The Dow Chemical Company
633 Washington Avenue
1803 Building
Midland, MI 48674
USA

November 17, 2021

Ms. Gail Dieter

New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau E, Section B
625 Broadway, 12th Floor
Albany, NY 12233-7017

Subject: 2020 and 2021 SWMU 1 Landfill Gas Monitoring Technical Memorandum, Former Hampshire Chemical Corp. Facility, Waterloo, New York

Dear Ms. Dieter:

Hampshire Chemical Corp. (HCC) is pleased to submit one hard copy and one electronic copy of the SWMU 1 Landfill Gas Monitoring Tech Memo, Former Hampshire Chemical Corp. Facility, Waterloo, New York. The Tech Memo was prepared to report on gas monitoring performed at SWMU 1 in accordance with an emailed Workplan dated January 12, 2018. The purpose of this investigation was to evaluate whether methane and other common landfill gases are present at the boundary of, and within the subsurface of the former landfill.

The Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) and corrective measures activities were conducted pursuant to a Second Amended Order on Consent executed between Hampshire Chemical Corp. (HCC) and the NYSDEC under Index Number 8-20000218-3281, August 12, 2011.

If you have any questions about this Landfill Gas Monitoring Report, please contact me at 519-939-7595, or Brian Carling at 610-384-0747.

Sincerely,

Robert Stuetzle
Sr. Remediation Specialist

Copy To: Ms. Gail Dieter, NYSDEC Central Office (Disc and Hard Copy)
Mr. Matthew Gillette, NYSDEC Region 8 (Disc)
Mr. David Pratt, NYSDEC Region 8 (Disc)
Mr. David Breyette, Evans Chemetics LP (Disc)
Jacobs Project File

Jacobs

Memorandum

4123 Mt. Kemble Avenue
Morristown, NJ 07960
www.jacobs.com

Subject	2020 and 2021 SWMU 1 Landfill Gas Monitoring Technical Memorandum, Former Hampshire Chemical Corp. Facility, Waterloo, New York
Attention	Former Hampshire Chemical Corp.
From	Jacobs Engineering Group Inc.
Date	November 2021
Project Number	WAT011DW

1. Introduction

This technical memorandum (TM) reports the results of landfill gas monitoring conducted at the Former Hampshire Chemical Corp. (HCC) Facility Solid Waste Management Unit 1 (SWMU 1) in Waterloo, New York (site). Two additional rounds of landfill gas monitoring activities were performed in September 2020 and May 2021 using up to four shallow landfill gas monitoring wells and six groundwater monitoring wells per the New York State Department of Environmental Conservation (NYSDEC) request in the approval letter for the *Technical Memorandum – February 2018 to January 2019 SWUM1 Landfill Gas Monitoring* dated October 4, 2019. One additional round of confirmatory landfill gas monitoring was performed in August 2021 due to apparent instrument malfunction that occurred in May 2021.

This investigation was conducted as a supplement to SWMU 1 corrective measures completed in November 2016. This investigation was conducted to evaluate whether methane and other common landfill gases are present at the boundary of and within the subsurface of the former landfill. The findings of this investigation will be used to evaluate the need for further methane monitoring, mitigation, and/or corrective measures at SWMU 1.

The site is regulated under Title 6 of the New York Code of Rules and Regulations (NYCRR) Part 373 and the Resource Conservation and Recovery Act (RCRA), with NYSDEC as the lead agency. RCRA facility investigations (RFIs) have been performed at the facility since 1993 to evaluate the nature and extent of releases to the environment.

2. Background

The site is located at 228 East Main Street in Waterloo, New York, on property currently occupied by Evans Chemetics, which operates a chemical manufacturing facility. Figure 1 shows the site location relative to New York State and the Village of Waterloo. SWMU 1 is in the southwestern corner of the facility property; bounded to the east by the facility, to the south by the Seneca–Cayuga Canal (canal), to the west by East Water Street, and to the north by the Seneca–Cayuga Canal Raceway (raceway). An asphalt road accesses the facility on the western side near East Water Street and crosses over SWMU 1. Figure 2 shows the location features within and surrounding SWMU 1, including roads, the canal, the raceway, monitoring wells, and the area of concern boundary.

Sanborn fire insurance maps of the site indicate the area along the western side of SWMU 1 and near some of the historical raceways was identified as the Village of Waterloo Dump as early as October 1918. The RCRA Facility

Assessment Report (A.T. Kearney 1993) indicates the former Village of Waterloo Dump was probably in operation at the western edge of the site until 1951 (O'Brien and Gere Engineers, Inc. 2003). This suggests an operating period for the dump of at least 33 years, during which the Village of Waterloo placed debris, soil, and refuse in this area.

The 1964 Sanborn map for the facility shows that the canal and raceways were filled to the western edge of the old lock, and the area is identified as the Village of Waterloo Dump (O'Brien and Gere Engineers, Inc. 2003). As indicated by facility personnel, additional material was placed over the filled former raceways in the early 1980s that was derived from soil excavated during facility construction projects, mainly the wastewater treatment plant at the site.

3. Previous Investigations and Corrective Measures

Test pitting conducted during previous environmental investigations at SWMU 1 have identified various municipal waste fill, including glass and plastic fragments, scrap metal, ash, ceramics, shoes, brake pads, copper wire, and vehicle tires. Construction debris, including cobbles, bricks, wood, and metal scrap, also was identified in the test pitting. Intact bottles, both empty and containing liquids, also have been identified in test pits located near the access roadway as well as down along the right-of-way near the canal (CH2M HILL Engineers, Inc. [CH2M] 2006, 2009). The results of the test pit excavations show that fill materials extend onto the canal right-of-way in the area. From that investigation, it has been estimated that approximately 2,500 cubic yards of fill material are present within the canal right-of-way (CH2M 2009).

A soil vapor investigation was conducted within the vicinity of SWMU 1 in December 2007 as part of the RFI Addendum (CH2M 2008). Soil vapor data collected at two locations, SGP-9 and SGP-10, and within the boundary of SWMU 1, were compared to historical SWMU 1 soil and groundwater data to evaluate if the reported soil vapor volatile organic compounds (VOCs) were related to site activities and a subsurface release. The constituents detected in the soil vapor samples historically were not detected in nearby monitoring wells. Based on data evaluation and a review of multiple lines of evidence, it was concluded that none of the reported VOCs in SWMU 1 soil vapor is likely to present a vapor intrusion concern; however, methane was not analyzed during the 2007 soil vapor investigation.

A survey of methane concentrations in six SWMU 1 groundwater monitoring wells was conducted in October and November 2012 (CH2M 2013). Methane was not detected at levels above 0.1 percent by volume (Vol%) during the 2012 survey.

Between September and November 2016, corrective measures were undertaken by HCC at SWMU 1. These activities are detailed in the *SWMU 1 Corrective Measures Construction Completion Report* (CH2M 2017) and included the construction of an engineered landfill cap, decommissioning of some groundwater monitoring wells, paving, and site restoration activities.

Beginning in December 2016, elevated concentrations of methane were detected in SWMU 1 monitoring wells MW-17 and TW-01 during wellhead screening conducted as part of a long-term groundwater monitoring event depth-to-water survey. NYSDEC was notified and four shallow landfill gas monitoring probes were installed in February 2018 (Jacobs 2019). Between February 2018 and August 2021, 13 landfill gas monitoring events have been conducted at SWMU 1 gas probes (GP-01 to GP-04) and groundwater monitoring wells (MW-16I, MW-17, MW-18, MW-26, and TW-01) (Jacobs 2019 and 2020).

Further details regarding previous environmental and geotechnical investigations conducted at SWMU 1 are in the RFI and RFI Addendum and TMs (CH2M 2006, 2008, 2009, 2012).

4. Landfill Gases

Landfill gas, if present, will be mostly comprised of methane and carbon dioxide by volume, but also can consist of smaller amounts of other gases. Three principal subsurface processes can create landfill gases, including bacterial decomposition, volatilization, and chemical reactions. Waste characteristics and composition and other environmental factors will influence the rate and volume of landfill gas (Agency for Toxic Substances and Disease Registry [ATSDR] 2001). In general, the more organic material that is buried in a covered SWMU, the more landfill gas will be produced by bacterial decomposition. Organic landfill waste will decompose by bacteria through phases as the subsurface transitions from aerobic to anaerobic conditions. Methane is only produced in the subsurface when oxygen is no longer present since methanogenic bacteria (methane producing) are generally only active under anaerobic conditions (ATSDR 2001).

In addition, the age of the buried waste material also will affect landfill gas production. Waste that has been buried more recently (less than 10 years) generally will produce more landfill gases than waste that is older (buried more than 10 years) (ATSDR 2001). Maximum gas production for organic waste materials through bacterial decomposition, volatilization, or chemical reactions is generally 5 to 7 years after the waste has been buried. Based upon documentation of when waste materials were last disposed in SWMU 1 (early 1950s according to the RCRA Facility Assessment Report [A.T. Kearney 1993]), the waste has been buried for more than 60 years. Additionally, during the 2012 survey, methane sampling found concentrations of 0.1 Vol%.

5. Screening Criteria

The lower explosive limit (LEL) for methane is 5 percent (methane by volume in air at standard temperature and pressure). Following the requirements discussed in Title 6, NYCRR Section 360-2.17(f), the concentration of methane at the property boundary of a sanitary landfill is not to exceed the LEL. Therefore, the LEL of 5 percent (methane by volume) was used for the screening criteria for the survey.

6. Field Activities

During September 2020, and May and August 2021, the concentrations of landfill gases were monitored at up to four landfill gas monitoring probes and five groundwater monitoring wells associated with SWMU 1 (Figure 2), with deviations due to field conditions noted in the following subsections. Headspace field screening logs are included in Attachment 1. This section discusses the investigative methods used during this effort.

6.1.1 Well Headspace Differential Pressure Measurements

The first measurement collected from the landfill gas monitoring wells was the pressure differential between the atmosphere and well headspace (differential pressure). Differential pressure measurements were made using an Alnor EBT730 or Infiltec DM1 micromanometer attached to the instrument quick-connect fitting by a short length of low-density polyethylene (LDPE) tubing. Table 1 lists the differential pressure ranges.

6.1.2 Well Headspace Volume Determination

The headspace volume of each landfill gas monitoring point was calculated to determine the volume of gas to purge before recording screening measurements. For the shallow landfill gas monitoring probes (GP-01 to GP-04), the headspace volume was fixed and did not vary between monitoring events; however, the headspace volume of the groundwater monitoring wells fluctuated with changes in groundwater elevations. Table 2 lists the headspace volume calculations and depth-to-water measurements for SWMU 1 groundwater monitoring wells. Figure 3 presents hydrographs of groundwater elevations at the five groundwater monitoring wells, and Table 3 summarizes the well construction information for the SWMU 1 groundwater monitoring wells.

6.1.3 Landfill Gas Measurements

Measurements of carbon monoxide (parts per million [ppm]), carbon dioxide (Vol%), hydrogen sulfide (ppm), the LEL (Vol% calibrated to methane), and methane (Vol%) were made using a Landtec GEM 2000 Plus or GEM 5000 landfill gas meter. The landfill gas meter's sample inlet port was attached to the instrument quick-connect fitting by a short length of vinyl tubing. Gas samples began flowing to the landfill gas meter when the instrument quick-connect fitting was attached to the headspace sampling valve.

In general, the landfill gas probes (GP-01 to GP-04) were purged using the landfill gas meter's internal pump at a rate of approximately 0.5 liter per minute (LPM), and the groundwater monitoring wells (MW-16I, MW-17, MW-18, MW-26, and TW-01) were purged using stand-alone air sampling pumps at a rate of 0.5 to 1.0 LPM (Table 2). Initial measurements from the landfill gas meter were recorded when concentrations stabilized for approximately 1 minute. Next, the landfill gas meter was disconnected, and a MiniRAE 3000 photoionization detector was attached to the well sampling valve by a short length of LDPE tubing to measure total VOC concentrations. Finally, a MultiRAE was attached to the well sampling valve to measure sulfur dioxide concentrations. Table 1 presents the initial landfill gas screening results.

Final measurements of landfill gas concentrations were recorded after approximately one volume of headspace gas was purged from the monitoring locations. Measurements were collected using the same instruments and methods as described above. The final gas concentrations are shown in Table 1. Table 2 contains the headspace purge data.

All instruments were calibrated daily according to the manufacturer's instructions, with calibration information recorded on data sheets.

The following deviations from the landfill gas measurement procedures occurred during the reporting period:

- At GP-03 on May 27, 2021, the landfill gas meter reported a hydrogen sulfide concentration above the instrument's detection limit of 500 ppm. Hydrogen sulfide concentrations above 1 ppm have not been recorded at any landfill gas monitoring locations during the 13 monitoring events since February 2018; therefore, the extremely high concentration was immediately suspect. Condensation and large water droplets were noted in the sample tubing connected to the landfill gas monitoring probe. In addition, the water level in the probe (approximately 5 feet below ground surface) was found to be above the probe's screen interval (5 to 7 feet below ground surface).
- A recalibration of the landfill gas meter for all parameters was attempted following the anomalous measurement; however, recalibration of the hydrogen sulfide sensor failed because the detected concentration for the calibration gas was greater than five times (55 ppm) the actual concentration of hydrogen sulfide (10 ppm). Given these conditions, it is suspected that the high moisture level in GP-03 fouled the hydrogen sulfide sensor. The hydrogen sulfide data for the other locations is not suspect because GP-03 was the last location monitored. A confirmatory landfill gas monitoring event was performed in August 2021; hydrogen sulfide was not detected at GP-03 or any other monitoring locations (Table 1).
- On August 3, 2021, GP-01 and GP-04 could not be accessed because wasp nests were present inside the aboveground well monuments. The well monuments will be sealed during the winter of 2021/2022 when there is no wasp activity.

7. Results and Discussion

Screening of landfill gas concentrations was conducted at up to nine monitoring points associated with SWMU 1 in September 2020, and May and August 2021. Table 1 summarizes the screening data. Methane was detected in headspace samples from eight SWMU 1 monitoring locations (GP-02, GP-03, GP-04, MW-16I, MW-17, MW-18, MW-26, and TW-01) at concentrations up to 4.2 Vol% (MW-17) (Table 1, Figures 4 and 5). The following summarizes methane measurements for the reporting period:

- The screening limit for methane of 5 Vol% (100% of the LEL for methane) was not exceeded at any location during the 2020 and 2021 monitoring events (Table 1).
- The highest concentrations of methane during the reporting period were detected at MW-17. In September 2020 and August 2021, methane was detected at concentrations of 4.2 Vol% (85% of the LEL for methane) and 3.7 Vol% (75% of the LEL for methane), respectively.
- At GP-02, GP-03, GP-04, MW-16I, MW-26, and TW-01, methane was detected at concentrations above the landfill gas meter's detection limit (0.1 Vol%) but less than or equal to 1 Vol%.
- Methane was not detected during the reporting period at GP-01.

Carbon dioxide and oxygen measurements are plotted on Figures 7 and 8, respectively. In general, methane concentrations appear to correlate positively with carbon dioxide concentrations and have an inverse relationship to oxygen concentrations.

Table 1 lists the concentrations of total VOCs, carbon monoxide, and hydrogen sulfide. These gases were not detected at significant levels from the SWMU 1 landfill gas monitoring locations during the reporting period.

Groundwater elevations observed at the SWMU 1 monitoring wells (MW-16I, MW-17, MW-18, MW-26, and TW-01) are plotted along with methane concentrations and well screen intervals on Figure 9. There is no apparent relationship between changes in groundwater elevations and methane concentrations during the reporting period. Except for MW-16I, the observed groundwater elevations were generally within the screened intervals of the monitoring wells, such that a portion of the perforated casing was unsaturated and exposed to formation gases.

Figure 10 shows methane concentrations at SWMU 1 plotted against daily minimum and maximum ambient air temperatures. Ambient air temperature data were collected at the Geneva Research Farm weather station (Global Historical Climatology Network station ID USC00303184) (National Oceanic and Atmospheric Administration 2021) approximately 9 miles west of the site in Geneva, New York. A positive correlation between ambient air temperature and methane concentrations may exist for GP-04 and MW-17. The effects of air temperature on methane concentrations, if any, are less apparent for other locations.

Historically, monitoring wells with the highest observed concentrations of methane (MW-17, TW-01, and to a lesser extent MW-18) are located within the central area of SWMU 1 with known landfill waste. Geologic cross sections show that buried waste horizons intercept the screened intervals of monitoring wells TW-01 and MW-18. Although anthropogenic material is not documented in the MW-17 boring log, but it is surrounded by several borings where waste is described. Therefore, it is probable that MW-17 is either surrounded by or is actually screened in landfill waste.

8. Conclusions

The following conclusions are based on the results of the historical, September 2020, and May and August 2021 monitoring events:

- The presence of methane in SWMU 1 groundwater monitoring wells was not identified before December 2016 so the presence may indicate methane is accumulating beneath the SWMU 1 landfill cap.
- The concentrations of methane at shallow landfill gas monitoring probes (GP-01, GP-02, and GP-03) along the eastern and western boundary of SWMU 1 are below the LEL or below instrument detection limits during the reporting period (Figure 4 and Table 1). Prior detections of methane in these monitoring points were rare and when present ranged from 0.1 to 0.2 percent (Figure 4). Methane at GP-04 (positioned in a potential preferential flow area) has ranged from 0.1 to 2.7 percent but has consistently remained below 5 percent LEL screening criteria.

- Concentrations of methane above 1 Vol% were detected at monitoring locations in the southwestern area of SWMU 1 historically (MW-17, MW-18, and TW-01); no locations exceeded the 5 percent LEL screening criteria in the last three rounds of monitoring.
- Wells MW-16I and MW-26 rarely detect methane and when they do it has ranged from 0.1 to 0.2 percent.
- The highest concentrations of methane appear to be constrained to monitoring wells located in the central area of SWMU 1 where landfill waste material is greatest (Figure 4).
- The nearest potential methane receptors along the western site boundary are occupied structures located west of East Water Street. Based on data collected to date, there appears to be low risk to offsite receptors west of SWMU 1, given that methane concentrations do not exceed screening levels (the 5 percent LEL for methane) along the western landfill boundary.
- No identified potential methane receptors are along the southern landfill boundary. Features present south of SWMU 1 include the canal and unoccupied land owned by HCC. Based on data collected to date, there appears to be low risk to offsite receptors south of SWMU 1.

9. Recommendations

Methane along the western boundary of SWMU 1 is well below the 5 percent LEL screening criteria, (suggesting low risk to occupied offsite buildings), concentrations of methane are stable or declining, and methane generation is expected to decrease with time as is typical for landfills. Based on historical observations and those for 2020 and 2021, no additional monitoring is proposed.

10. References

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Tables

Table 1. Screening Measurements for SWMU 1 Landfill Gas Monitoring Locations
2020 and 2021 SWMU 1 Landfill Gas Monitoring Report
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date	Location	Differential Pressure Range	VOC (ppm)	Methane (%vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulfide (ppm)	Carbon Dioxide (%)	Oxygen (%)
9/18/2020	GP-01	0.004 - 0.015	0.0	0.0	0	0	0	16.1	2.9
	GP-02	-0.007 - 0.009	0.1	0.2	6	0	0	8.7	0.0
	GP-03	-0.141 - -0.223	0.0	0.0	0	0.0	0	15.3	7.5
	GP-04	-0.025 - 0.015	0.1	1.0	20	0	0	13.4	0.0
	MW-16I	-0.008 - 0.209	0.0	0.1	2	0	0	0.3	20.9
	MW-17	-0.015 - 0.210	0.2	4.2	85	0	0	12.0	1.0
	MW-18	-0.012 - -0.009	0.0	0.0	0	0	0	10.9	6.1
	MW-26	-0.005 - 0.109	0.0	0.1	3	0	0	12.8	6.0
	TW-01	-0.201 - 0.001	0.0	0.1	2	0	0	0.6	20.2
5/27/2021	GP-01	-0.008 - -0.005	0.1	0.0	0	1	1	10.8	3.5
	GP-02	-0.008 - -0.006	0.1	0.0	0	0	0	3.7	13.4
	GP-03	1.438 - 1.563	0.0	0.3	6	1	see note a	8.9	5.0
	GP-04	-0.019 - -0.012	0.3	0.0	0	0	0	9.6	0.4
	MW-16I	0.032 - 0.040	0.1	0.0	0	0	0	0.1	20.0
	MW-17	-0.011 - -0.010	0.0	0.0	0	0	0	0.0	20.3
	MW-18	-0.010 - -0.009	0.0	0.0	0	0	0	0.0	20.4
	MW-26	-0.011 - -0.005	0.0	0.0	0	0	0	0.0	20.5
	TW-01	-0.008 - -0.006	0.1	0.0	0	0	0	0.0	20.6
8/3/2021	GP-01	NM[b]							
	GP-02	0.001 - 0.003	0.0	0.0	0	0	0	9.0	0.2
	GP-03	-0.001 - 0.000	0.0	0.0	1.0[c]	0	0	17.1	8.0
	GP-04	NM[b]							
	MW-16I	0.230 - 0.237	0.2	0.1	2	0	0	0.0	19.5
	MW-17	-0.006 - -0.003	0.1	3.7	75	0	0	11.0	0.4
	MW-18	0.008 - 0.010	0.0	0.3	7	0	0	13.1	0.2
	MW-26	-0.008 - -0.004	0.0	0.0	0	0	0	12.1	1.9
	TW-01	-0.004 - -0.002	0.0	0.0	0	0	0	0.1	20.8

[a] Hydrogen sulfide reading was over range (>500 ppm). Suspected sensor fault due to high humidity and water drawn into sample tubing. See report text.

[b] Unable to access location due to wasps nesting in the well monument.

[c] Anomalous LEL measurement where methane percent by volume measurement was zero.

Notes:
> = greater than
% = percent
%vol = percent by volume
LEL = lower explosive limit
NM = not measured
ppm = parts per million
VOC = volatile organic compound

Table 2. Purging Data for SWMU 1 Landfill Gas Measurements
August and November 2019 SWMU 1 Landfill Gas Monitoring Report
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date	Location	Well Screen Interval (feet bgs)	Casing Diameter (inches)	Headspace/ Depth to Water[a] (feet)	Headspace Volume (liters)	Purge Time (minutes)	Purge Rate (mL/min)	Volume Purged (liters)	Purge Method	Notes
				D	*0.17D*	*T*	*R*	*TR*		
9/18/2020	GP-01	5 -7	1	8.3	1.4	3.0	500	1.5	GEM	
	GP-02			7.0	1.2	5.0	500	2.5	GEM	
	GP-03			7.0	1.2	5.0	500	2.5	GEM	
	GP-04			8.3	1.4	3.0	500	1.5	GEM	
	MW-16I	30.5 - 35.5	2	26.20	17.3	18.0	1000	18.0	SKC	Pump stopped due to high vacuum after 18 minutes
	MW-17	15.6 - 25.6		22.62	14.9	15.0	1000	15.0	SKC	
	MW-18	6.1 - 12.1		12.69	8.4	9.0	1000	9.0	SKC	
	MW-26	4.2 - 14.2		12.42	8.2	9.0	1000	9.0	SKC	
	TW-01	9.4 - 19.9		17.80	11.7	12.0	1000	12.0	SKC	
5/27/2021	GP-01	5 -7	1	8.3	1.4	5.0	500	2.5	SKC	
	GP-02			7.0	1.2	7.0	500	3.5	GEM	
	GP-03			7.0	1.2	6.0	500	3.0	GEM	
	GP-04			8.3	1.4	5.0	500	2.5	SKC	
	MW-16I	30.5 - 35.5	2	26.63	17.6	25.0	500	12.5	SKC	Pump stopped due to high vacuum after 25 minutes
	MW-17	15.6 - 25.6		22.79	15.0	30.0	500	15.0	SKC	
	MW-18	6.1 - 12.1		12.47	8.2	15.0	500	7.5	SKC	
	MW-26	4.2 - 14.2		12.39	8.2	16.0	500	8.0	SKC	
	TW-01	9.4 - 19.9		12.92	8.5	18.0	500	9.0	SKC	
8/3/2021	GP-01	5 -7	1	8.3	1.4	note b	500	--	SKC	
	GP-02			7.0	1.2	5.0	500	2.5	GEM	
	GP-03			7.0	1.2	4.0	500	2.0	GEM	
	GP-04			8.3	1.4	note b	500	--	SKC	
	MW-16I	30.5 - 35.5	2	23.46	15.5	34.0	500	17.0	SKC	
	MW-17	15.6 - 25.6		20.75	13.7	28.0	500	14.0	SKC	
	MW-18	6.1 - 12.1		11.86	7.8	16.0	500	8.0	SKC	
	MW-26	4.2 - 14.2		9.77	6.4	13.0	500	6.5	SKC	
	TW-01	9.4 - 19.9		16.23	10.7	20.0	500	10.0	SKC	

[a] Unable to access location due to wasps nesting in the well monument.
[b] For monitoring well locations, the headspace length measurement is the unwetted well volume (i.e., the depth to water from the top of casing).
Notes:
For landfill gas probe locations, the headspace length measurement is equal to the total well length.
"--" = not measured or not applicable
bgs = below ground surface
ft bgs = feet below ground level
GEM = GEM2000+ or GEM5000 landfill gas monitoring instrument
mL/min = milliliters per minute
SKC = SKC air sampling pump or equivalent

Table 3. SWMU 1 Monitoring Well Construction Data

August and November 2019 SWMU 1 Landfill Gas Monitoring Report

Former Hampshire Chemical Corp. Facility, Waterloo, New York

Location	**Well Diameter** (inches)	**Well Material**	**Ground Elevation** (feet amsl)	**Top of Casing Elevation** (feet amsl)	**Total Well Depth** (feet bgs)	**Screen Slot** (inches)	**Screen Interval** (feet bgs)	**Screen Interval** (feet amsl)
MW-16I	2	Schedule 40 PVC	454.27	455.99	35.53	0.01	30.5 - 35.5	423.7 - 418.7
MW-17	2	Schedule 40 PVC	449.92	452.13	14.50	0.01	15.3 - 25.3	434.6 - 424.6
MW-18	2	Schedule 40 PVC	440.04	442.07	12.32	0.01	6.3 - 12.3	433.7 - 427.7
MW-26	2	Schedule 40 PVC	439.29	441.76	16.00	0.01	7.5 - 17.5	431.8 - 421.8
TW-01	2	Schedule 40 PVC	447.33	449.01	17.50	0.01	10.3 - 20.8	437.0 - 426.5

Notes:

amsl = above mean sea level

bgs = below ground surface

PVC = polyvinyl chloride

Figures

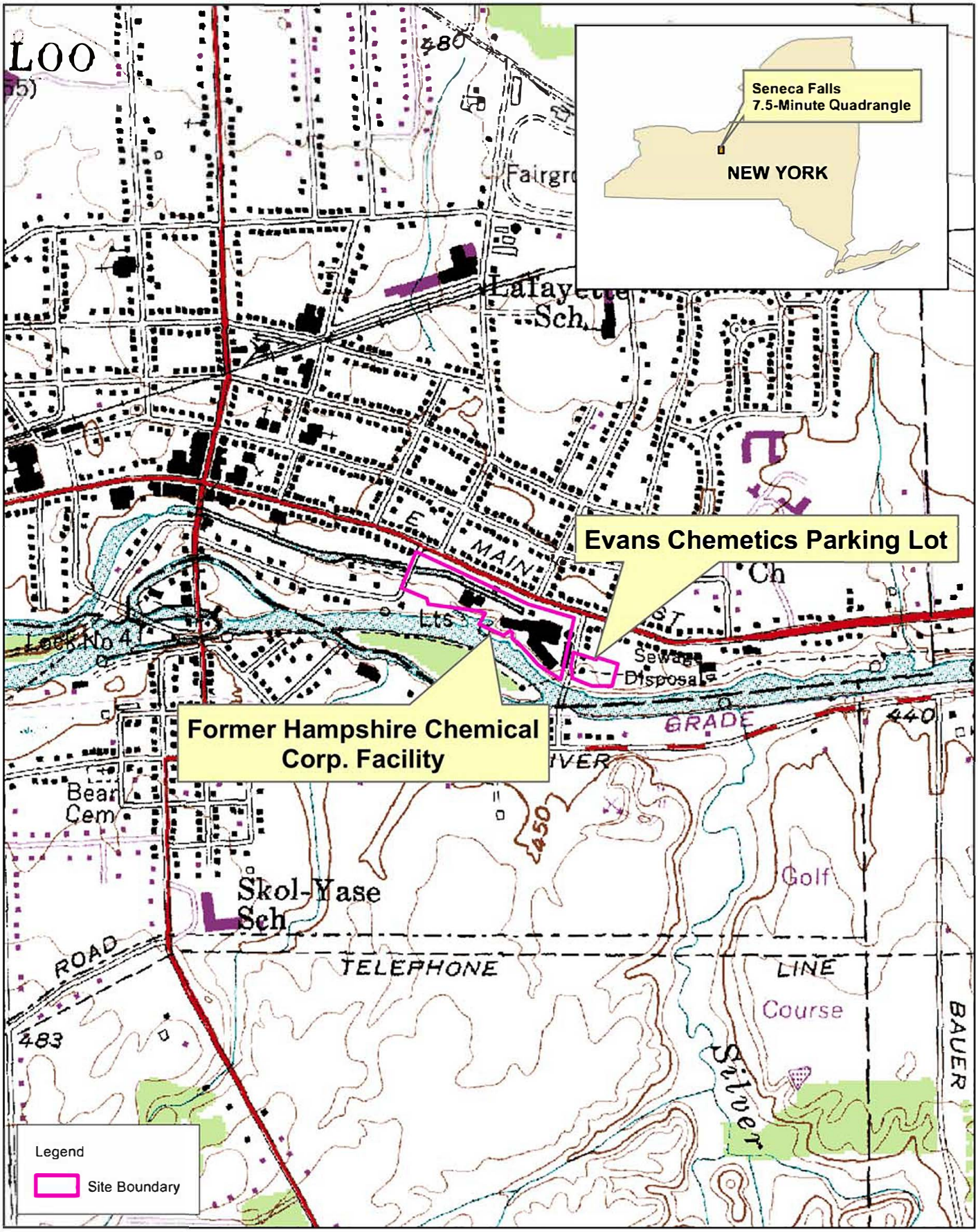

Figure 1. Site Location
Former Hampshire Chemical Corp. Facility, Waterloo, NY

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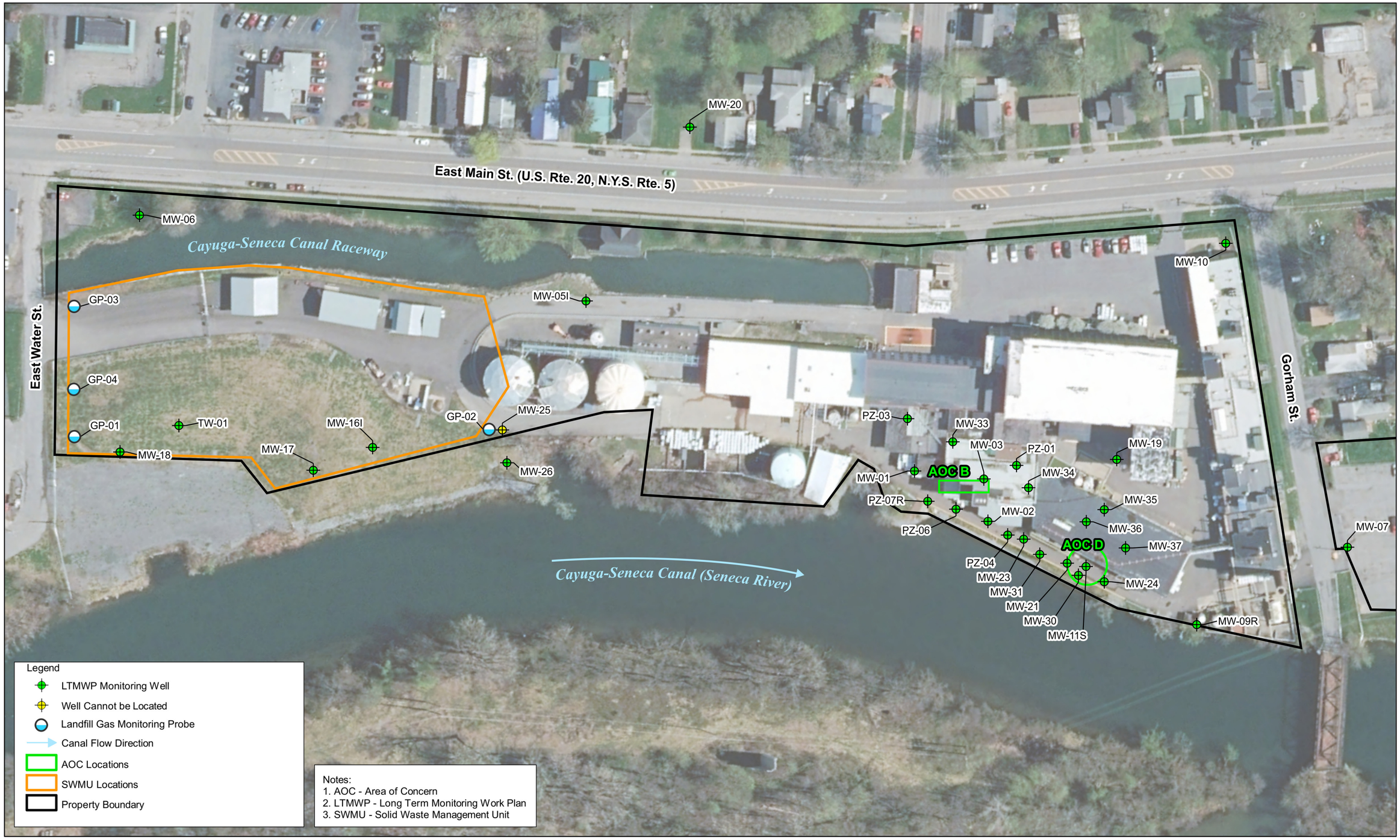

FIGURE 2
Site Layout Map
SWMU 1 Landfill Gas Monitoring Report
Former Hampshire Chemical Corporation
Waterloo, New York

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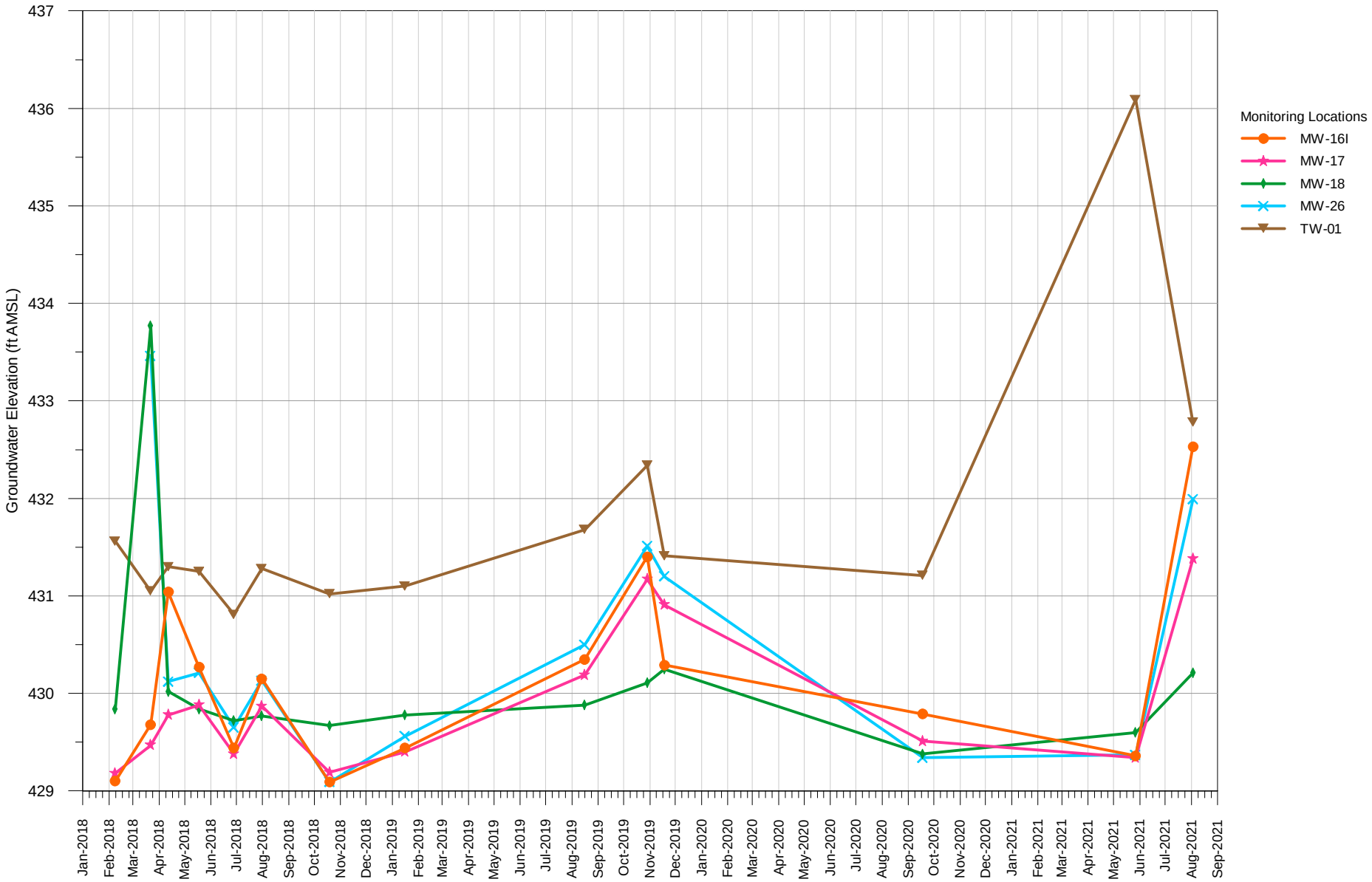

Notes
1) ft AMSL - feet above mean sea level
2) SWMU - solid waste management unit

Figure 3
Groundwater Elevations at SWMU 1 Monitoring Wells
Former Hampshire Chemical Corp. Facility
Waterloo, New York

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East Water Street

Cayuga-Seneca Canal Raceway

SWMU 1 Landfill

Cayuga-Seneca Canal

GP-03	CH_4 (%)
2/8/2018	0.0
3/22/2018	--
4/12/2018	--
5/18/2018	0.0
6/28/2018	0.0
7/31/2018	0.0
10/19/2018	0.0
1/16/2019	--
8/16/2019	0.0
11/18/2019	0.0
9/18/2020	0.0
5/27/2021	0.3
8/3/2021	0.0

GP-04	CH_4 (%)
2/8/2018	0.4
3/22/2018	0.9
4/12/2018	1.3
5/18/2018	1.2
6/28/2018	1.3
7/31/2018	2.2
10/19/2018	2.2
1/16/2019	0.1
8/16/2019	2.7
11/18/2019	0.2
9/18/2020	1.0
5/27/2021	0.0
8/3/2021	--

GP-02	CH_4 (%)
2/8/2018	0.0
3/22/2018	0.0
4/12/2018	0.0
5/18/2018	0.0
6/28/2018	0.0
7/31/2018	0.0
10/19/2018	0.0
1/16/2019	0.1
8/16/2019	0.0
11/18/2019	0.0
9/18/2020	0.2
5/27/2021	0.0
8/3/2021	0.0

GP-01	CH_4 (%)
2/8/2018	0.1
3/22/2018	0.0
4/12/2018	0.1
5/18/2018	0.0
6/28/2018	0.0
7/31/2018	0.2
10/19/2018	0.0
1/16/2019	0.1
8/16/2019	0.0
11/18/2019	0.0
9/18/2020	0.0
5/27/2021	0.0
8/3/2021	--

MW-18	CH_4 (%)
2/8/2018	0.0
3/22/2018	0.4
4/12/2018	3.1
5/18/2018	1.3
6/28/2018	0.3
7/31/2018	1.0
10/19/2018	2.2
1/16/2019	1.7
8/16/2019	0.0
11/18/2019	0.5
9/18/2020	0.0
5/27/2021	0.0
8/3/2021	0.3

TW-01	CH_4 (%)
2/8/2018	**6.0**
3/22/2018	**6.7**
4/12/2018	0.1
5/18/2018	0.3
6/28/2018	**8.0**
7/31/2018	0.0
10/19/2018	**8.6**
1/16/2019	**11.9**
8/16/2019	0.0
11/18/2019	0.9
9/18/2020	0.1
5/27/2021	0.0
8/3/2021	0.0

MW-17	CH_4 (%)
2/8/2018	2.3
3/22/2018	3.4
4/12/2018	4.1
5/18/2018	4.8
6/28/2018	**5.7**
7/31/2018	**7.3**
10/19/2018	**8.4**
1/16/2019	**5.0**
8/16/2019	**5.1**
11/18/2019	**5.5**
9/18/2020	4.2
5/27/2021	0.0
8/3/2021	3.7

MW-16I	CH_4 (%)
2/8/2018	0.1
3/22/2018	0.0
4/12/2018	0.1
5/18/2018	0.0
6/28/2018	0.0
7/31/2018	0.0
10/19/2018	0.0
1/16/2019	0.2
8/16/2019	0.0
11/18/2019	0.0
9/18/2020	0.1
5/27/2021	0.0
8/3/2021	0.1

MW-26	CH_4 (%)
2/8/2018	--
3/22/2018	0.0
4/12/2018	0.0
5/18/2018	0.0
6/28/2018	0.0
7/31/2018	0.0
10/19/2018	0.0
1/16/2019	0.1
8/16/2019	0.0
11/18/2019	0.0
9/18/2020	0.1
5/27/2021	0.0
8/3/2021	0.0

N

0 100
Feet

Legend

- LTMWP monitoring well
- Landfill gas monitoring probe
- SWMU 1 boundary

Notes:
1) CH_4 (%) - percent of methane by volume
2) LEL - lower explosive limit
3) LTMWP - long-term monitoring work plan
4) SWMU - solid waste management unit
5) Results are bold where methane concentrations are greater than or equal to the lower explosive limit (5% by volume).

FIGURE 4
Methane Screening Results
September 2020 to August 2021 SWMU 1 Landfill Gas Monitoring Report
Former Hampshire Chemical Corporation
Waterloo, New York

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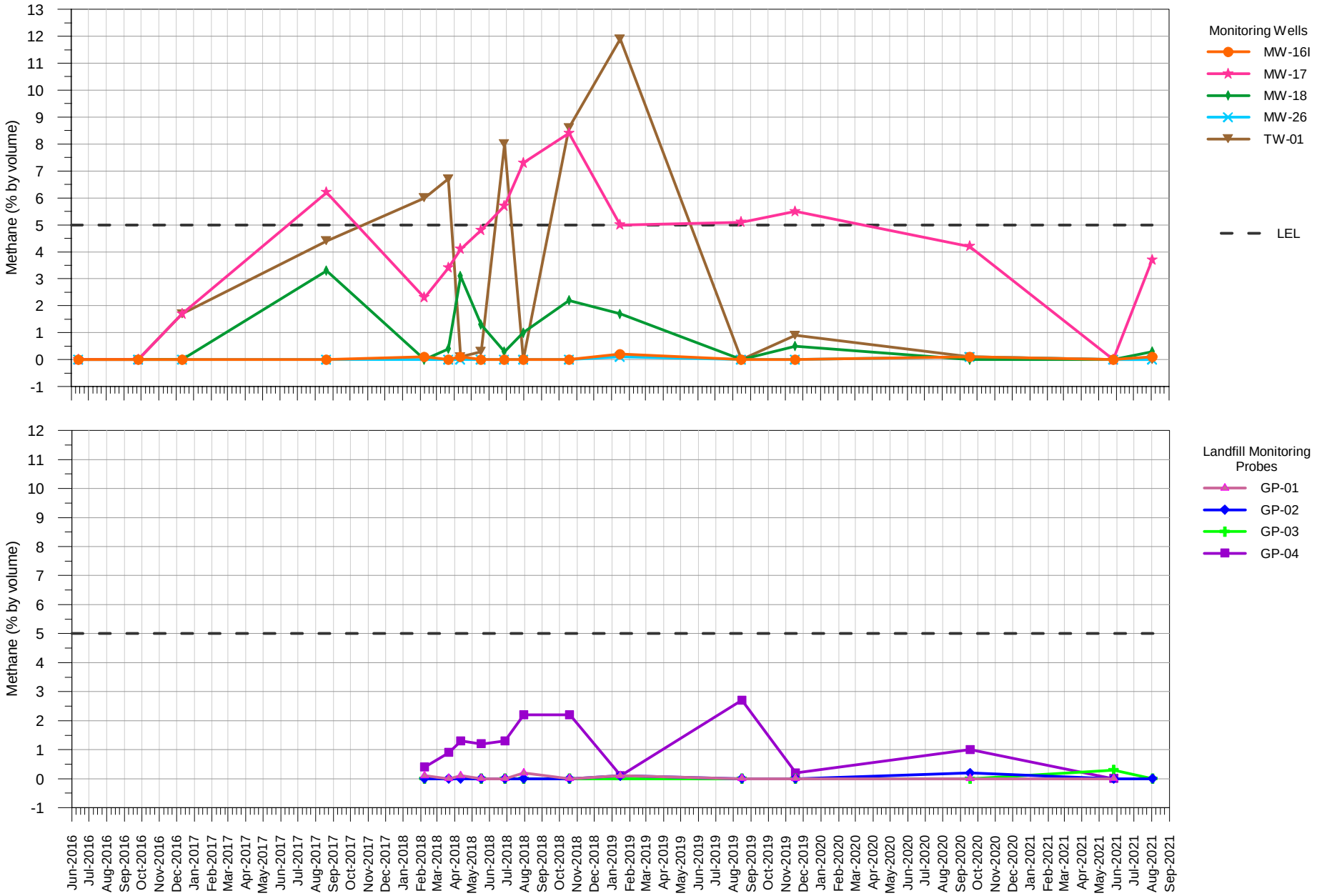

Notes
1) LEL - lower explosive limit
2) SWMU - solid waste management unit

Figure 5
Methane Concentrations at SWMU 1 Landfill Gas Monitoring Points
Former Hampshire Chemical Corp. Facility
Waterloo, New York

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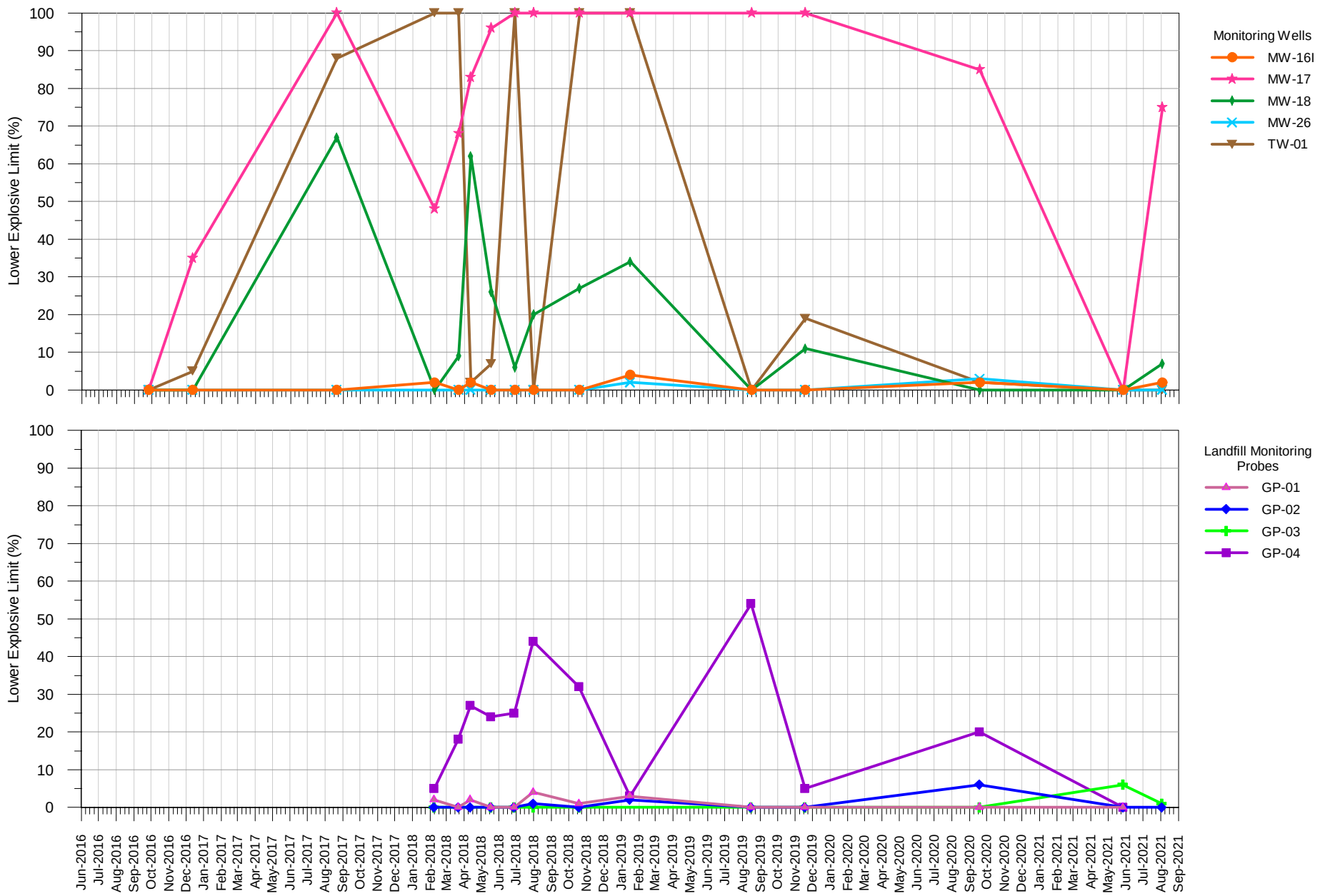

Notes
1) SWMU - solid waste management unit
2) LEL - lower explosive limit
3) Measurements greater than 100% of the LEL plotted as 100%

Figure 6
LEL Measurements at SWMU 1 Landfill Gas Monitoring Points
Former Hampshire Chemical Corp. Facility
Waterloo, New York

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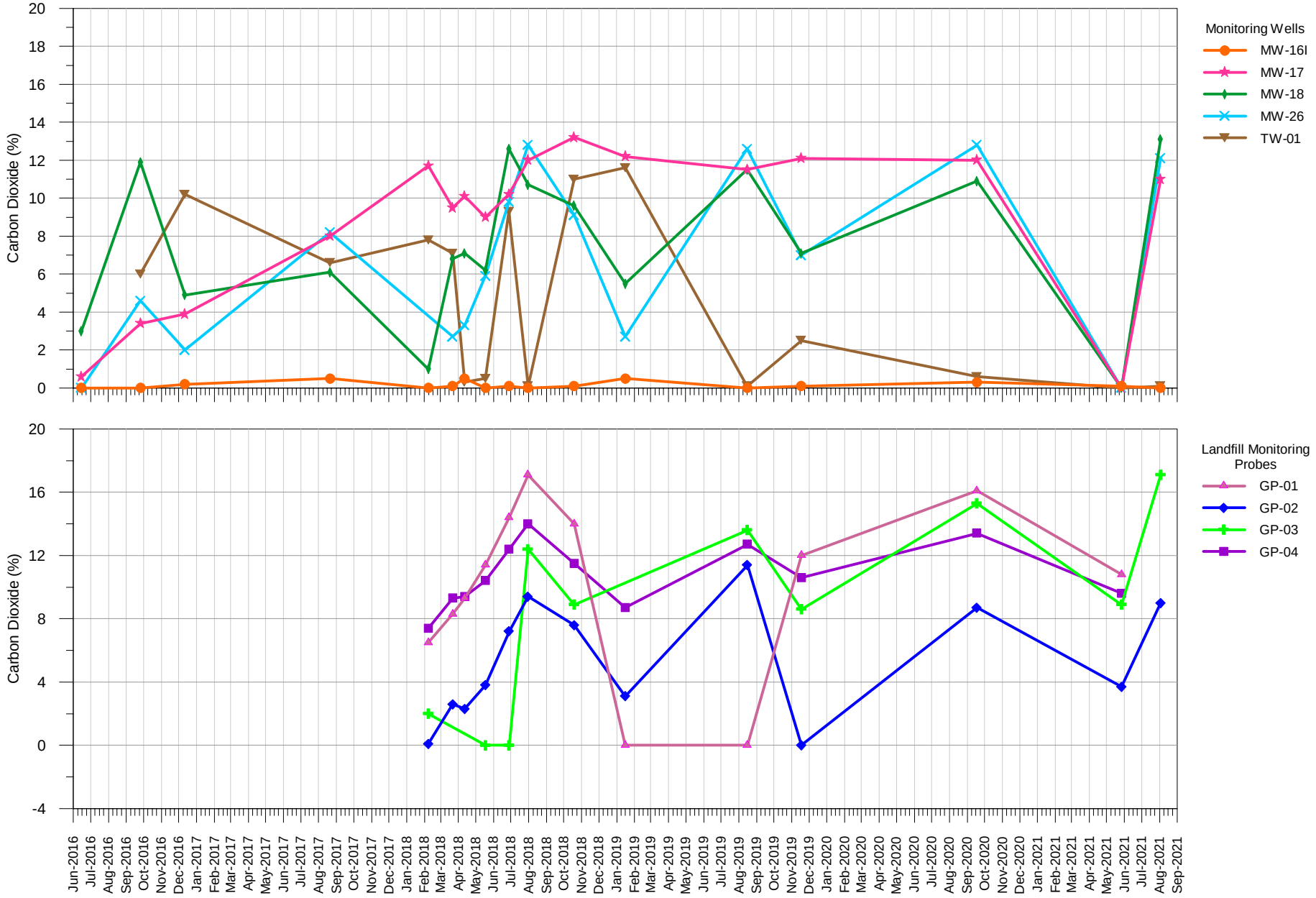

Notes
1) SWMU - solid waste management unit

Figure 7
Carbon Dioxide Concentrations at SWMU 1 Landfill Gas Monitoring Points
Former Hampshire Chemical Corp. Facility
Waterloo, New York

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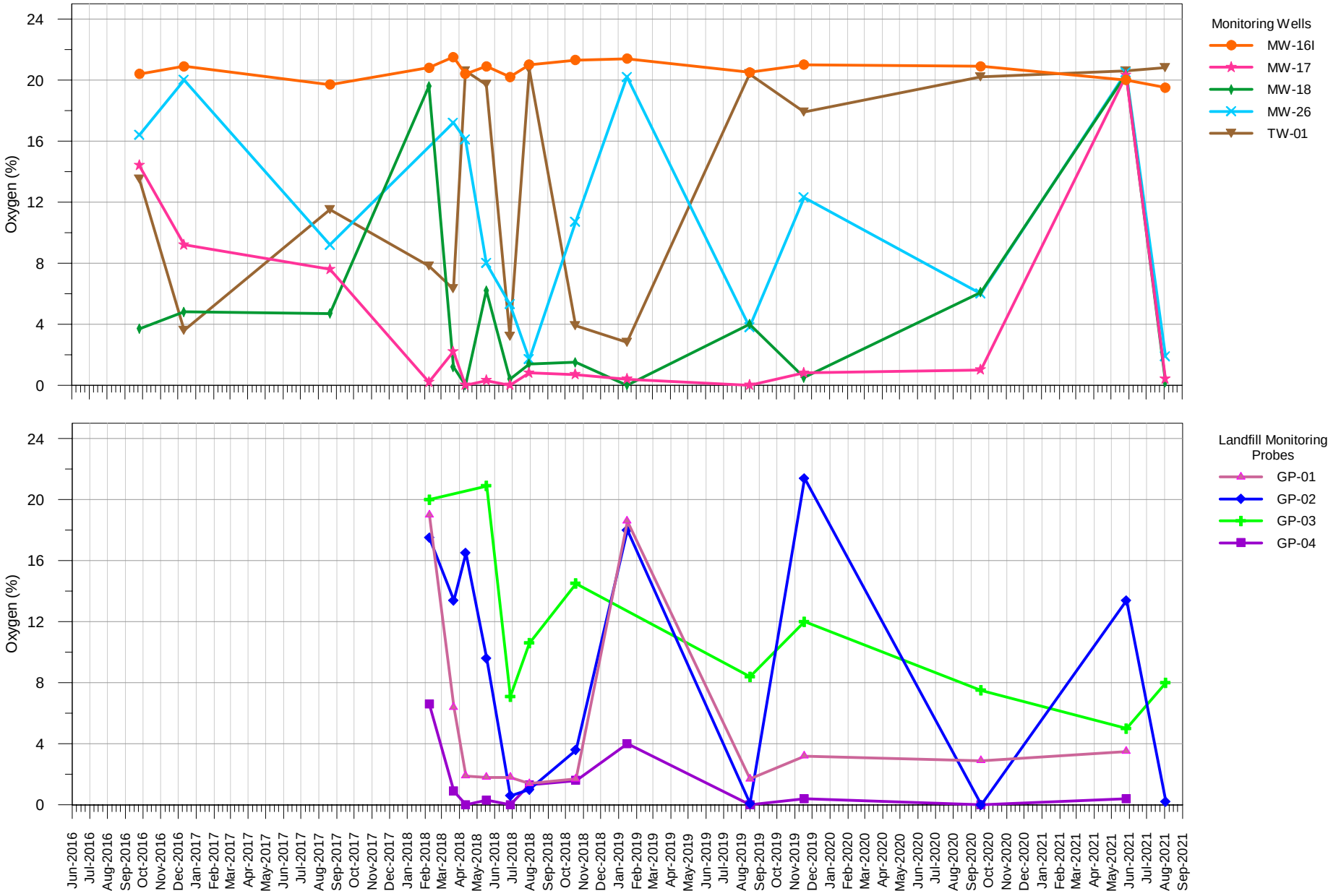

Notes
1) SWMU - solid waste management unit

Figure 8
Oxygen Concentrations at SWMU 1 Landfill Gas Monitoring Points
Former Hampshire Chemical Corp. Facility
Waterloo, New York

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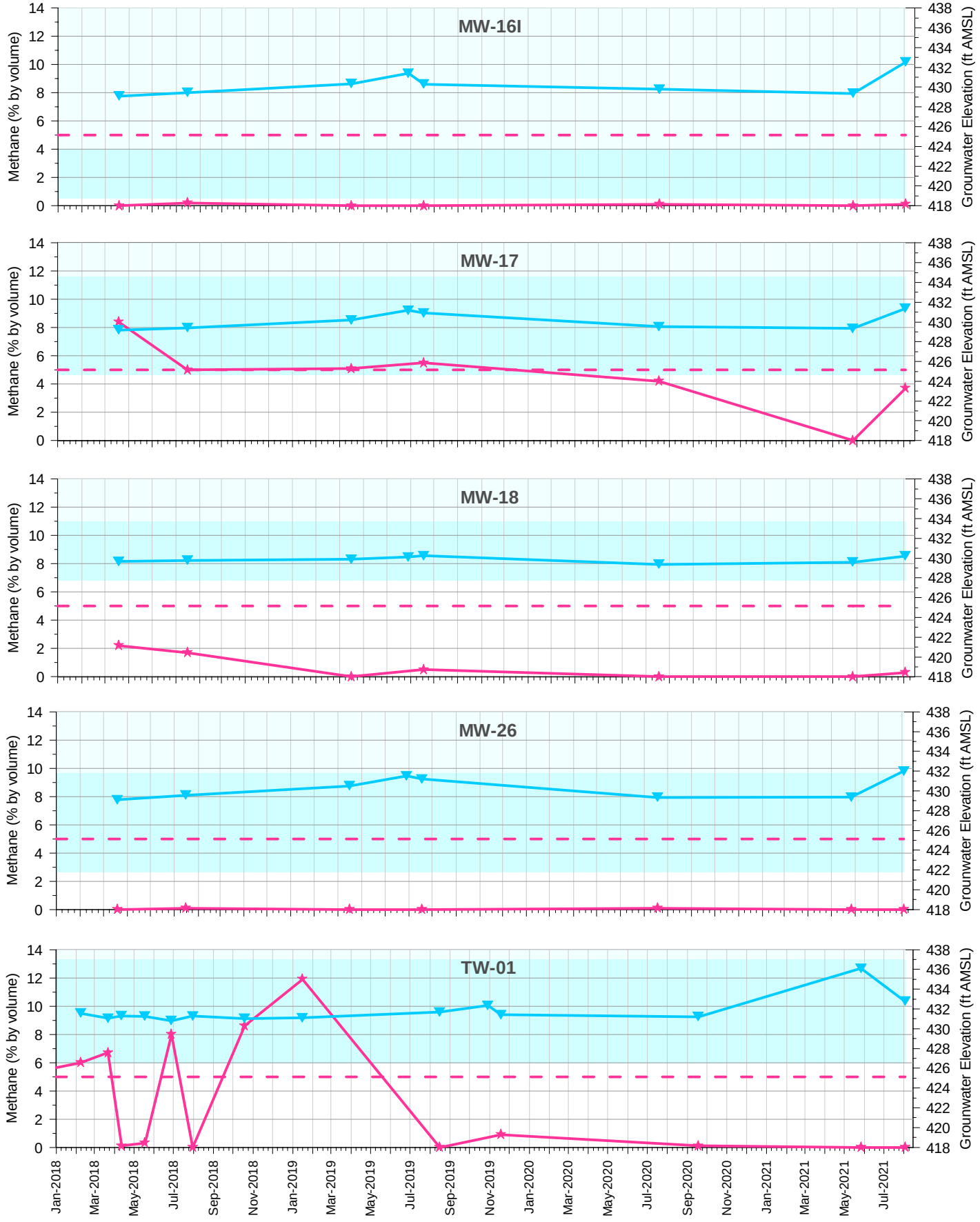

Legend

- Groundwater Elevation
- LEL
- Methane
- Well Screen Interval

Notes

1) LEL - lower explosive limit
2) SWMU - solid waste management unit
3) ft AMSL - feet above mean sea level

Figure 9
Methane Concentrations and Groundwater Elevations at SWMU 1 Groundwater Monitoring Wells
Former Hampshire Chemical Corp. Facility
Waterloo, New York

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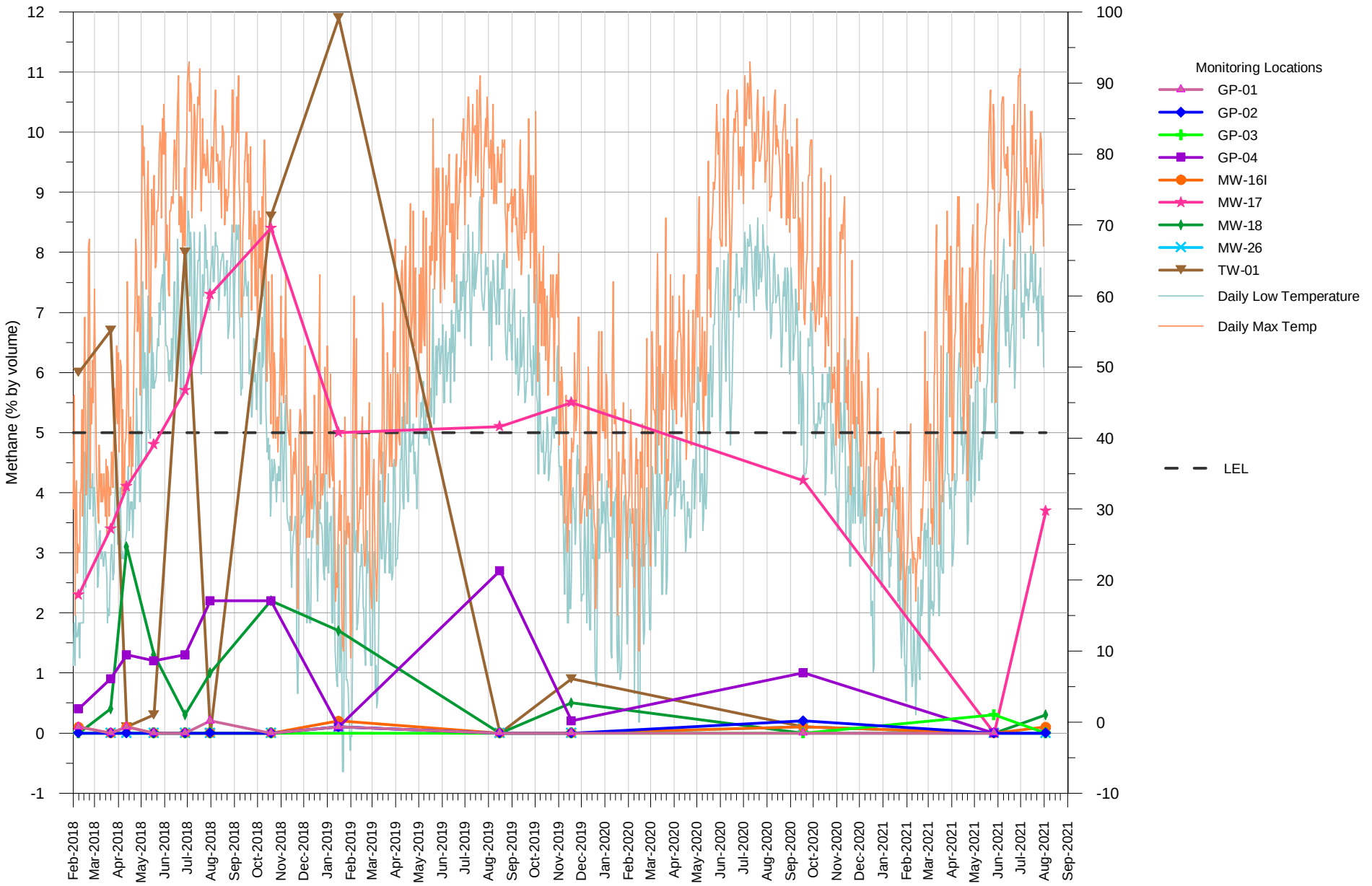

Notes
1) LEL - lower explosive limit
2) SWMU - solid waste management unit
3) Air temperature data was collected at the Geneva Research Farm weather station (Global Historical Climatology Network station ID USC00303184)

Figure 10
Methane Concentrations and Daily Temperatures at SWMU 1 Landfill Gas Monitoring Points
Former Hampshire Chemical Corp. Facility
Waterloo, New York

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Attachment 1
Wellhead Screening Logs

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SWMU 1 Landfill Gas Monitoring, August/September 2020
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date: 9/18/20
Project #: WAT006Dw

GP-01

	❶ Field Pressure Data		Probe Information		Purge Vol.	❸ Field Purge Data			Notes
	Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Probe Length (feet)	Volume (liters) = 0.17 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
Hi	+0.015								
Lo	+0.004		5 - 7	8.30	1.4	3	500	1.5	

	Gas Concentration Field Measurements								
	VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
❷ Initial	0	0.0	0	~~0~~	0	15.8	3.0	–	
❹ Stable	0	0.0	0	0	0	16.1	2.9	–	

GP-02

	❶ Field Pressure Data		Probe Information		Purge Vol.	❸ Field Purge Data			Notes
	Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Probe Length (feet)	Volume (liters) = 0.17 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
Hi	~~+0.009~~ ~~+0.025~~								
Lo	~~-0.015~~ ~~-0.007~~		5 - 7	7.00	1.2	~~5~~	500	2.5	

	Gas Concentration Field Measurements								
	VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
❷ Initial	0.1	0.2	5	0	0	8.8	0.0	–	
❹ Stable	0.1	0.2	6	0	0	8.7	0.0	–	

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SWMU 1 Landfill Gas Monitoring, August/September 2020
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date:
Project #: WAT006Dw

GP-03 (OUTSIDE)

❶ Field Pressure Data		Probe Information		Purge Vol.	❸ Field Purge Data			Notes
Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Probe Length (feet)	Volume (liters) = 0.17 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
Hi	-0.223							
Lo	-0.141	5 - 7	7.00	1.2	5	500	2.5	

Gas Concentration Field Measurements

	VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)
❷ Initial	0.0	0	0	0	0.0	15.3	5.5	-
❹ Stable	0.0	0	0	0	0	15.3	7.5	-

GP-04

❶ Field Pressure Data		Probe Information		Purge Vol.	❸ Field Purge Data			Notes
Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Probe Length (feet)	Volume (liters) = 0.17 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
Hi	+0.015							
Lo	-0.025	5 - 7	8.60	1.5	3	500	3	

Gas Concentration Field Measurements

	VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)
❷ Initial	0.1	1.3	26	0	0	13.0	0.3	-
❹ Stable	0.1	1.0	20	0	0	13.4	0.0	-

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SWMU 1 Landfill Gas Monitoring, August/September 2020
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date: 9/18/20
Project #: WAT006Dw

MW-16I

❶ Field Pressure Data		❸ Probe Information		❹ Purge Vol.	❺ Field Purge Data			Notes
Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = 8:43 Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
Hi	+0.209							
Lo	-0.008	30.5 - 35.5	26.20	17.3	18	100	18	

Gas Concentration Field Measurements

	VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
❷ Initial	0.0	0.1	3	0	0	0.2	19.8	-	AFTER 18 MINS, WELL
❻ Stable	0.0	0.1	2	0	0	0.3	20.9	-	HAD AUDIBLE VACUUM WHEN DISCONNECTING TUBING

MW-17

❶ Field Pressure Data		❸ Probe Information		❹ Purge Vol.	❺ Field Purge Data			Notes
Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = 8:28 Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
Hi	+0.210							
Lo	-0.015	15.6 - 25.6	22.62	14.93	15	1000	18	

Gas Concentration Field Measurements

	VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
❷ Initial	0.2	3.5	70	0	0	9.7	5.4	-	
❻ Stable	0.2	4.2	85	0	0	12.0	1.0	-	

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SWMU 1 Landfill Gas Monitoring, August/September 2020
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date:
Project #: WAT006Dw

		❶ Field Pressure Data		❸ Probe Information		❹ Purge Vol.	❺ Field Purge Data			Notes
		Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
MW-18	Hi	-0.009								
	Lo	-0.012		6.1 - 12.1	12.09	8.38	9	1000	10	
		Gas Concentration Field Measurements								
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
❷	Initial	0.0	0	0	0	0	7.5	10.0	-	
❻	Stable	0.0	0	0	0	0	10.9	6.1	-	

		❶ Field Pressure Data		❸ Probe Information		❹ Purge Vol.	❺ Field Purge Data			Notes
		Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
MW-26	Hi	+0.109								
	Lo	-0.005		4.2 - 14.2	12.42	8.19	9	1000	11	
		Gas Concentration Field Measurements								
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
❷	Initial	0.0	0.1	2	0	0	6.8	12.7	-	
❻	Stable	0.0	0.1	3	0	0	12.8	6.0	-	

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SWMU 1 Landfill Gas Monitoring, August/September 2020
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date: 9/18/20
Project #: WAT006Dw

		❶ Field Pressure Data	❸ Probe Information		❹ Purge Vol.	❺ Field Purge Data			Notes
		Diff. Pressure (inch WC)	Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
TW-01	Hi	0.001							
	Lo	-0.201	9.4 - 19.9	17.80	11.75	12	1000	12	

		Gas Concentration Field Measurements								
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
❷	Initial	0.0	0.3	7	0	0	0.9	20	–	
❻	Stable	0.0	0.1	2	0	0	0.6	20.2	–	

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SWMU 1 Landfill Gas Monitoring, May 2021
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date: 5/27/2024
Project #: WATOIIDW

		① Field Pressure Data		Probe Information		Purge Vol.	③ Field Purge Data			Notes
		Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Probe Length (feet)	Volume (liters) = 0.17 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
GP-01 near gate	Hi	-0.0005								
	Lo	-0.006		5 - 7	8.30	1.4	5	500	2.5	
		Gas Concentration Field Measurements								
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
②	Initial	0.1	0.0		1	1	10.6	4.0	NM	
④	Stable	0.1	0.0		1	1	10.8	3.5	NM	

		① Field Pressure Data		Probe Information		Purge Vol.	③ Field Purge Data			Notes
		Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Probe Length (feet)	Volume (liters) = 0.17 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
GP-02 GWTP tanks	Hi	-0.008								
	Lo	-0.006		5 - 7	7.00	1.2	~~7~~	500	3.5	
		Gas Concentration Field Measurements								
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
②	Initial	0.2	0		0	1	4.4	12.3	NM	
④	Stable	0.1	0		0	0	~~20.4~~ 3.7	~~20.3~~ 13.4	NM	

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SWMU 1 Landfill Gas Monitoring, May 2021
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date: 5/27/21
Project #: WATOII DW

		① Field Pressure Data		Probe Information		Purge Vol.	③ Field Purge Data			Notes
		Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Probe Length (feet)	Volume (liters) = 0.17 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	Moisture droplets in suction tube noted
GP-03 Raceway	HI	1.563								
	LO	1.438		5 - 7	7.00	1.2	6	500	3	Water level at 4.47 btoc
		Gas Concentration Field Measurements								
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	*checked water level then recheck gas concentrations.
②	Initial	ϕ	ϕ	ϕ	ϕ	ϕ	3.4	17.1	NM	
④	Stable	ϕ	ϕ0.3	6	ϕ	ϕ	~~2.9~~	~~17.~~	NM	Confirmed high concentrations noted H_2S odor. Condensation tube
					1	OR*	8.9	5.00	NM	

		① Field Pressure Data		Probe Information		Purge Vol.	③ Field Purge Data			Notes
		Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Probe Length (feet)	Volume (liters) = 0.17 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	See notes at end
GP-04 NE fence corner	HI	-0.012								
	LO	-0.019		5 - 7	8.60	1.5	5	500	2.5	
		Gas Concentration Field Measurements								
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
②	Initial	0.4	ϕ.ϕ	ϕ	ϕ	ϕ	9.2	ϕ.8	NM	
④	Stable	0.3	ϕ	ϕ	ϕ	ϕ	9.6	ϕ.4	NM	

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SWMU 1 Landfill Gas Monitoring, May 2021
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date: 5/27/2021
Project #: WAT011DW

		1 Field Pressure Data		3 Probe Information		4 Purge Vol.	5 Field Purge Data			Notes
		Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	Pump vacuum error after 25 minutes
MW-16I	Hi	~~-2.56~~	0.040							
	Lo	~~-2.98~~	0.032	30.5 - 35.5	26.63	17.6	25	500	12.5	

		Gas Concentration Field Measurements							
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)
2	Initial	0.1	0.1	2	0	1	0.6	20.0	NM
6	Stable	0.1	0.0	ϕ	0	0	0.1	20.0	NM

		1 Field Pressure Data		3 Probe Information		4 Purge Vol.	5 Field Purge Data			Notes
		Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
MW-17	Hi	- 0.011								
	Lo	-0.010		15.6 - 25.6	22.79	15.04	30	500	15	

		Gas Concentration Field Measurements							
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)
2	Initial	ϕ	1.6	32	1	ϕ	6.7	3.2	NM
6	Stable	ϕ	ϕ	ϕ	ϕ	ϕ	ϕ	20.3	NM

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SWMU 1 Landfill Gas Monitoring, May 2021
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date: 5/27/2021
Project #: WAT011DW

MW-18

① Field Pressure Data		③ Probe Information		④ Purge Vol.	⑤ Field Purge Data			Notes
	Diff. Pressure (inch WC)	Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
Hi	-0.00							
Lo	-0.009	6.1 - 12.1	12.47	8.2	15	500	7.5	

Gas Concentration Field Measurements

	VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
② Initial	0.1	∅	∅	∅	∅	7.7	6.8	NM	
⑥ Stable	0	∅	∅	∅	∅	∅	20.4	NM	

MW-26

① Field Pressure Data		③ Probe Information		④ Purge Vol.	⑤ Field Purge Data			Notes
	Diff. Pressure (inch WC)	Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
Hi	-0.005							
Lo	-0.011	4.2 - 14.2	12.39	~~10~~8.2	16	500	8	

Gas Concentration Field Measurements

	VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
② Initial	0.1	0.0	∅	∅	∅	6.3	9.3	NM	
⑥ Stable	∅	∅	∅	∅	∅	∅	20.5	NM	

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Date: 5/27/21
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		① Field Pressure Data	③ Probe Information		④ Purge Vol.	⑤ Field Purge Data			Notes
		Diff. Pressure (inch WC)	Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
TW-01	Hi	-0.006							
	Lo	-0.008	9.4 - 19.9	12.92	8.5	18	500	9	
		Gas Concentration Field Measurements							
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)
②	Initial	0.2	Ø	Ø	Ø	Ø	1.3	18.9	NM
⑤	Stable	0.1	Ø	Ø	Ø	Ø	Ø	20.6	NM

After high H_2S at GP03 rechecked against cal gases. GP-03 was final location visited.

Cal Gas #1

CO (50ppm) = 51
H_2S (10ppm) = 55
CH_4 (2.5%) = 2.3
O_2 (18%) = 17.8

Cal Gas #2

CO_2 (35%) = 46.7
CH_4 (50%) = 33.8

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SWMU 1 Landfill Gas Monitoring, August 2021
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date: 8/3/21
Project #: WAT011DW

		① Field Pressure Data	Probe Information		Purge Vol.	③ Field Purge Data			Notes
		Diff. Pressure (inch WC)	Screen Interval (ft bgs)	D = Probe Length (feet)	Volume (liters) = 0.17 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
GP-01	Hi								SW corner
	Lo		5 - 7	8.30	1.4				Unable to access well. Steel monument is full of yellow jackets

		Gas Concentration Field Measurements							
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)
②	Initial								
④	Stable								

		① Field Pressure Data	Probe Information		Purge Vol.	③ Field Purge Data			Notes
		Diff. Pressure (inch WC)	Screen Interval (ft bgs)	D = Probe Length (feet)	Volume (liters) = 0.17 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	
GP-02	Hi	+0.003							SE corner
	Lo	+0.001	5 - 7	7.00	1.2	5	500	2.5	Purge start 13:53 Purge stop 13:58

		Gas Concentration Field Measurements							
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)
②	Initial	0	0.0	0	0	0	9.0	0.4	—
④	Stable	0	0.0	0	0	0	9.0	0.2	—

Box full of ants

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SWMU 1 Landfill Gas Monitoring, August 2021
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date: 8/3/21
Project #: WAT011DW

		① Field Pressure Data		Probe Information		Purge Vol.	③ Field Purge Data			Notes
		Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Probe Length (feet)	Volume (liters) = 0.17 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	Water Street
GP-03	Hi	-0.001								Purge Start 1429
	Lo	0.000		5 - 7	7.00	1.2	4	500	2	Purge Stop 1431
		Gas Concentration Field Measurements								
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	LEL reads 1% at 0.0% vol
②	Initial	ϕ	0.0	1	ϕ	ϕ	17.4	7.5	-	
④	Stable	ϕ	ϕ.ϕ	1	ϕ	ϕ	17.1	8.0	-	

		① Field Pressure Data		Probe Information		Purge Vol.	③ Field Purge Data			Notes
		Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Probe Length (feet)	Volume (liters) = 0.17 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	NW corner
GP-04	Hi									Unable to access well. Steel
	Lo			5 - 7	8.60	1.5				monument is full of yellow
		Gas Concentration Field Measurements								jackets.
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
②	Initial									
④	Stable									

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Date: 8/3/21
Project #: WAT011DW

	① Field Pressure Data		③ Probe Information		④ Purge Vol.	⑤ Field Purge Data			Notes
	Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	purge start 1303
MW17 ~~MW-16I~~	Hi -0.003								purge stop 1333
	Lo -0.006		30.5 - 35.5	20.75	13.7	28	500	14	
	Gas Concentration Field Measurements								
	VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
② Initial	0.0	3.6	72	0	0	10.9	0.2	–	
⑥ Stable	0.1	3.7	75	0	0	11.0	0.4	–	

	① Field Pressure Data		③ Probe Information		④ Purge Vol.	⑤ Field Purge Data			Notes
	Diff. Pressure (inch WC)		Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	Purge start @ ~~1334~~ 1330
MW16I ~~MW-17~~	Hi 0.237								Purge stop 1404
	Lo 0.230		15.6 - 25.6	23.46	15.5	34	500	17	
	Gas Concentration Field Measurements								
	VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
② Initial	0.1	0.0	0	0	0	0.4	19.1	–	
⑥ Stable	0.2	0.1	2	0	0	0.0	19.5	–	

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SWMU 1 Landfill Gas Monitoring, August 2021
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date: 8/3/21
Project #: WAT011DW

		① Field Pressure Data	③ Probe Information		④ Purge Vol.	⑤ Field Purge Data			Notes
		Diff. Pressure (inch WC)	Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	start purge 1244
MW-18	Hi	0.010							stop purge 1300
	Lo	0.008	6.1 - 12.1	11.86	7.8	16	500	8	

		Gas Concentration Field Measurements								
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
②	Initial	Ø.1	Ø.1	2	Ø	Ø	12.7	Ø.9	-	
⑥	Stable	Ø.Ø	Ø.3	7	Ø	Ø	13.1	Ø.2	-	

		① Field Pressure Data	③ Probe Information		④ Purge Vol.	⑤ Field Purge Data			Notes
		Diff. Pressure (inch WC)	Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	Purge start 1347
MW-26	Hi	-0.004							Purge stop 1400
	Lo	-0.008	4.2 - 14.2	9.77	6.5	13	500	6.5	

		Gas Concentration Field Measurements								
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
②	Initial	Ø	Ø.Ø	Ø	Ø	Ø	10.4	5.7	-	
⑥	Stable	Ø	Ø.Ø	Ø	Ø	Ø	12.1	1.9	-	

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SWMU 1 Landfill Gas Monitoring, August 2021
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Date: 8/3/21
Project #: WA7011DW

		① Field Pressure Data	③ Probe Information		④ Purge Vol.	⑤ Field Purge Data			Notes
		Diff. Pressure (inch WC)	Screen Interval (ft bgs)	D = Depth to Water (ft BTOC)	Volume (liters) = 0.66 * D	T = Purge Time (minutes)	R = Purge Rate (ml/min)	Actual Volume Purged (liters) = T * R	Start purge 12:34
TW-01	Hi	-0.002							Stop purge 12:54
	Lo	-0.004	9.4 - 19.9	16.23	10.7	20	500	10	

		Gas Concentration Field Measurements								
		VOC (ppm)	CH_4 (% vol.)	LEL CH_4 (%)	CO (ppm)	H_2S (ppm)	CO_2 (%)	O_2 (%)	SO_2 (ppm)	
②	Initial	~~0.0~~ 0.2	0.0	0	0	0	1.2	~~20.9~~ 20.6	–	
⑥	Stable	0	0	0	0	0	0.1	20.8	–	