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2nd QUARTER LANDFILL GAS MONITORING June 2020

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

Prepared for

Waste Management Disposal Services of Massachusetts, Inc.
c/o 100 Brandywine Boulevard, Suite 300
Newtown, Pennsylvania 18940

Prepared by

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

Project Number BR0321H

June 2020

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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 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 June 16, 2020 in accordance with 310 CMR 19.132(5). Geosyntec has reviewed the findings, and this report provides a summary of the monitoring.

2. LANDFILL GAS MONITORING ACTIVITIES

On June 16, 2020, Katahdin monitored five landfill gas probes (GP), two landfill gas vents, five 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; $\text{LEL} = 5\%$ 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 prior to the monitoring event.

The landfill gas monitoring wells 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 basin were monitored under initial conditions only.

2.2 Results

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 levels greater than 25% of LEL in GP-1 and GP-2 under both initial and steady state conditions. The initial and steady state condition methane concentrations detected at GP-1 were both recorded at 51.2% (1,024% of LEL). The initial and steady state condition methane concentrations detected at GP-2 were recorded at 56.3% (1,126% of LEL) and 56.2% (1,124% of LEL), respectively. In accordance with 310 CMR 19.132(5)(h), because the concentration of methane exceeds 25% of the LEL at the property boundary, MassDEP was notified of this on June 17, 2020 (Appendix A) within the 24-hour reporting period. Methane was not detected at GP-9, GP-10, and GP-12.

In response to previous methane exceedances at GP-1 and GP-2, in November 2015 and as required by the Post-Closure Monitoring Plan, Katahdin advanced five bar hole probes beyond the property boundary. 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). Methane was not detected under initial or steady state conditions at any of the BHP locations (BHP-1, BHP-2, BHP-3, BHP-4, and BHP-5).

Methane was not detected at soil gas vent Vent-1. Methane was detected at soil gas vent Vent-2 at 0.9% (18% of LEL). Methane was not detected in either catch basin (CB-1 and CB-2) or the ambient air sample, which was collected near the front entrance to the landfill.

Oxygen was detected at all locations monitored during the June 2020 field event under initial and steady state conditions at concentrations ranging from 0.4% to 22.1%. The ambient oxygen concentration was measured as 21.9%.

Hydrogen sulfide was detected at landfill gas probe GP-2 at 12 ppm_v. Hydrogen sulfide was also detected at two of the bar hole probe locations, BHP-1 and BHP-2, both at 1 ppm_v. Hydrogen sulfide was not detected at either of the soil gas vents or either catch basin during the June 2020 field event. The ambient hydrogen sulfide concentration was measured as 0 ppm_v.

NMVOCs were detected at seven of fourteen monitoring locations under initial conditions at concentrations ranging from 0.7 to 373 ppm_v. Under steady state conditions, NMVOCs were detected at five of ten monitoring locations at concentrations ranging from 0.6 to 250 ppm_v. The ambient NMVOC concentration was measured as 0.0 ppm_v.

3. CONCLUSIONS

The June 2020 landfill gas monitoring results indicate landfill gas continues to be present in soil near the property boundary in the southwest corner of the landfill. Methane was detected above 25% LEL under both initial and steady state conditions at GP-1 and GP-2. In response, MassDEP was notified of this condition on June 17, 2020 in accordance with 310 CMR 19.132(5)(h)(2). 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.

As noted in Geosyntec's *3rd Quarter Landfill Gas Monitoring September 2019* report, the NMVOCs concentrations measured at two gas probes and one soil gas vent (GP-1, GP-2, and Vent-1) on September 19, 2019 were significantly greater than historical detections at the Site. NMVOCs concentrations at these locations returned to historical levels during the November 2019, March 2020, and June 2020 monitoring events. Additionally, the NMVOC concentration measured at bar hole probe locations BHP-1 and BHP-2 during the June 2020 event were greater than historical detections at the Site.

It is believed that these elevated NMVOC readings may have been biased high due to an elevated moisture content in the landfill gas at these sampling locations, which is known to affect PIDs. These locations will continue to be monitored during ongoing quarterly sampling events to observe if the elevated NMVOCs readings continue.

The following table shows the results of the survey conducted in the year 1949. The data is presented in a tabular format, with columns representing different categories and rows representing specific data points. The table is organized into several sections, each corresponding to a different aspect of the survey. The first section deals with the general characteristics of the respondents, including their age, sex, and education level. The second section focuses on the respondents' views on the current state of the economy and the government's policies. The third section examines the respondents' attitudes towards social issues, such as labor relations and social security. The fourth section discusses the respondents' opinions on international relations and the role of the United States in the world. The final section provides a summary of the findings and conclusions drawn from the survey.

TABLE

The following table shows the results of the survey conducted in the year 1949. The data is presented in a tabular format, with columns representing different categories and rows representing specific data points. The table is organized into several sections, each corresponding to a different aspect of the survey. The first section deals with the general characteristics of the respondents, including their age, sex, and education level. The second section focuses on the respondents' views on the current state of the economy and the government's policies. The third section examines the respondents' attitudes towards social issues, such as labor relations and social security. The fourth section discusses the respondents' opinions on international relations and the role of the United States in the world. The final section provides a summary of the findings and conclusions drawn from the survey.

Table 1
Landfill Gas Monitoring Results
June 16, 2020

Berkley Landfill - Berkley, Massachusetts

Initial Condition	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*	Ambient
Methane	%	51.2	56.3	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% of LEL	%	1024	1126	0	0	0	0	18	0	0	0	0	0	0	0	0
Oxygen	%	1.9	0.4	22.1	21.3	21.2	21.9	21.5	21.5	21.6	21.7	21.6	21.5	21.5	21.4	21.9
Hydrogen Sulfide	ppm	0	12	0	0	0	0	0	0	0	1	1	0	0	0	0
NMVOcs	ppm	0.7	9.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	373	62.1	20.9	8.0	2.5	0.0
Steady-State Condition																
Methane	%	51.2	56.2	0.0	0.0	0.0					0.0	0.0	0.0	0.0	0.0	0.0
% of LEL	%	1024	1124	0	0	0					0	0	0	0	0	0
Oxygen	%	1.9	0.4	22.1	21.3	21.3					21.7	21.6	21.5	21.5	21.4	21.4
Hydrogen Sulfide	ppm	0	12	0	0	0					1	1	0	0	0	0
NMVOcs	ppm	0.0	0.0	0.0	0.0	0.0					250	36.9	6.6	5.7	0.6	0.6

Notes: Weather: Sunny, 70's, wind NE 5-10 MPH
 Time: 15:30
 Temp: 75°F
 Rel Humidity: 37%
 Bar. Pressure: 30.36

Highlighted results indicate a methane concentrations greater than 25% of the LEL.
 Monitoring Data was collected by Katahdin Analytical Laboratories, Inc. on June 16, 2020.

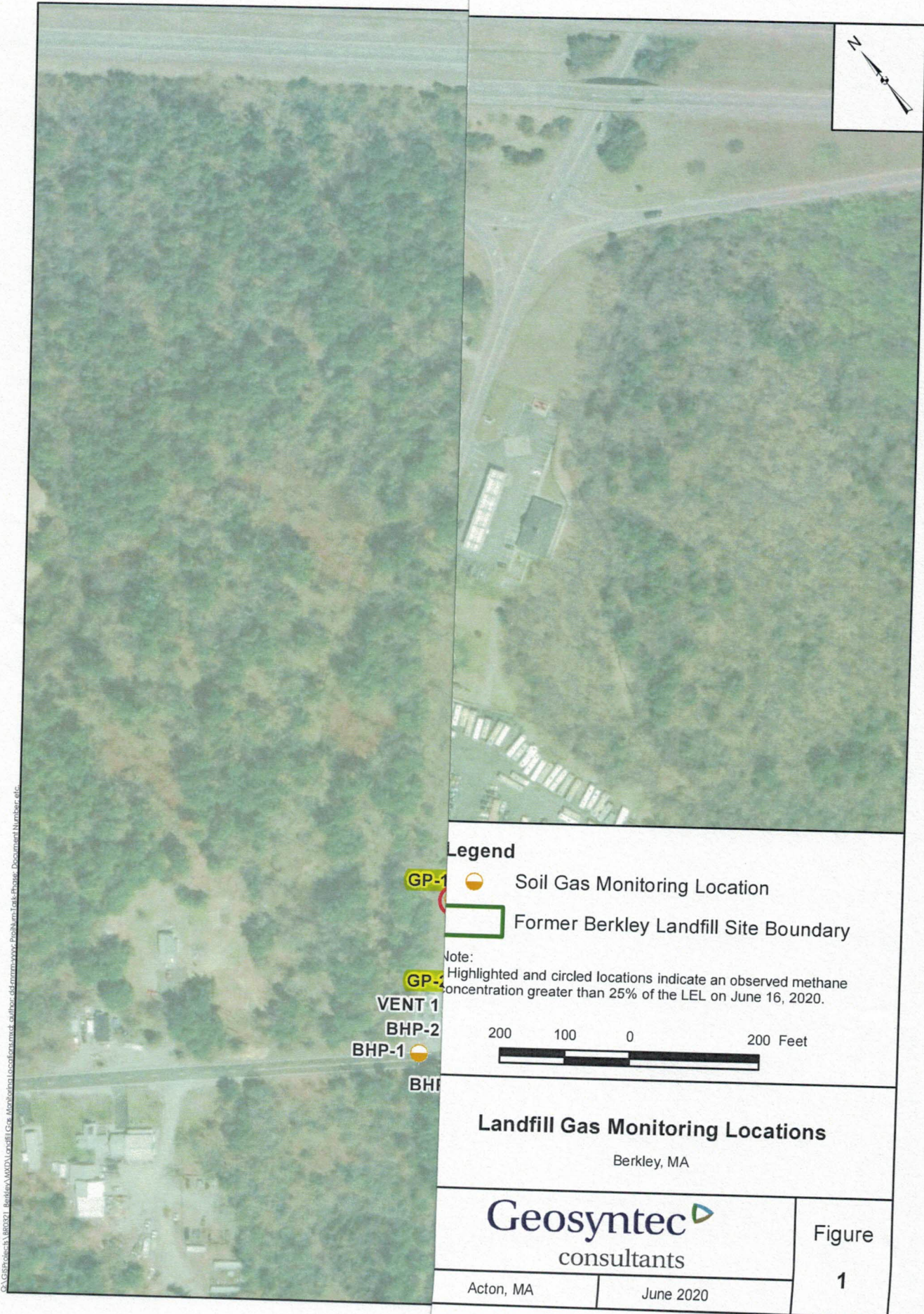
Ground Conditions: Overgrown, Green, Dry

Abbreviations: ppm = parts per million
 LEL = lower explosive limit
 NMVOC = non-methane volatile organic compounds
 NE = northeast
 MPH = miles per hour

*BHP-5 is taken across the street from landfill gated entrance. BHP-1-4 are taken on same side of street as landfill.

FIGURE





APPENDIX A

MASSDEP NOTIFICATION LETTER

June 17, 2020

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

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

**Subject: Berkley Landfill – Landfill Gas Reportable Incident (24-hour)
June 16, 2020 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 June 16, 2020 that was performed by Katahdin Analytical Laboratories, Inc. (Katahdin) at the Berkley Landfill on County Street in Berkley, Massachusetts (the Property). The results indicate a 24-hour reportable incident at the Property (i.e., landfill gas was detected at concentrations greater than 25% of the lower explosive limit (LEL) near the property boundary). A summary of the results is attached along with the monitoring point locations.

Methane was detected at concentrations above 25% of the LEL (LEL = 5% by volume) under steady-state conditions and initial conditions at two locations, gas probe (GP)-1 and GP-2. These locations are circled in red on Figure 1. The steady-state methane concentration detected at GP-1 was 51.2% (1,024% of LEL) and at GP-2 was 56.2% (1,124% of LEL). The initial methane concentration detected at GP-1 was 51.2% (1,024% of LEL) and at GP-2 was 56.3% (1,126% of LEL).

Previously, in response to methane exceedances at GP-1 and GP-2 in November 2015, Katahdin advanced five bar hole probes 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). The five bar holes were converted into permanent monitoring locations. Methane was not detected in the bar hole probes during the June 2020 sampling event; ambient methane concentration was measured at 0.0% (Table 1).

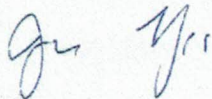
Detectable concentrations of methane above 25% of the LEL were not measured at the following locations.

- Two gas vents (Vent 1 and Vent 2) located along the property boundary in the general area of BHP-3.
- Pre-November 2015 soil gas wells around the property boundary

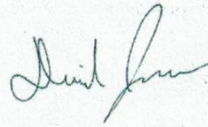
- The two catch basins along County Street in the vicinity of the methane exceedances WMDSM had previously installed signs at the property line informing the public that gas migration is a concern in that area and that precautions need to be taken if excavations are planned. The Town of Berkley is reminded on a quarterly basis about this condition. Geosyntec will issue the landfill gas monitoring report to the Massachusetts Department of Environmental Protection within 60 days of the event.

Should you have any questions, please feel free to contact Jessica Yeager at 617-992-9065.

Sincerely,



Jessica Yeager, P.E. (MA), LSP
Senior Engineer

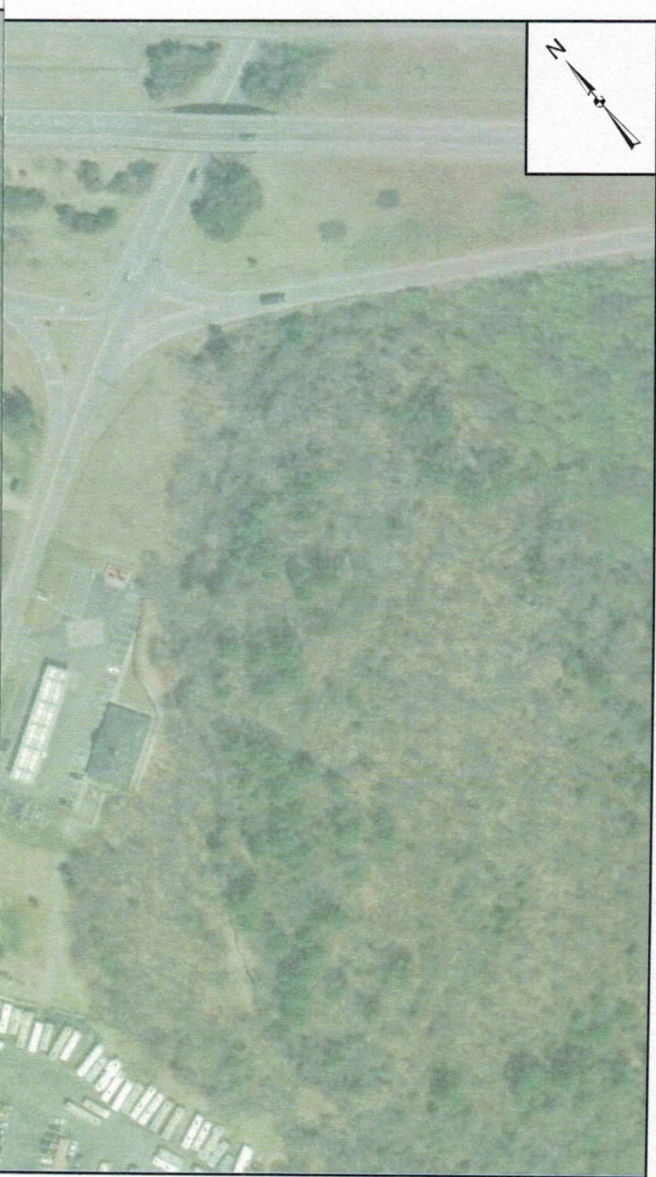


David Jensen, EIT (NH)
Staff Engineer



Attachments:

- Figure 1 – Landfill Gas Monitoring Locations
- Table 1 – Landfill Gas Monitoring Results

G:\GIS\Projects\1803201_Berkley\MXD\Landfill Gas Monitoring\www.problem1.esri.com Document Number etc



Legend

- GP-1  Soil Gas Monitoring Location
-  Former Berkley Landfill Site Boundary

Note:
Highlighted and circled locations indicate an observed methane concentration greater than 25% of the LEL on June 16, 2020.

- VENT 1
- BHP-2
- BHP-1 
- BHP

200 100 0 200 Feet



Landfill Gas Monitoring Locations

Berkley, MA

Geosyntec
consultants

Acton, MA

June 2020

Figure
1

Table 1
Landfill Gas Monitoring Results
June 16, 2020
Berkley Landfill - Berkley, Massachusetts

	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*	Ambient
Initial Condition															
Methane	51.2	56.3	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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% of LEL	1024	1124	0	0	0					0	0	0	0	0	0
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Notes: Weather: Sunny, 70's, wind NE 5-10 MPH

Time: 15:30

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