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3rd QUARTER LANDFILL GAS MONITORING September 2022

**Berkley Landfill
County Street
Berkley, Massachusetts
Facility #384031**

Prepared for

Waste Management Disposal Services of Massachusetts, Inc.
c/o 600 New Ludlow Road
South Hadley, Massachusetts 01075

Prepared by

Geosyntec Consultants, Inc.
289 Great Road, Suite 202
Acton, Massachusetts

Project Number BR0321L

October 2022

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1. INTRODUCTION

Geosyntec Consultants, Inc. (Geosyntec) has prepared this quarterly landfill gas monitoring report on behalf of Waste Management Disposal Services of Massachusetts, Inc. (WMDSM) for the former Berkley Landfill located on County Street in Berkley, Massachusetts (the Site). This landfill gas monitoring report is being submitted in accordance with the January 15, 2010 Post-Closure Monitoring Plan (the Plan) to the Massachusetts Department of Environmental Protection (MassDEP). On behalf of Geosyntec, Katahdin Analytical Laboratories, Inc. (Katahdin) conducted landfill gas monitoring at the Site on September 15, 2022 in accordance with 310 CMR 19.132(5). Geosyntec has reviewed the data, and this report provides a summary of the monitoring.

2. LANDFILL GAS MONITORING ACTIVITIES

On September 15, 2022, Katahdin monitored five landfill gas probes (GP), two landfill gas vents, eight bar hole probes (BHP), two catch basins (CB), and ambient air at the Berkley Landfill in accordance with the Post-Closure Monitoring Plan. Figure 1 presents the layout of the monitoring locations.

2.1 Materials and Methods

A Landtec GEM-5000 (GEM-5000) was used to measure methane (CH_4) and oxygen in percentages by volume (%). If methane was detected, the methane concentrations were converted to percent lower explosive limit (% LEL; LEL = 5% methane by volume). The GEM-5000 was fitted with an additional gas pod that measures hydrogen sulfide (H_2S) concentrations in parts per million by volume (ppm_v). Total non-methane volatile organic compounds (NMVOCs) were measured in ppm_v using a Mini Rae 2000 Photoionization Detector (PID). The instruments were calibrated on-site prior to the monitoring event.

The landfill gas probe and bar hole probe locations were sampled under initial conditions and steady state conditions. Initial condition concentrations were measured immediately after opening the stopcock valve or extracting the bar hole probe and are representative of landfill gas that might accumulate in a confined space over time. After initial conditions were recorded, each location was purged for approximately two minutes at five liters per minute using an air pump. After purging, the steady state landfill gas concentrations were measured. The landfill gas vents and catch basins were monitored under initial conditions only.

2.2 Results

As required by the Plan, five landfill gas probes (GP-1, GP-2, GP-9, GP-10, and GP-12) were monitored along the property boundary. Methane was detected at concentrations above 25% of the LEL in GP-1 and GP-2 under both initial and steady state conditions. The initial and steady-state concentrations detected at GP-1 were 28.4% (568% of LEL) and 58.1% (1,162% of LEL), respectively, and the initial and steady-state concentrations detected at GP-2 were 54.2% (1,084% of LEL) and 46.9% (938% of LEL), respectively. Methane was not detected at the other three landfill gas probes. In accordance with 310 CMR 19.132(5)(h), because the concentration of methane exceeded 25% of the LEL at the property boundary, Geosyntec attempted to notify MassDEP of this condition on September 16, 2022, within the 24-hour reporting period; however, due to an issue with the electronic mail delivery system, the notification was not sent until September 19, 2022 (Appendix A).

In response to previous methane exceedances at GP-1 and GP-2, and as required by the Plan, Katahdin began advancing bar hole probes at five locations beyond the property boundary in November 2015. Four locations (BHP-1 through BHP-4) are located between the property line and the edge of County Street. The fifth location (BHP-5) is located across County Street from BHP-2 (Figure 1). In 2020 some clearing and grading activity was observed on the adjacent property west of the Site near GP-1. In order to better delineate methane in soil gas along the landfill property boundary in this area, Katahdin advanced bar hole probes at three additional locations (BHP-6, BHP-7, and BHP-8; see Figure 1 for approximate locations) starting in September 2020. During the September 2022 field event, methane was detected under initial conditions at three BHP

locations (BHP-1, BHP-6, BHP-8) at a maximum concentration of 0.5% (10% of LEL) and under steady state conditions at one BHP location (BHP-6) at 0.1% (2% of LEL) (see Table 1).

Methane was not detected at either soil gas vent (Vent-1 and Vent-2) nor either catch basin (CB-1 and CB-2), located along County Street during the September 2022 monitoring event. However, methane was detected in the ambient air sample at 0.1% (2% of LEL), which was collected near the front entrance to the landfill.

Oxygen was measured at all locations monitored during the September 2022 monitoring event under initial and steady state conditions at concentrations ranging from 0.8% to 21.8%. The ambient oxygen concentration was measured as 21.1%.

Hydrogen sulfide was detected GP-1 and GP-2 under initial and steady-state conditions between 1 and 2 ppm_v. Hydrogen sulfide was not detected at any other monitoring location under initial or steady-state conditions during the September 2022 monitoring event. The ambient hydrogen sulfide concentration was measured as 0 ppm_v.

NMVOCs were detected at 13 of 17 monitoring locations under initial conditions at concentrations ranging from 0.6 to 41.2 ppm_v. Under steady-state conditions, NMVOCs were detected at 11 of 13 monitoring locations at concentrations ranging from 0.2 to 10.4 ppm_v. The ambient NMVOC concentration was measured as 0.0 ppm_v.

3. CONCLUSIONS

The third quarter, September 2022 landfill gas monitoring results indicate landfill gas is present in the soil near the property boundary in the southwest corner of the landfill. Methane was detected above the 24-hour notification limit (25% LEL) at landfill gas probes GP-1 and GP-2. In response to the exceedances, Geosyntec attempted to notify MassDEP of this condition on September 16, 2022 in accordance with 310 CMR 19.132(5)(h)(2); however, due to an issue with the electronic mail delivery system, the notification was not sent until September 19, 2022. WMDSM previously installed signs on the fencing in the southwest corner of the landfill to warn the public and the Berkley Highway Department of the potential migration condition; WMDSM will continue to maintain these signs. WMDSM plans to continue to perform quarterly landfill gas monitoring at the Site.

TABLE

Table 1
Landfill Gas Monitoring Results
September 15, 2022
Berkley Landfill - Berkley, Massachusetts

Units	GP-1	GP-2	GP-9	GP-10	GP-12	Vent-1	Vent-2	CB-1	CB-2	BHP-1	BHP-2	BHP-3	BHP-4	BHP-5*	BHP-6	BHP-7	BHP-8	Ambient	
Initial Condition																			
Methane %	28.4	54.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.5	0.0	0.2	0.1	
% of LEL	568	1,084	0	0	0	0	0	0	0	4	0	0	0	0	10	0	4	2	
Oxygen %	12.2	0.8	21.2	21.8	18.4	19.3	19.0	20.3	20.6	19.4	19.4	19.4	19.5	19.7	19.5	19.8	19.4	21.1	
Hydrogen Sulfide ppm	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hydrogen Sulfide ppm	13.9	41.2	2.0	1.2	1.2	0.0	0.6	0.0	0.0	2.7	2.3	1.5	1.7	11.0	0.8	0.0	1.1	0.0	
Steady-State Condition																			
Methane %	58.1	46.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	
% of LEL	1,162	938	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	
Oxygen %	1.8	3.1	21.2	20.2	19.2	19.2	19.4	19.4	19.4	19.3	19.4	19.4	19.4	19.8	20.2	19.8	19.3	19.3	
Hydrogen Sulfide ppm	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hydrogen Sulfide ppm	2.0	2.0	0.6	1.2	0.2	0.2	0.2	0.2	0.2	2.8	2.3	1.5	1.8	10.4	0.3	0.0	0.0	0.0	

Notes: Weather: Slightly windy, sunny, clear sky

Time: 12:09

Temp: 66°F

Rel Humidity: 43%

Bar. Pressure: 30.09 in Hg

Monitoring Data was collected by Katahdin Analytical Laboratories, Inc. on September 15, 2022.

Ground Conditions: Mostly dry, wet in area that are typically very wet in the spring.

Abbreviations: % = percent

ppm = parts per million

LEL = lower explosive limit

NM/VOC = non-methane volatile organic compounds

*BHP-5 is located across the street from landfill gated entrance. BHP-1, 4 and 6-8 are located on same side of street as the landfill.

FIGURE



Legend

- Soil Gas Monitoring Location
- Former Berkeley Landfill Site

Note:
 - Highlighted and circled locations observed a methane concentration greater than 25% of the LEL on September 15, 2022.



Landfill Gas Monitoring Locations
 Berkeley, MA

Geosyntec
 consultants

Acton, MA

September 2022

Figure
 1

APPENDIX A

September 16, 2022

Transmitted via email: Mark.Dakers@state.ma.us

Mr. Mark Dakers
Massachusetts Department of Environmental Protection
Southeast Regional Office
20 Riverside Drive
Lakeville, Massachusetts 02347

**Subject: Berkley Landfill – Landfill Gas Reportable Incident (24-hour)
September 15, 2022 Event
Berkley, Massachusetts**

Dear Mr. Dakers:

On behalf of Waste Management Disposal Services of Massachusetts, Inc. (WMDSM), Geosyntec Consultants, Inc. (Geosyntec) has prepared this landfill gas reportable event letter based on results from a landfill gas monitoring event conducted on September 15, 2022. The monitoring event was performed by Katahdin Analytical Laboratories, Inc. (Katahdin) at the Berkley Landfill on County Street in Berkley, Massachusetts (the Property). The monitoring results collected on September 15, 2022 indicated the presence of a 24-hour reportable incident at the Property (i.e., methane was detected in landfill gas at concentrations greater than 25% of the lower explosive limit (LEL) near the Property boundary). A summary of the monitoring data is attached along with a figure showing the monitoring point locations in relation to the landfill and surrounding area.

September 15, 2022, Incident

As shown on Table 1, methane was detected at concentrations above 25% of the LEL (LEL = 5% by volume) under initial and steady-state conditions at two locations, gas probes (GP)-1 and GP-2. These locations are circled in red and highlighted on Figure 1. The initial and steady state methane concentration detected at GP-1 were 28.4% (568% of LEL) and 58.1% (1,162% of LEL), respectively, and the initial and steady-state concentrations detected at GP-2 were 54.2 (1,084% of LEL) and 46.9% (938% of LEL), respectively.

Historical Background Information

In response to previous methane exceedances measured at GP-1 and GP-2 in November 2015, Katahdin started advancing bar hole probes at five locations beyond the Property boundary. Four of the locations (BHP-1 through BHP-4) are located between the Property line and the edge of County Street. The fifth location (BHP-5) is located across County Street from BHP-2 (Figure 1). Quarterly monitoring of these five bar hole probe locations has continued since 2015. In addition, to delineate methane in soil gas along the northwest landfill Property boundary near GP-1, Katahdin started advancing bar hole probes at three locations within the Property boundary (BHP-6 through BHP-8; Figure 1) in September 2020.

Summary

Other than at the GP-1 and GP-2 locations, the following landfill gas monitoring locations did not have detectable concentrations of methane above 25% of the LEL during the September 2022 monitoring event (Table 1).

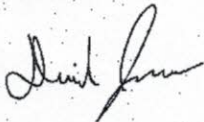
- Eight bar hole probes (BHP-1 through BHP-8)
- Two gas vents (Vent 1 and Vent 2) located along County Street
- Three gas probes (GP-9, GP-10, and GP-12) located along the western, southern, and eastern edges of the property boundary
- The two catch basins (CB-1 and CB-2) located along County Street
- Ambient methane concentration was measured at 0.1%

WMDSM had previously installed signage at the property line informing the public that landfill gas migration is a potential concern in that area and that precautions need to be taken if excavations are planned. Also, quarterly monitoring reports are sent to the Town of Berkley, which describe the ongoing landfill gas monitoring, potential conditions that may be encountered, and to serve as a reminder for precautionary measures when working in this area.

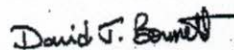
Geosyntec will issue the required landfill gas monitoring report to the Massachusetts Department of Environmental Protection within 60 days of the September 15, 2022, reportable event.

Should you have any questions, please feel free to contact David Jensen at 978-206-5796.

Sincerely,



David Jensen, EIT (NH)
Senior Staff Engineer

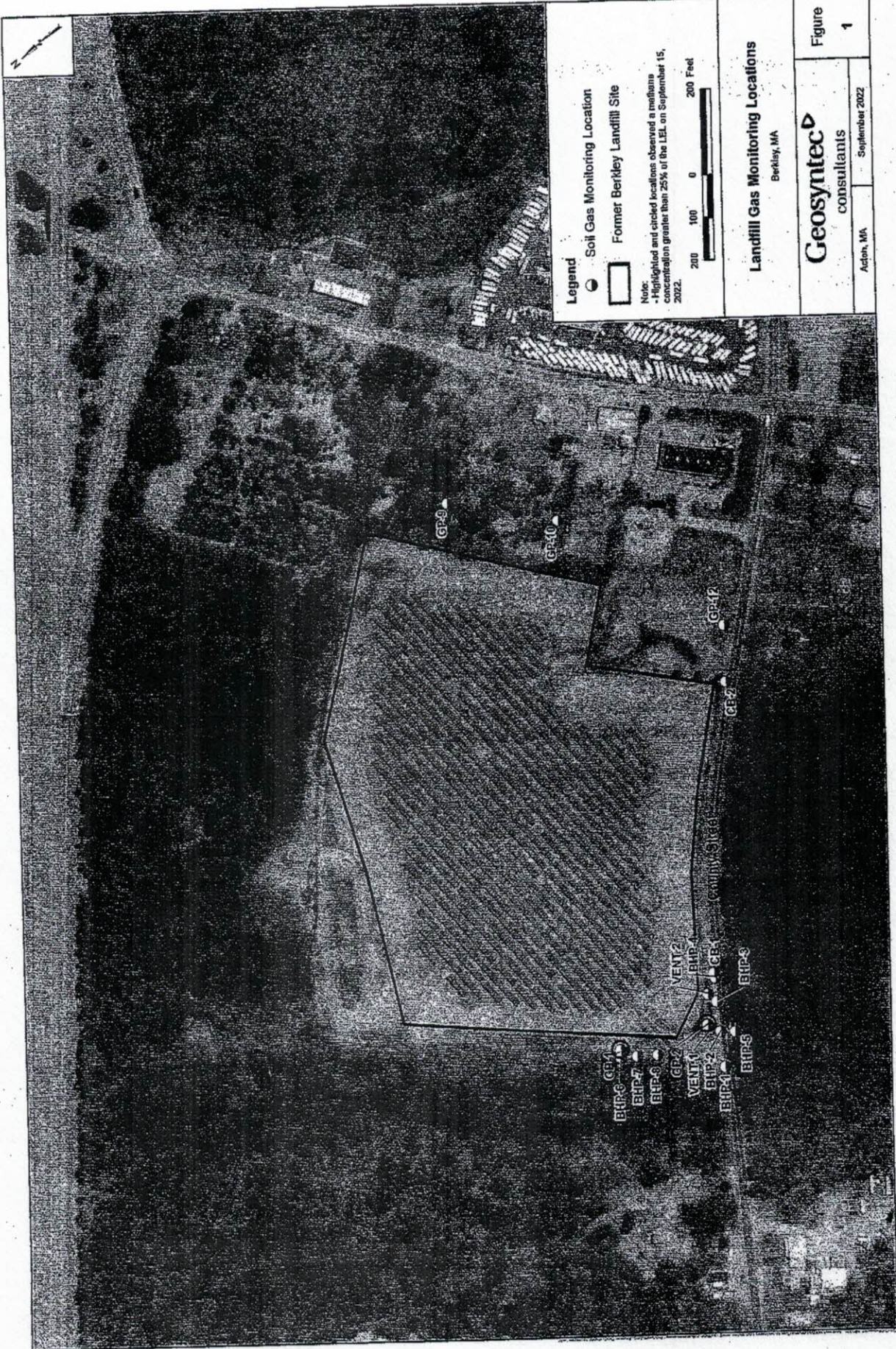


David J. Bonnett, PE
Senior Principal

Attachments:

Figure 1 – Landfill Gas Monitoring Locations

Table 1 – Landfill Gas Monitoring Results



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Landfill Gas Monitoring Locations
 Berkeley, MA

Geosyntec
 consultants

Acton, MA September 2022

Figure 1

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Hydrogen Sulfide	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
NMVOCS	2.0	2.0	0.6	1.2	0.2	2.8	2.3	1.5	1.8	10.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Notes:

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Abbreviations:

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