			01/01/21 01:35	1
1,2-Dibromoethane	ND		0.50	0.060	ug/L			01/01/21 01:35	1
1,1-Dichloropropene	ND		0.50	0.050	ug/L			01/01/21 01:35	1
1,2-Dichloroethane	ND		0.50	0.050	ug/L			01/01/21 01:35	1
1,2,3-Trichlorobenzene	ND		0.50	0.050	ug/L			01/01/21 01:35	1
1,2,3-Trichloropropane	ND		1.0	0.10	ug/L			01/01/21 01:35	1
Toluene	ND		0.50	0.070	ug/L			01/01/21 01:35	1
Chlorobenzene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
1,2,4-Trimethylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
1,2,4-Trichlorobenzene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
Dibromochloromethane	ND		0.50	0.070	ug/L			01/01/21 01:35	1
Xylenes, Total	ND		1.0	0.15	ug/L			01/01/21 01:35	1
Tetrachloroethene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
cis-1,2-Dichloroethene	ND		0.50	0.050	ug/L			01/01/21 01:35	1
trans-1,2-Dichloroethene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
Methyl tertiary butyl ether	ND		0.50	0.050	ug/L			01/01/21 01:35	1

Client Sample ID: MW-1
Lab Sample ID: 410-24912-2
Date Collected: 12/22/20 11:20
Matrix: Water
Date Received: 12/23/20 18:39

Method: 8260C LL - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,3,5-Trimethylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
1,3-Dichlorobenzene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
1,3-Dichloropropane	ND		0.50	0.070	ug/L			01/01/21 01:35	1
Chloroform	ND		0.50	0.090	ug/L			01/01/21 01:35	1
Benzene	ND		0.50	0.050	ug/L			01/01/21 01:35	1
1,1,1-Trichloroethane	ND		0.50	0.060	ug/L			01/01/21 01:35	1
Bromomethane	ND		0.50	0.070	ug/L			01/01/21 01:35	1
Chloromethane	**0.20**	**J**	0.50	0.060	ug/L			01/01/21 01:35	1
Chloroethane	ND		0.50	0.070	ug/L			01/01/21 01:35	1
2,2-Dichloropropane	ND		0.50	0.050	ug/L			01/01/21 01:35	1
Vinyl chloride	ND		0.50	0.10	ug/L			01/01/21 01:35	1
Methylene Chloride	ND		0.50	0.070	ug/L			01/01/21 01:35	1
Carbon disulfide	ND		1.0	0.060	ug/L			01/01/21 01:35	1
Bromoform	ND		1.0	0.30	ug/L			01/01/21 01:35	1
Bromodichloromethane	ND		0.50	0.050	ug/L			01/01/21 01:35	1
1,1-Dichloroethane	ND		0.50	0.070	ug/L			01/01/21 01:35	1
2-Chlorotoluene	ND		0.50	0.070	ug/L			01/01/21 01:35	1
1,1-Dichloroethene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
Trichlorofluoromethane	ND		0.50	0.050	ug/L			01/01/21 01:35	1
4-Chlorotoluene	ND		0.50	0.070	ug/L			01/01/21 01:35	1
Dichlorodifluoromethane	ND		0.50	0.050	ug/L			01/01/21 01:35	1
1,2-Dichloropropane	ND		0.50	0.060	ug/L			01/01/21 01:35	1
1,1,2-Trichloroethane	ND		0.50	0.060	ug/L			01/01/21 01:35	1
Acrylonitrile	ND		5.0	0.40	ug/L			01/01/21 01:35	1
Trichloroethene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.070	ug/L			01/01/21 01:35	1
1,2-Dichlorobenzene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
1,2-Dibromo-3-Chloropropane	ND		0.50	0.10	ug/L			01/01/21 01:35	1
Bromobenzene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
Bromochloromethane	ND		0.50	0.050	ug/L			01/01/21 01:35	1
Isopropylbenzene	ND		0.50	0.050	ug/L			01/01/21 01:35	1
Dibromomethane	ND		0.50	0.060	ug/L			01/01/21 01:35	1
di-Isopropyl ether	ND		0.50	0.050	ug/L			01/01/21 01:35	1
Ethyl t-butyl ether	ND		0.50	0.050	ug/L			01/01/21 01:35	1
Hexachlorobutadiene	ND		0.50	0.070	ug/L			01/01/21 01:35	1
Naphthalene	ND		0.50	0.050	ug/L			01/01/21 01:35	1
n-Butylbenzene	ND		0.50	0.050	ug/L			01/01/21 01:35	1
N-Propylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
p-Isopropyltoluene	ND		0.50	0.050	ug/L			01/01/21 01:35	1
sec-Butylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:35	1
t-Amyl methyl ether	ND		0.50	0.20	ug/L			01/01/21 01:35	1
t-Butyl alcohol	ND		10	1.1	ug/L			01/01/21 01:35	1
tert-Butylbenzene	ND		0.50	0.070	ug/L			01/01/21 01:35	1
trans-1,4-Dichloro-2-butene	ND		5.0	2.0	ug/L			01/01/21 01:35	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*99*		*80 - 120*		*01/01/21 01:35*	*1*
Dibromofluoromethane (Surr)	*98*		*80 - 120*		*01/01/21 01:35*	*1*
4-Bromofluorobenzene (Surr)	*98*		*80 - 120*		*01/01/21 01:35*	*1*
Toluene-d8 (Surr)	*100*		*80 - 120*		*01/01/21 01:35*	*1*

Client Sample Results

Client: Groundwater & Environmental Services Inc
Job ID: 410-24912-1
Project/Site: Carroll - High's #86, Jarrettsville MD

Client Sample ID: MW-4
Lab Sample ID: 410-24912-3
Date Collected: 12/22/20 12:20
Matrix: Water
Date Received: 12/23/20 18:39

Method: 8260C LL - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.070	ug/L			01/01/21 01:57	1
cis-1,3-Dichloropropene	ND		0.50	0.050	ug/L			01/01/21 01:57	1
trans-1,3-Dichloropropene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
Ethylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
Styrene	ND		0.50	0.050	ug/L			01/01/21 01:57	1
1,4-Dichlorobenzene	ND		0.50	0.070	ug/L			01/01/21 01:57	1
1,2-Dibromoethane	ND		0.50	0.060	ug/L			01/01/21 01:57	1
1,1-Dichloropropene	ND		0.50	0.050	ug/L			01/01/21 01:57	1
1,2-Dichloroethane	ND		0.50	0.050	ug/L			01/01/21 01:57	1
1,2,3-Trichlorobenzene	ND		0.50	0.050	ug/L			01/01/21 01:57	1
1,2,3-Trichloropropane	ND		1.0	0.10	ug/L			01/01/21 01:57	1
Toluene	ND		0.50	0.070	ug/L			01/01/21 01:57	1
Chlorobenzene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
1,2,4-Trimethylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
1,2,4-Trichlorobenzene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
Dibromochloromethane	ND		0.50	0.070	ug/L			01/01/21 01:57	1
Xylenes, Total	ND		1.0	0.15	ug/L			01/01/21 01:57	1
Tetrachloroethene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
cis-1,2-Dichloroethene	ND		0.50	0.050	ug/L			01/01/21 01:57	1
trans-1,2-Dichloroethene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
Methyl tertiary butyl ether	**1.6**		0.50	0.050	ug/L			01/01/21 01:57	1
1,3,5-Trimethylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
1,3-Dichlorobenzene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
1,3-Dichloropropane	ND		0.50	0.070	ug/L			01/01/21 01:57	1
Chloroform	ND		0.50	0.090	ug/L			01/01/21 01:57	1
Benzene	ND		0.50	0.050	ug/L			01/01/21 01:57	1
1,1,1-Trichloroethane	ND		0.50	0.060	ug/L			01/01/21 01:57	1
Bromomethane	ND		0.50	0.070	ug/L			01/01/21 01:57	1
Chloromethane	**0.13**	**J**	0.50	0.060	ug/L			01/01/21 01:57	1
Chloroethane	ND		0.50	0.070	ug/L			01/01/21 01:57	1
2,2-Dichloropropane	ND		0.50	0.050	ug/L			01/01/21 01:57	1
Vinyl chloride	ND		0.50	0.10	ug/L			01/01/21 01:57	1
Methylene Chloride	ND		0.50	0.070	ug/L			01/01/21 01:57	1
Carbon disulfide	ND		1.0	0.060	ug/L			01/01/21 01:57	1
Bromoform	ND		1.0	0.30	ug/L			01/01/21 01:57	1
Bromodichloromethane	ND		0.50	0.050	ug/L			01/01/21 01:57	1
1,1-Dichloroethane	ND		0.50	0.070	ug/L			01/01/21 01:57	1
2-Chlorotoluene	ND		0.50	0.070	ug/L			01/01/21 01:57	1
1,1-Dichloroethene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
Trichlorofluoromethane	ND		0.50	0.050	ug/L			01/01/21 01:57	1
4-Chlorotoluene	ND		0.50	0.070	ug/L			01/01/21 01:57	1
Dichlorodifluoromethane	ND		0.50	0.050	ug/L			01/01/21 01:57	1
1,2-Dichloropropane	ND		0.50	0.060	ug/L			01/01/21 01:57	1
1,1,2-Trichloroethane	ND		0.50	0.060	ug/L			01/01/21 01:57	1
Acrylonitrile	ND		5.0	0.40	ug/L			01/01/21 01:57	1
Trichloroethene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.070	ug/L			01/01/21 01:57	1
1,2-Dichlorobenzene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
1,2-Dibromo-3-Chloropropane	ND		0.50	0.10	ug/L			01/01/21 01:57	1

Client: Groundwater & Environmental Services Inc
Job ID: 410-24912-1
Project/Site: Carroll - High's #86, Jarrettsville MD

Client Sample ID: MW-4
Lab Sample ID: 410-24912-3
Date Collected: 12/22/20 12:20
Matrix: Water
Date Received: 12/23/20 18:39

Method: 8260C LL - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromobenzene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
Bromochloromethane	ND		0.50	0.050	ug/L			01/01/21 01:57	1
Isopropylbenzene	ND		0.50	0.050	ug/L			01/01/21 01:57	1
Dibromomethane	ND		0.50	0.060	ug/L			01/01/21 01:57	1
di-Isopropyl ether	**0.19**	**J**	0.50	0.050	ug/L			01/01/21 01:57	1
Ethyl t-butyl ether	ND		0.50	0.050	ug/L			01/01/21 01:57	1
Hexachlorobutadiene	ND		0.50	0.070	ug/L			01/01/21 01:57	1
Naphthalene	ND		0.50	0.050	ug/L			01/01/21 01:57	1
n-Butylbenzene	ND		0.50	0.050	ug/L			01/01/21 01:57	1
N-Propylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
p-Isopropyltoluene	ND		0.50	0.050	ug/L			01/01/21 01:57	1
sec-Butylbenzene	ND		0.50	0.060	ug/L			01/01/21 01:57	1
t-Amyl methyl ether	ND		0.50	0.20	ug/L			01/01/21 01:57	1
t-Butyl alcohol	**2.6**	**J**	10	1.1	ug/L			01/01/21 01:57	1
tert-Butylbenzene	ND		0.50	0.070	ug/L			01/01/21 01:57	1
trans-1,4-Dichloro-2-butene	ND		5.0	2.0	ug/L			01/01/21 01:57	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*98*		*80 - 120*		*01/01/21 01:57*	*1*
Dibromofluoromethane (Surr)	*98*		*80 - 120*		*01/01/21 01:57*	*1*
4-Bromofluorobenzene (Surr)	*97*		*80 - 120*		*01/01/21 01:57*	*1*
Toluene-d8 (Surr)	*100*		*80 - 120*		*01/01/21 01:57*	*1*

Client: Groundwater & Environmental Services Inc

Job ID: 410-24912-1

Project/Site: Carroll - High's #86, Jarrettsville MD

Method: 8260C LL - Volatile Organic Compounds by GC/MS

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)			
		DCA	DBFM	BFB	TOL
Lab Sample ID	Client Sample ID	(80-120)	(80-120)	(80-120)	(80-120)
410-24912-1	MW-3	99	97	98	100
410-24912-2	MW-1	99	98	98	100
410-24912-3	MW-4	98	98	97	100
LCS 410-81468/6	Lab Control Sample	97	99	99	101
MB 410-81468/9	Method Blank	95	97	98	100

Surrogate Legend

DCA = 1,2-Dichloroethane-d4 (Surr)

DBFM = Dibromofluoromethane (Surr)

BFB = 4-Bromofluorobenzene (Surr)

TOL = Toluene-d8 (Surr)

Client: Groundwater & Environmental Services Inc
Project/Site: Carroll - High's #86, Jarrettsville MD

Job ID: 410-24912-1

Method: 8260C LL - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 410-81468/9
Matrix: Water
Analysis Batch: 81468

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	ND		0.50	0.070	ug/L			12/31/20 18:59	1
cis-1,3-Dichloropropene	ND		0.50	0.050	ug/L			12/31/20 18:59	1
trans-1,3-Dichloropropene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
Ethylbenzene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
Styrene	ND		0.50	0.050	ug/L			12/31/20 18:59	1
1,4-Dichlorobenzene	ND		0.50	0.070	ug/L			12/31/20 18:59	1
1,2-Dibromoethane	ND		0.50	0.060	ug/L			12/31/20 18:59	1
1,1-Dichloropropene	ND		0.50	0.050	ug/L			12/31/20 18:59	1
1,2-Dichloroethane	ND		0.50	0.050	ug/L			12/31/20 18:59	1
1,2,3-Trichlorobenzene	ND		0.50	0.050	ug/L			12/31/20 18:59	1
1,2,3-Trichloropropane	ND		1.0	0.10	ug/L			12/31/20 18:59	1
Toluene	ND		0.50	0.070	ug/L			12/31/20 18:59	1
Chlorobenzene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
1,2,4-Trimethylbenzene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
1,2,4-Trichlorobenzene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
Dibromochloromethane	ND		0.50	0.070	ug/L			12/31/20 18:59	1
Xylenes, Total	ND		1.0	0.15	ug/L			12/31/20 18:59	1
Tetrachloroethene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
cis-1,2-Dichloroethene	ND		0.50	0.050	ug/L			12/31/20 18:59	1
trans-1,2-Dichloroethene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
Methyl tertiary butyl ether	ND		0.50	0.050	ug/L			12/31/20 18:59	1
1,3,5-Trimethylbenzene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
1,3-Dichlorobenzene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
1,3-Dichloropropane	ND		0.50	0.070	ug/L			12/31/20 18:59	1
Chloroform	ND		0.50	0.090	ug/L			12/31/20 18:59	1
Benzene	ND		0.50	0.050	ug/L			12/31/20 18:59	1
1,1,1-Trichloroethane	ND		0.50	0.060	ug/L			12/31/20 18:59	1
Bromomethane	ND		0.50	0.070	ug/L			12/31/20 18:59	1
Chloromethane	ND		0.50	0.060	ug/L			12/31/20 18:59	1
Chloroethane	ND		0.50	0.070	ug/L			12/31/20 18:59	1
2,2-Dichloropropane	ND		0.50	0.050	ug/L			12/31/20 18:59	1
Vinyl chloride	ND		0.50	0.10	ug/L			12/31/20 18:59	1
Methylene Chloride	ND		0.50	0.070	ug/L			12/31/20 18:59	1
Carbon disulfide	ND		1.0	0.060	ug/L			12/31/20 18:59	1
Bromoform	ND		1.0	0.30	ug/L			12/31/20 18:59	1
Bromodichloromethane	ND		0.50	0.050	ug/L			12/31/20 18:59	1
1,1-Dichloroethane	ND		0.50	0.070	ug/L			12/31/20 18:59	1
2-Chlorotoluene	ND		0.50	0.070	ug/L			12/31/20 18:59	1
1,1-Dichloroethene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
Trichlorofluoromethane	ND		0.50	0.050	ug/L			12/31/20 18:59	1
4-Chlorotoluene	ND		0.50	0.070	ug/L			12/31/20 18:59	1
Dichlorodifluoromethane	ND		0.50	0.050	ug/L			12/31/20 18:59	1
1,2-Dichloropropane	ND		0.50	0.060	ug/L			12/31/20 18:59	1
1,1,2-Trichloroethane	ND		0.50	0.060	ug/L			12/31/20 18:59	1
Acrylonitrile	ND		5.0	0.40	ug/L			12/31/20 18:59	1
Trichloroethene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
1,1,2,2-Tetrachloroethane	ND		0.50	0.070	ug/L			12/31/20 18:59	1
1,2-Dichlorobenzene	ND		0.50	0.060	ug/L			12/31/20 18:59	1

Method: 8260C LL - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 410-81468/9
Matrix: Water
Analysis Batch: 81468
Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromo-3-Chloropropane	ND		0.50	0.10	ug/L			12/31/20 18:59	1
Bromobenzene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
Bromochloromethane	ND		0.50	0.050	ug/L			12/31/20 18:59	1
Isopropylbenzene	ND		0.50	0.050	ug/L			12/31/20 18:59	1
Dibromomethane	ND		0.50	0.060	ug/L			12/31/20 18:59	1
di-Isopropyl ether	ND		0.50	0.050	ug/L			12/31/20 18:59	1
Ethyl t-butyl ether	ND		0.50	0.050	ug/L			12/31/20 18:59	1
Hexachlorobutadiene	ND		0.50	0.070	ug/L			12/31/20 18:59	1
Naphthalene	ND		0.50	0.050	ug/L			12/31/20 18:59	1
n-Butylbenzene	ND		0.50	0.050	ug/L			12/31/20 18:59	1
N-Propylbenzene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
p-Isopropyltoluene	ND		0.50	0.050	ug/L			12/31/20 18:59	1
sec-Butylbenzene	ND		0.50	0.060	ug/L			12/31/20 18:59	1
t-Amyl methyl ether	ND		0.50	0.20	ug/L			12/31/20 18:59	1
t-Butyl alcohol	ND		10	1.1	ug/L			12/31/20 18:59	1
tert-Butylbenzene	ND		0.50	0.070	ug/L			12/31/20 18:59	1
trans-1,4-Dichloro-2-butene	ND		5.0	2.0	ug/L			12/31/20 18:59	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*95*		*80 - 120*		*12/31/20 18:59*	*1*
Dibromofluoromethane (Surr)	*97*		*80 - 120*		*12/31/20 18:59*	*1*
4-Bromofluorobenzene (Surr)	*98*		*80 - 120*		*12/31/20 18:59*	*1*
Toluene-d8 (Surr)	*100*		*80 - 120*		*12/31/20 18:59*	*1*

Lab Sample ID: LCS 410-81468/6
Matrix: Water
Analysis Batch: 81468
Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,1,2-Tetrachloroethane	5.00	4.73		ug/L		95	71 - 134
cis-1,3-Dichloropropene	5.00	4.47		ug/L		89	67 - 121
trans-1,3-Dichloropropene	5.00	4.48		ug/L		90	61 - 129
Ethylbenzene	5.00	4.57		ug/L		91	80 - 120
Styrene	5.00	4.70		ug/L		94	80 - 120
1,4-Dichlorobenzene	5.00	4.66		ug/L		93	80 - 120
1,2-Dibromoethane	5.00	4.62		ug/L		92	80 - 120
1,1-Dichloropropene	5.00	4.61		ug/L		92	74 - 120
1,2-Dichloroethane	5.00	4.36		ug/L		87	69 - 122
1,2,3-Trichlorobenzene	5.00	4.50		ug/L		90	68 - 125
1,2,3-Trichloropropane	5.00	4.73		ug/L		95	80 - 125
Toluene	5.00	4.59		ug/L		92	80 - 120
Chlorobenzene	5.00	4.70		ug/L		94	80 - 120
1,2,4-Trimethylbenzene	5.00	4.57		ug/L		91	80 - 120
1,2,4-Trichlorobenzene	5.00	4.57		ug/L		91	68 - 122
Dibromochloromethane	5.00	4.78		ug/L		96	64 - 138
Xylenes, Total	15.0	14.2		ug/L		94	80 - 120
Tetrachloroethene	5.00	4.79		ug/L		96	80 - 120
cis-1,2-Dichloroethene	5.00	4.79		ug/L		96	80 - 122

Client: Groundwater & Environmental Services Inc
Project/Site: Carroll - High's #86, Jarrettsville MD

Job ID: 410-24912-1

Method: 8260C LL - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 410-81468/6
Matrix: Water
Analysis Batch: 81468

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
trans-1,2-Dichloroethene	5.00	4.45		ug/L		89	80 - 122
Methyl tertiary butyl ether	5.00	4.29		ug/L		86	69 - 120
1,3,5-Trimethylbenzene	5.00	4.61		ug/L		92	80 - 120
1,3-Dichlorobenzene	5.00	4.61		ug/L		92	80 - 120
1,3-Dichloropropane	5.00	4.59		ug/L		92	80 - 120
Chloroform	5.00	4.52		ug/L		90	80 - 120
Benzene	5.00	4.53		ug/L		91	80 - 120
1,1,1-Trichloroethane	5.00	4.50		ug/L		90	78 - 126
Bromomethane	5.00	4.39		ug/L		88	60 - 136
Chloromethane	5.00	4.21		ug/L		84	56 - 124
Chloroethane	5.00	4.14		ug/L		83	63 - 120
2,2-Dichloropropane	5.00	4.40		ug/L		88	61 - 141
Vinyl chloride	5.00	4.60		ug/L		92	60 - 125
Methylene Chloride	5.00	4.64		ug/L		93	80 - 120
Carbon disulfide	5.00	4.35		ug/L		87	67 - 130
Bromoform	5.00	4.79		ug/L		96	49 - 144
Bromodichloromethane	5.00	4.59		ug/L		92	73 - 124
1,1-Dichloroethane	5.00	4.61		ug/L		92	74 - 120
2-Chlorotoluene	5.00	4.62		ug/L		92	80 - 120
1,1-Dichloroethene	5.00	4.59		ug/L		92	80 - 131
Trichlorofluoromethane	5.00	4.49		ug/L		90	62 - 136
4-Chlorotoluene	5.00	4.57		ug/L		91	80 - 120
Dichlorodifluoromethane	5.00	4.41		ug/L		88	43 - 123
1,2-Dichloropropane	5.00	4.59		ug/L		92	80 - 120
1,1,2-Trichloroethane	5.00	4.79		ug/L		96	80 - 120
Acrylonitrile	25.0	23.2		ug/L		93	64 - 139
Trichloroethene	5.00	4.60		ug/L		92	80 - 120
1,1,2,2-Tetrachloroethane	5.00	4.60		ug/L		92	75 - 123
1,2-Dichlorobenzene	5.00	4.64		ug/L		93	80 - 120
1,2-Dibromo-3-Chloropropane	5.00	4.60		ug/L		92	56 - 148
Bromobenzene	5.00	4.68		ug/L		94	80 - 120
Bromochloromethane	5.00	4.47		ug/L		89	80 - 120
Isopropylbenzene	5.00	4.70		ug/L		94	80 - 120
Dibromomethane	5.00	4.56		ug/L		91	80 - 122
di-Isopropyl ether	5.00	4.35		ug/L		87	58 - 131
Ethyl t-butyl ether	5.00	4.44		ug/L		89	57 - 126
Hexachlorobutadiene	5.00	4.75		ug/L		95	72 - 132
Naphthalene	5.00	4.37		ug/L		87	64 - 122
n-Butylbenzene	5.00	4.45		ug/L		89	74 - 123
N-Propylbenzene	5.00	4.57		ug/L		91	74 - 122
p-Isopropyltoluene	5.00	4.68		ug/L		94	80 - 120
sec-Butylbenzene	5.00	4.68		ug/L		94	80 - 120
t-Amyl methyl ether	5.00	4.47		ug/L		89	65 - 125
t-Butyl alcohol	50.0	38.4		ug/L		77	62 - 138
tert-Butylbenzene	5.00	4.47		ug/L		89	79 - 120
trans-1,4-Dichloro-2-butene	25.0	19.9		ug/L		79	10 - 172

Client: Groundwater & Environmental Services Inc
Project/Site: Carroll - High's #86, Jarrettsville MD

Job ID: 410-24912-1

Method: 8260C LL - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 410-81468/6
Matrix: Water
Analysis Batch: 81468

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	97		80 - 120
Dibromofluoromethane (Surr)	99		80 - 120
4-Bromofluorobenzene (Surr)	99		80 - 120
Toluene-d8 (Surr)	101		80 - 120

QC Association Summary

Client: Groundwater & Environmental Services Inc
Project/Site: Carroll - High's #86, Jarrettsville MD

Job ID: 410-24912-1

GC/MS VOA

Analysis Batch: 81468

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-24912-1	MW-3	Total/NA	Water	8260C LL	
410-24912-2	MW-1	Total/NA	Water	8260C LL	
410-24912-3	MW-4	Total/NA	Water	8260C LL	
MB 410-81468/9	Method Blank	Total/NA	Water	8260C LL	
LCS 410-81468/6	Lab Control Sample	Total/NA	Water	8260C LL	

Lab Chronicle

Client: Groundwater & Environmental Services Inc
Project/Site: Carroll - High's #86, Jarrettsville MD

Job ID: 410-24912-1

Client Sample ID: MW-3

Lab Sample ID: 410-24912-1

Date Collected: 12/22/20 10:25
Date Received: 12/23/20 18:39

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C LL		1	81468	01/01/21 01:13	K4WN	ELLE

Client Sample ID: MW-1

Lab Sample ID: 410-24912-2

Date Collected: 12/22/20 11:20
Date Received: 12/23/20 18:39

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C LL		1	81468	01/01/21 01:35	K4WN	ELLE

Client Sample ID: MW-4

Lab Sample ID: 410-24912-3

Date Collected: 12/22/20 12:20
Date Received: 12/23/20 18:39

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C LL		1	81468	01/01/21 01:57	K4WN	ELLE

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Env, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

Laboratory: Eurofins Lancaster Laboratories Env, LLC

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Maryland	State	100	06-30-21

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
8260C LL		Water	1,1,1,2-Tetrachloroethane
8260C LL		Water	1,1,1-Trichloroethane
8260C LL		Water	1,1,2,2-Tetrachloroethane
8260C LL		Water	1,1,2-Trichloroethane
8260C LL		Water	1,1-Dichloroethane
8260C LL		Water	1,1-Dichloroethene
8260C LL		Water	1,1-Dichloropropene
8260C LL		Water	1,2,3-Trichlorobenzene
8260C LL		Water	1,2,3-Trichloropropane
8260C LL		Water	1,2,4-Trichlorobenzene
8260C LL		Water	1,2,4-Trimethylbenzene
8260C LL		Water	1,2-Dibromo-3-Chloropropane
8260C LL		Water	1,2-Dibromoethane
8260C LL		Water	1,2-Dichlorobenzene
8260C LL		Water	1,2-Dichloroethane
8260C LL		Water	1,2-Dichloropropane
8260C LL		Water	1,3,5-Trimethylbenzene
8260C LL		Water	1,3-Dichlorobenzene
8260C LL		Water	1,3-Dichloropropane
8260C LL		Water	1,4-Dichlorobenzene
8260C LL		Water	2,2-Dichloropropane
8260C LL		Water	2-Chlorotoluene
8260C LL		Water	4-Chlorotoluene
8260C LL		Water	Acrylonitrile
8260C LL		Water	Benzene
8260C LL		Water	Bromobenzene
8260C LL		Water	Bromochloromethane
8260C LL		Water	Bromodichloromethane
8260C LL		Water	Bromoform
8260C LL		Water	Bromomethane
8260C LL		Water	Carbon disulfide
8260C LL		Water	Chlorobenzene
8260C LL		Water	Chloroethane
8260C LL		Water	Chloroform
8260C LL		Water	Chloromethane
8260C LL		Water	cis-1,2-Dichloroethene
8260C LL		Water	cis-1,3-Dichloropropene
8260C LL		Water	Dibromochloromethane
8260C LL		Water	Dibromomethane
8260C LL		Water	Dichlorodifluoromethane
8260C LL		Water	di-Isopropyl ether
8260C LL		Water	Ethyl t-butyl ether
8260C LL		Water	Ethylbenzene
8260C LL		Water	Hexachlorobutadiene
8260C LL		Water	Isopropylbenzene

Accreditation/Certification Summary

Client: Groundwater & Environmental Services Inc — Job ID: 410-24912-1
Project/Site: Carroll - High's #86, Jarrettsville MD

Laboratory: Eurofins Lancaster Laboratories Env, LLC (Continued)

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Maryland	State	100	06-30-21

8260C LL	Water	Methyl tertiary butyl ether
8260C LL	Water	Methylene Chloride
8260C LL	Water	Naphthalene
8260C LL	Water	n-Butylbenzene
8260C LL	Water	N-Propylbenzene
8260C LL	Water	p-Isopropyltoluene
8260C LL	Water	sec-Butylbenzene
8260C LL	Water	Styrene
8260C LL	Water	t-Amyl methyl ether
8260C LL	Water	t-Butyl alcohol
8260C LL	Water	tert-Butylbenzene
8260C LL	Water	Tetrachloroethene
8260C LL	Water	Toluene
8260C LL	Water	trans-1,2-Dichloroethene
8260C LL	Water	trans-1,3-Dichloropropene
8260C LL	Water	trans-1,4-Dichloro-2-butene
8260C LL	Water	Trichloroethene
8260C LL	Water	Trichlorofluoromethane
8260C LL	Water	Vinyl chloride
8260C LL	Water	Xylenes, Total

Method Summary

Method	Method Description	Protocol	Laboratory
8260C LL	Volatile Organic Compounds by GC/MS	SW846	ELLE
5030C	Purge and Trap	SW846	ELLE

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Env, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

Sample Summary

Client: Groundwater & Environmental Services Inc | Job ID: 410-24912-1
Project/Site: Carroll - High's #86, Jarrettsville MD

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
410-24912-1	MW-3	Water	12/22/20 10:25	12/23/20 18:39	
410-24912-2	MW-1	Water	12/22/20 11:20	12/23/20 18:39	
410-24912-3	MW-4	Water	12/22/20 12:20	12/23/20 18:39	

Page 1 of 1

410-24912 Chain of Custody

eurofins | Lancaster Laboratories Environmental

lysis Request/Chain of Custody

Group # ____ Sample # ____

Client: Groundwater & Env Services, Inc.	
Project Name/#: High's Store #86 - Jarrettsville	Site ID #:
Project Manager: Peter Reichardt	P.O #: 0403314/08/206
Sampler: Jeff Plummer	PWSID #:
Phone #: 800-220-3606 x 3726	Quote #:
State where sample(s) were collected 3711 Federal Hill Rd Jarretsville MD	

Matrix: Sediment ☐ / Soil ☐; Water: Ground ☑ Surface ☐ Potable ☐ NPDES ☐; Other

Analyses Requested — Preservation Codes: H — Full Suite VOCs plus oxygenates and Napthalene (8260)

Sample Identification	Collection Date	Collection Time	Grab	Composite	Sediment/Soil	Water	Other	Total # of Containers	Full Suite VOCs plus oxygenates and Napthalene (8260)
MW-3	12-22-20	1025	X			X		3	X
MW-1	12-22-20	1120	X			X		3	X
MW-4	12-22-20	1220	X			X		3	X

For Lab Use Only
SF #: ____
SCR #: ____

Preservation Codes
H HCl T Thiosulfate
N HNO_3 B NaOH
S H_2SO_4 P H_3PO_4
O Other

Remarks

Turnaround Time Requested (TAT) (please check): Standard ☑ Rush ☐
(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed

Rush results requested by (please check): E-Mail ☑ Phone ☐

E-mail Address midatlantic@gesonline.com & ges@equisonline.com

Phone:

Relinquished by	Date	Time	Received by	Date	Time
Jeff Plummer	12-23-20	0800	Denise Wooding	12 23 20	0900
Denise Wooding	12-23-20	12.17	[signature]	12/23/20	1217
[signature]	12/23/20	1830			
			[signature]	12/23/20	1839

Data Package Options (please check if required)
Type I (Validation/non-CLP) ☐ MA MCP ☐
Type III (Reduced non-CLP) ☐ CT RCP ☐
Type VI (Raw Data Only) ☐ TX TRRP-13 ☐
NYSDEC Category ☐ A or ☐ B

EDD Required? Yes ☐ No ☐ If yes, format: GES EQEDD

Relinquished by Commercial Carrier:
UPS ____ FedEx ____ Other X

Temperature upon receipt 0.7 °C

Eurofins Lancaster Laboratories Environmental, LLC • 2425 New Holland Pike, Lancaster PA 17601 • 717-656-2300

7045 0614

Login Sample Receipt Checklist

Client: Groundwater & Environmental Services Inc — Job Number: 410-24912-1

Login Number: 24912 — **List Source: Eurofins Lancaster Laboratories Env**
List Number: 1
Creator: Colon Martinez, Jessenia C

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable (</=6C, not frozen).	True	
Cooler Temperature is recorded.	True	
WV: Container Temperature is acceptable (</=6C, not frozen).	N/A	
WV: Container Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	N/A	
Is the Field Sampler's name present on COC?	True	
Sample Preservation Verified.	N/A	
Residual Chlorine Checked.	N/A	
Sample custody seals are intact.	N/A	

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15