

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY**

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**INTEROFFICE COMMUNICATION**

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TO: Scott Miller, Supervisor, Air Quality Division, Jackson District

FROM: Mike Depa, Toxicologist, Air Quality Division

SUBJECT: Summary of 2017 Arbor Hills Landfill GMAP Air Monitoring

DATE: May 14, 2018

The purpose of this memo is to summarize the U.S. Environmental Protection Agency's (USEPA's) "GMAP" air monitoring that occurred on October 10 and 11, 2017. USEPA used mobile and stationary monitors to analyze the air for methane, benzene, toluene and xylene as well as other pollutants including those that are emitted from engine exhaust. USEPA stated that benzene was detected and was not associated with engine combustion on one occasion that occurred on October 10<sup>th</sup> on Napier Road, half way between Five Mile Road and Six Mile Road. The maximum air concentration of benzene not associated with combustion byproducts was 10 parts per billion (ppb) and lasted one-second long. Most of the other benzene measurements were much lower and were lower than the method detection limit. A short-term air exposure health limit of 25 ppb was used to evaluate the benzene concentrations for their potential to cause adverse health effects. The 25 ppb health limit is protective for sensitive individuals, including children, asthmatics and the elderly. The highest one-second concentration of 10 ppb benzene was lower than the 25 ppb benzene health limit, therefore, no adverse effects from short-term air exposure to benzene are expected.

Additionally, the 2017 GMAP air monitoring showed that the methane concentrations are substantially lower than previous GMAP air monitoring done in February of 2016; 4 parts per million (ppm) in 2017 vs 100 ppm in 2016. Also, hydrogen sulfide was not detected during the recent GMAP air monitoring, whereas in 2016 the highest hydrogen sulfide air concentration was measured at 82 ppb. Benzene was not monitored in 2016, so it is not known if its concentration has decreased. A more detailed analysis of EPA's 2017 GMAP monitoring report is attached to this memo as an appendix.

The results of the 2017 GMAP monitoring did not show air concentrations that raise health concerns. Furthermore, the concentrations of methane and hydrogen sulfide are much lower than previous GMAP air monitoring done in 2016.

Thanks for your interest in evaluating the air monitoring data at Arbor Hills Landfill. Let me know if you have any questions or concerns about the information provided.

cc: Ms. Diane Kavanaugh Vetort, MDEQ  
Ms. Jenifer Dixon, MDEQ  
Mr. Robert Sills, MDEQ

## APPENDIX

The following is a summary of the “Arbor Hills Landfill GMAP Air Monitoring” report (hereafter “report”) dated February 21, 2018 prepared by Marta Fuoco of the U.S. Environmental Protection Agency (USEPA), Region 5, Air Monitoring and Analysis Section. The report describes the results of the USEPA’s air sampling performed on October 10 and 11, 2017, around the Arbor Hills Landfill (AHL) on 10690 Six Mile Rd, in Northville, MI.

### Summary of the Report

- USEPA stated, “Measured concentrations of BTEX<sup>1</sup> not associated with motor vehicle exhaust were potentially identified...on 10/10/2017; the maximum benzene concentration measured was 10ppb [parts per billion].” This maximum benzene measurement was indicated on an aerial photograph (page 9 of the report) as occurring on Napier Road, half-way between Five Mile Road and Six Mile Road.
- The highest methane concentration was reported as 3.93 parts per million (ppm).
- The report states, “No values above the detection level for H<sub>2</sub>S [hydrogen sulfide] were measured.”
- Maximum one-second air concentrations of various volatile organic compounds (VOCs) were presented in a table from the report. Other than benzene on 10/10/2017, the VOC air concentrations were not specifically identified as to whether or not they were associated with motor vehicle exhaust.
- Data from the two stationary monitors located on the east and west sides of the landfill showed similar air concentrations to the GMAP mobile monitor.

### Interpretation of the Results

The Michigan Department of Environmental Quality Air Quality Division (MDEQ-AQD) adopted a health-based screening level for benzene of 9 ppb (30 µg/m<sup>3</sup>; 24-hr averaging time) that was derived by the Agency for Toxic Substance and Disease Registry<sup>2</sup> (ATSDR). The benzene health-based exposure limit of 9 ppb was derived by ATSDR to protect the public health, including sensitive individuals, from exposure to benzene lasting up to 14 days. ATSDR states that their health-based exposure limit and its associated 14-day exposure duration, “is likely to be without appreciable risk of adverse noncancer health effects.” This means that a person would need to be exposed to benzene of a concentration of at least 9 ppb continuously for at least a 14 day period to experience adverse health effects. Over shorter periods of exposure an individual could be exposed to slightly higher benzene concentrations with no adverse effects. This indicates that the sampling results from USEPA’s GMAP mobile monitor do not provide information that is directly comparable to ATSDR’s benzene health-based exposure limit. The GMAP report provides one-second air concentrations, and no time-averaged values, and the ATSDR health-based exposure limit is designed to be protective of benzene exposures lasting up to 14 days.

A 15-minute short-term exposure limit (STEL) established by the American Conference of Governmental Industrial Hygienists<sup>3</sup> (ACGIH) is sometimes used by MDEQ-AQD to derive a

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<sup>1</sup> BTEX = Benzene, Toluene, Ethyl benzene and Xylene

<sup>2</sup> Toxicological Profile for Benzene. 2007. ATSDR. U.S. Department of Health and Human Services.

<https://www.atsdr.cdc.gov/toxprofiles/tp3.pdf>

<sup>3</sup> <https://www.acgih.org/>

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screening level<sup>4</sup> protective of public health. ACGIH derived a STEL for benzene at 2.5 parts per million (ppm) that is protective for occupationally exposure workers exposed for 15-minutes (a 15-minute averaging time). MDEQ-AQD applies a safety factor of 100 to ACGIH exposure limits, to account for continued exposure to sensitive individuals in the general public, since workers are expected to be relatively healthy. A 15-minute MDEQ-AQD short-term comparison value (STCV) is calculated as follows:

$$\begin{aligned} \text{MDEQ-AQD STCV} &= \text{ACGIH STEL} \div \text{safety factor} \\ \text{MDEQ-AQD STCV} &= 2.5 \text{ ppm} \div 100 \\ \text{MDEQ-AQD STCV} &= 0.025 \text{ ppm} \end{aligned}$$

The units of ppm were converted to ppb:

$$\text{MDEQ-AQD STCV} = 0.025 \text{ ppm} \times (1000 \text{ ppb}) / (1 \text{ ppm}) = 25 \text{ ppb}$$

The MDEQ-AQD STCV is protective of public health, including sensitive individuals, and is much closer in averaging time to the USEPA's GMAP results. Although the 10 ppb maximum one-second air concentration of benzene reported by USEPA is slightly above the ATSDR's health-based exposure limit of 9 ppb, the 10 ppb benzene air concentration is lower than the MDEQ-AQD's health-based STCV of 25 ppb (averaged over 15-minutes).

In addition to monitored benzene concentrations being lower than the STCV, several factors lessen the concern that adverse health effects could result from benzene exposure near AHL:

1. The highest concentration was measured on Napier Road where no residents live.
2. Since air pollutants disperse, the concentration benzene is expected to decrease as one moves further east from Napier Road.
3. The 14-day average air concentration of benzene would likely be lower than the maximum one-second concentration of 10 ppb benzene.

The results of USEPA's 2017 GMAP monitoring did not find levels of air contaminants, including benzene, that raise public health concerns. However, monitoring was limited in that the air sampling was only done on two days (October 10 and 11, 2017). While the conclusions that can be drawn from the study are constrained by the short sampling duration, the results of USEPA's 2017 GMAP monitoring provide valuable information reflecting the air quality near the AHL. Hydrogen sulfide was not detected during the latest 2017 GMAP air sampling, whereas an earlier 2016 GMAP monitoring study<sup>5</sup> showed a maximum one-second air concentration of 82 ppm. Similarly, on October 11, 2017 the GMAP report found that the highest one-second methane air concentration over the two days of sampling was measured at 3.9 ppm. USEPA's 2016 GMAP monitoring study found that the highest methane concentration was 100 ppm, with many of the lower methane air concentrations well above 20 ppm. Since the latest GMAP air monitoring shows substantially lower hydrogen sulfide and methane air concentrations than past air monitoring, these results provide some evidence that the landfill gases are effectively collected by the Gas Collection and Control System.

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<sup>4</sup> Rule 336.1232(1)(c) et. seq. of the Michigan Administrative Code promulgated pursuant to Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

[http://dmbinternet.state.mi.us/DMB/ORRDocs/AdminCode/1744\\_2017-068EQ\\_AdminCode.pdf](http://dmbinternet.state.mi.us/DMB/ORRDocs/AdminCode/1744_2017-068EQ_AdminCode.pdf)

<sup>5</sup> Arbor Hills Landfill GMAP H2S/CH4 Air Monitoring; dated March 22, 2016 (by M. Fuoco)