

# MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

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## INTEROFFICE COMMUNICATION

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TO: Diane Kavanaugh Vetort, Environmental Quality Analyst  
Air Quality Division, Jackson District

FROM: Mike Depa, Toxicologist, Air Quality Division

SUBJECT: Arbor Hills Landfill GMAP H<sub>2</sub>S/CH<sub>4</sub> Air Monitoring Report

DATE: April 19, 2016

I reviewed the "Arbor Hills Landfill GMAP H<sub>2</sub>S/CH<sub>4</sub> Air Monitoring" report (hereafter "the report") prepared by Marta Fuoco of the United States Environmental Protection Agency (USEPA), Region 5, Air Monitoring and Analysis Section. The report is dated March 22, 2016. The report briefly describes the results of the USEPA's mobile monitoring results from February 16-17, 2016 near the Arbor Hills Landfill. The landfill is located in Salem Township (Section 13), Washtenaw County, Michigan. There is a residential neighborhood to the east of the landfill in Northville Township (Section 18), Wayne County.

### **Summary of the Report**

On 2/16/2016, the wind was 5-10 mph WNW (low ceiling).  
On 2/17/2016, the wind was 5-10 mph NNW (sunny skies).

The report states that concentrations of methane (CH<sub>4</sub>) are compared to ATSDR's<sup>1</sup> *de minimis* level for screening purposes of soil gas concentration of 12,500 ppm or other state or local values.

The report states that for short-term hydrogen sulfide (H<sub>2</sub>S) monitoring data, the monitored concentrations are frequently compared to ATSDR's acute inhalation Minimal Risk Level (MRL) of 70 ppb or other state or local levels.

CH<sub>4</sub> and H<sub>2</sub>S concentrations were displayed on a map as the mobile monitor was driven around the landfill, including public roads and streets within the residential areas.

The highest measured concentration of CH<sub>4</sub> was 100.9 parts per million (ppm).

The highest H<sub>2</sub>S value of 81.9 parts per billion (ppb) was measured on Napier Road, which follows the east side of the landfill. In a residential area just east of the landfill, the highest concentration of H<sub>2</sub>S was measured at 34.3 ppb.

The author of the report states, "[T]he maximum H<sub>2</sub>S concentration of 81.9 ppb monitored on February 16 at 42.404306, -83.550220 exceeds ATSDR's acute MRL of 70 ppb, indicating a potential acute human health hazard." The maximum CH<sub>4</sub> concentration of 100.9 ppm was below the *de minimis* level of 12,500 ppm.

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<sup>1</sup> ATSDR stands for Agency for Toxic Substances and Disease Registry. Part of the Centers for Disease Control, U.S. Department of Health and Human Services.

**Interpretation of Findings in the Report**

The highest concentrations of H<sub>2</sub>S were measured on the east side of the landfill and dropped off in concentration as measurements were taken further east. The highest concentration in the residential area of 34.3 ppb was directly in line with the landfill and wind coming from the west (see attached wind roses, provided by Craig Fitzner, Supervisor, Air Monitoring Unit). The concentrations of H<sub>2</sub>S in the residential area dropped off quickly to the north, south and east of the point of highest concentration. Because of the concentration gradient (highest next to the landfill and lower further east) and with the wind coming from the west it is highly likely that the source of CH<sub>4</sub> and H<sub>2</sub>S in the air is from the landfill.

The concentrations of CH<sub>4</sub> do not indicate a health concern.

ATSDR derived the acute (i.e., short-term) MRL of 70 ppb for H<sub>2</sub>S from a study where breathing difficulty was observed in 2 of 10 asthmatic subjects at the exposure concentration of 2000 ppb after a 30-minute exposure. The acute MRL of 70 ppb has a safety factor of approximately 30; meaning it is 30 times lower than the concentration that showed slight effects in sensitive individuals. The acute MRL is designed to be protective of exposures from 1 to 14 days in duration. The concentrations of H<sub>2</sub>S in the residential area are less than the MRL. The highest concentration of H<sub>2</sub>S on the roadway of 82 ppb, just east of the landfill, is slightly above the acute MRL of 70 ppb. Concentrations of H<sub>2</sub>S just slightly above the acute MRL are not likely to result in breathing difficulties in sensitive individuals over short-term time periods (e.g., 1-14 days) because of the safety factor used in the calculation of the acute MRL. However, there are significant shortcomings to the sampling duration that do not allow a firm conclusion. This is because the sampling occurred over a short duration (1-2 days). Furthermore, the 1-second sample readings are not long enough to determine if longer term exposures (for example 24 hours) would be the same. The longer term air concentrations on Napier Rd. are likely to be lower, but could be slightly higher because of the variability in weather, and emission rates of H<sub>2</sub>S from the landfill are not likely to remain constant over time. Greater dispersion occurs with transport to the residential areas where exposure durations of 1-14 days are more reasonably expected.

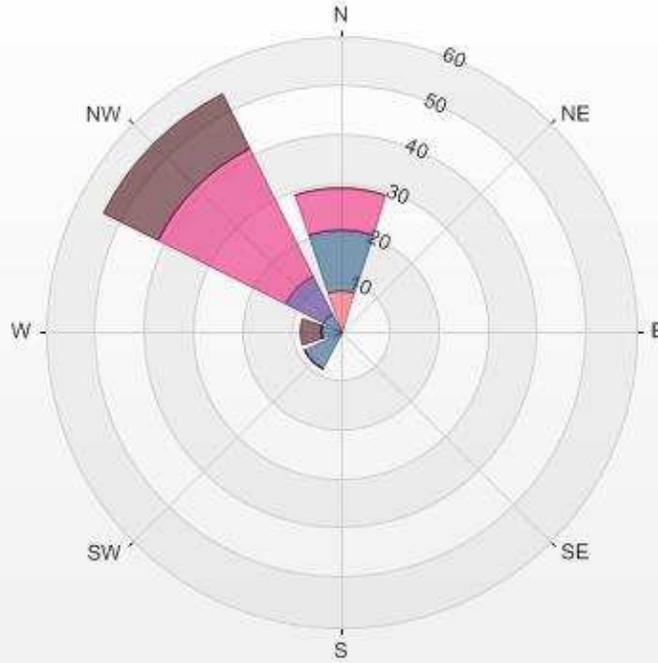
It should be mentioned that H<sub>2</sub>S is noted for having a strong and offensive odor. Individual variability to detect the odor has been studied and an average odor detection threshold was found to be approximately 8 ppb. In a human volunteer odor study, 50% of the subjects described the H<sub>2</sub>S odor as annoying at 40 ppb. However, odor detection and annoyance is highly subjective and the odor values above represent approximate air concentrations. Annoyance from H<sub>2</sub>S exposure occurs at a concentration that is less than the MRL, therefore, it is not a reliable indicator for air concentrations that may cause health concerns.

MD:lh

Attachment

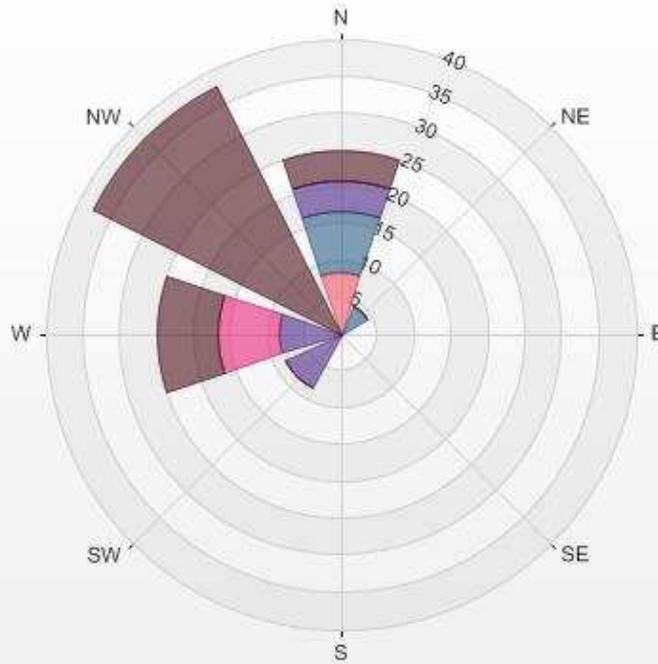
cc: Heidi Hollenbach  
Lynn Fiedler  
Teresa Seidel  
Barb Rosenbaum  
Craig Fitzner  
Scott Miller  
Bob Sills

LIVONIA NEAR ROAD 2/16/2016 12:00 AM - 2/16/2016 11:00 PM Calm: 0.0%



% Icon Classes (mph) 0 0.5-1.2 8 1.2-2.4 29 2.4-3.6 8 3.6-4.8 38 4.8-6.0 17 >6.0

LIVONIA NEAR ROAD 2/17/2016 12:00 AM - 2/17/2016 11:00 PM Calm: 0.0%



% Icon Classes (mph) 0 0.5-1.2 8 1.2-2.4 13 2.4-3.6 21 3.6-4.8 8 4.8-6.0 50 >6.0