

Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***MONITORING AND RESEARCH
DEPARTMENT***

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***ODOR MONITORING PROGRAM AT THE METROPOLITAN WATER
RECLAMATION DISTRICT OF GREATER CHICAGO'S SOLIDS DRYING
AND SOLIDS PROCESSING FACILITIES DURING 2024***

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ODOR MONITORING PROGRAM AT THE METROPOLITAN WATER
RECLAMATION DISTRICT OF GREATER CHICAGO'S SOLIDS DRYING AND
SOLIDS PROCESSING FACILITIES DURING 2024

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LIST OF ACRONYMS

CALSMA	Calumet Solids Management Area
District	Metropolitan Water Reclamation District of Greater Chicago
H ₂ S	hydrogen sulfide
HASMA	Harlem Avenue Solids Management Area
LASMA	Lawndale Avenue Solids Management Area
M&R	Monitoring and Research
ppbv	parts per billion by volume
ppmv	parts per million by volume
RASMA	Ridgeland Avenue Solids Management Area
SDA	solids drying area
SDS	solids drying site
SPS	solids processing site
WRP	water reclamation plant

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DISCLAIMER

Mention of proprietary equipment in this report does not constitute endorsement by the Metropolitan Water Reclamation District of Greater Chicago.

SUMMARY

The Metropolitan Water Reclamation District of Greater Chicago (District) has maintained a program of monitoring odors at one (1) solids drying site (SDS), one (1) solids processing site (SPS), and five (5) solids drying areas (SDAs) since 1990. Two SDAs, the Ridgeland Avenue Solids Management Area (RASMA) and Stony Island SDA, were removed from the odor monitoring program as they are no longer used by the District, and the land is leased by others. The Monitoring and Research Department (M&R) Department staff made subjective observations regarding the type and intensity of any odor perceived and recorded instantaneous hydrogen sulfide (H₂S) measurements using a handheld monitor at each monitoring site.

There were ten (10) locations monitored at the Calumet Water Reclamation Plant (WRP) SDS. There were fifteen (15) locations monitored at the Harlem Avenue Solids Management Area (HASMA), Marathon and the Vulcan SDAs, and the Lawndale Avenue Solids Management Area (LASMA) SPS. The frequency of monitoring is one (1) day per week at the SDS, SDAs, and SPS. Each odor observation was characterized as very strong, strong, easily noticeable, faint, very faint, or no odor.

During 2024, no very strong odors were observed at the Calumet WRP SDS, no very strong odors were observed at the HASMA, Marathon and Vulcan SDAs, and LASMA SPS, four (4) strong odors were observed at the Calumet WRP SDS, and 12 strong odors were observed at HASMA, Marathon and Vulcan SDAs, and LASMA SPS. At all the sites that were monitored by the M&R Department, the observations that were characterized as faint to no odor were 89 percent at the Calumet WRP SDS and 84 percent at HASMA, Marathon and Vulcan SDAs, and LASMA SPS.

At each of the SDS, SDAs, and SPS, there are specific locations which had noticeable odors. A summary of locations which had occasional strong or very strong odors is presented in Table 1.

The H₂S levels were mostly below the detection limit of three (3) parts per billion by volume (ppbv) with occasional high values. The average level of H₂S at the monitoring locations ranged from <3.0 to 3.93 ppbv.

TABLE 1: STRONG AND VERY STRONG ODOR OBSERVATIONS FOR 2024

Facility (Station Number)	Number of Strong Odor Observations	Number of Very Strong Odor Observations	Total Number of Observations
Calumet WRP SDS			
CALSMA West Drying Cell #4 @ Scale House (02)	1	0	
CALSMA East, East of Cell #1 (23)	2	0	
CALSMA East, West of Cell #1 (25)	1	0	
Total	4	0	451
HASMA, Marathon and Vulcan SDAs, and LASMA SPS			
Vulcan Construction Shaft (04)	1	0	
Vulcan Northwest (05)	2	0	
Vulcan TARP Well (06)	4	0	
LASMA Lagoon 30 (12)	1	0	
LASMA Cell 5E-5W (17)	2	0	
Marathon Southwest (19)	2	0	
Total	12	0	774

Note: CALSMA = Calumet Solids Management Area.
HASMA = Harlem Avenue Solids Management Area.
LASMA = Lawndale Avenue Solids Management Area.
SDA = Solids Drying Area.
SDS = Solids Drying Site.
SPS = Solids Processing Site.
WRP = Water Reclamation Plant.

INTRODUCTION

The M&R Department has been conducting an odor monitoring program at various District solids drying and processing facilities for the past 30 years. The program was initiated by the M&R Department to monitor the solids processing and drying sites at LASMA, HASMA, Marathon, and Vulcan SDA in 1990, and was expanded to the Calumet WRP SDS in 1992 and to RASMA and the Stony Island SDA in 2001 as part of the District's SDA operating permits. Odor monitoring for RASMA and the Stony Island SDA was terminated as they are no longer used as biosolids drying sites and the land is leased by others.

At each location, a similar procedure is followed to monitor odors. The M&R Department personnel visited various locations at each facility on a regular basis. The odor monitoring personnel make subjective observations regarding the character and intensity of odors at each of the stations. The odor intensities are ranked on a scale of 0 to 5, corresponding to no odor, very faint, faint, easily noticeable, strong, and very strong. In addition to the subjective evaluation of odors in terms of intensity and character, the ambient air is sampled and analyzed for H₂S concentration using Jerome Model 631-X and Model J605 H₂S analyzers. The monitoring range of the Model 631-X is 3 ppbv to 50 parts per million by volume (ppmv). The monitoring range of the Model J605 is 3 ppbv to 10 ppmv.

The objective of the program is to collect and maintain a database of odor levels within and around each solids drying and processing facility as part of a permit requirement by the Illinois Environmental Protection Agency for odor management at the District's biosolids drying facilities. This data can also be used to study the trends in odor levels associated with solids drying and processing operations and to correlate odor levels with conditions related to solids drying and processing operations or changing conditions within the facility that in turn can be used for applying deodorizing agents or designing facilities for composting of biosolids. Composting operations commenced at HASMA in 2014 and at the Calumet WRP SDS in 2018.

A summary of the odor-monitoring program for the solids drying and processing facilities is presented in [Table 2](#). This table includes a brief description of the program with regard to when the monitoring commenced at each facility, the number of monitoring locations, the frequency of the monitoring, who conducts the monitoring, if H₂S is measured by personnel during the monitoring, and the number of odor complaints in 2024. Monitoring activities were conducted as described in this report.

Maps showing the odor monitoring locations are presented in [Appendix AI](#).

TABLE 2: ODOR MONITORING PROGRAM FOR 2024

Facility	Number of Locations Monitored	Year Began	Months of Year	Days per Week	Departments Participating	H ₂ S Measured	Number of Odor Complaints	Number of Complaints Verified
Calumet WRP SDS	10	1992	12	1	M&R	Yes	1	1
HASMA, Marathon Vulcan SDAs, and LASMA SPS	15	1990	12	1	M&R	Yes	10	0

Note: HASMA = Harlem Avenue Solids Management Area.
LASMA = Lawndale Avenue Solids Management Area.
M&R = Monitoring and Research Department.
SDA = Solids Drying Area.
SDS = Solids Drying Site.
SPS = Solids Processing Site.
WRP = Water Reclamation Plant.

The number of monitoring locations at each facility varies from 10 to 15 depending upon the size of the facility and the history of odor episodes at those facilities. The solids drying and processing facilities are monitored one day per week by the M&R Department personnel.

In 2024, one (1) odor complaint was received at the Calumet WRP SDS, which was verified. Ten (10) odor complaints were received at the HASMA, Marathon and Vulcan SDAs, and LASMA SPS, but none of them were verified.

This report presents the odor monitoring data for the year 2024. The odor monitoring data has been reviewed and summarized in terms of frequency of occurrence, locations of observed odors, and H₂S levels.

RESULTS OF ODOR MONITORING AT THE METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO'S SOLIDS DRYING AND SOLIDS PROCESSING FACILITIES IN 2024

The results of the various odor monitoring programs at each of the monitored sites for 2024 are summarized in Table 3. The results have been divided into two major groups: significant odors, which include the very strong, strong, and easily noticeable odors, and insignificant odors, which comprise no odors, very faint, or faint odors.

A general observation drawn from the table is that the Calumet WRP SDS, based on the observations of M&R Department personnel who conducted odor monitoring, had a few episodes of significant odors.

Calumet Water Reclamation Plant Solids Drying Site

The Calumet WRP SDS consists of the East SDA, located east of the Calumet WRP, and the West SDA, located west of the Calumet WRP. In M&R Department monitoring records, the Calumet WRP SDS had 89 percent of the total observations characterized as faint to no odor. The occurrence of strong odors at the drying areas, which also include the non-operational centrifuge building located at the East SDA, was infrequent. The majority of the observations were described as faint to no odor. There was no very strong odor observation and four strong odor observations out of 451 total observations in M&R Department monitoring records. The strong odors were observed in various months and were spread among the various locations depending upon the activity at the time.

No very strong odors were observed in 2024. Strong odors were observed under four (4) percent of the time on a monthly basis. Figure 1 presents the monthly frequency of occurrence of the easily noticeable, strong, and very strong odor observations. The easily noticeable odor observations during this period ranged from 0 to 28 percent. The easily noticeable odors were more frequent during the months of May through October, and the highest frequency was observed during August 2024, at 27.3 percent.

The average H₂S levels ranged from 0.33 ppbv to 1.08 ppbv. The highest H₂S levels ranged from 6.51 to 26.56 ppbv. The mean and maximum values at all locations are shown in Table 4 with the method for calculating averages described in the footnote. The highest value observed (26.56 ppbv) was at Calumet SMA Location 3 North of CALSMA West at North Gate on September 4, 2024.

There was one (1) odor complaint related to the Calumet WRP SDS during 2024, which was verified by M&O staff. The odor complaint happened at 10:15 a.m. on June 20, 2024, near 605 E. 131st St., Chicago, Illinois. The odor complaint was close to Location 1 (CASLMA West Cell #1 Gate) of Calumet WRP SDS. The wind direction was from the north, and the odor complaint was downwind of Calumet WRP SDS. It was possible that the odor complaint was caused by odor from Calumet WRP SDS.

Harlem Avenue Solids Management Area, Vulcan Solids Drying Area, Marathon Solids Drying Area, and Lawndale Avenue Solids Management Area Solids Processing Site

The HASMA facility consists of HASMA, LASMA SPS, Vulcan SDA, and Marathon SDA, located near the intersection of South Harlem Avenue and the Chicago Sanitary and Ship Canal on the north bank of the Canal. The HASMA, Vulcan SDA, Marathon SDA, and LASMA SPS had 84 percent of the total observations characterized as faint to no odor. The occurrence of strong odors at these facilities was infrequent. Most of the observations were described as faint to no odor. There were no very strong and 12 strong odor observations out of 774 total observations. The strong odors were observed in various months and were spread among the various locations depending upon the activity at the time.

The percentage of observations at which easily noticeable, strong, and very strong odors were observed was plotted by month and is presented in [Figure 2](#). Very strong odors were not observed during 2024. Strong odors were observed under six percent of the time monthly. The easily noticeable odor observations ranged from 1.3 to 30.5 percent during this period. The easily noticeable odors were highest during September 2024, at 30.5 percent.

The average H₂S levels at the various locations around these SDAs and SPS ranged from 0.24 ppbv to 3.93 ppbv. The highest H₂S levels at the various locations around these SDAs and SPS ranged from 4.18 to 105.3 ppbv. The mean and maximum values at all locations are shown in [Table 5](#) with the method for calculating averages described in the footnote. The highest value of 105.3 ppbv was detected at Vulcan Northeast on July 30, 2024.

There were ten (10) odor complaints related to HASMA, Vulcan SDA, Marathon SDA, and LASMA SPS during 2024. Some odor complaints were initiated by the same person. The District sent staff to inspect the odor situation, but none of the odor complaints were verified by the District staff at the time of inspection. This may be due to the erratic nature of the odor episodes. [Figure 3](#) shows the locations of odor complaints represented by purple diamonds. Odor complaints 4, 5, 6, happened at the same location, so the total number of purple diamonds is less than ten (10). Odor complaints one (1) to seven (7) were at the east and southeast of the biosolids drying areas. Odor complaints 8 to 10 were at the northeast of the biosolids drying areas. At the time of odor complaints, the wind direction for odor complaint one (1) was from west and southwest; and the wind directions for odor complaints eight (8) and nine (9) were from south and southwest. The locations of these odor complaints appeared to be at the downwind location of HASMA SPS.

According to the information from www.wunderground.com, at the time of odor complaints, the wind directions for odor complaint two (2) was mainly from east and northeast; the wind direction for odor complaint three (3), four (4), six (6), and seven (7) were mainly from east; the wind directions for odor complaint five (5) was mainly from north and northeast; and the wind direction for odor complaint ten (10) was mainly from south. It appears that when these odor complaints were reported the wind directions were opposite to the biosolids drying area.

TABLE 3: ODOR MONITORING RESULTS FOR 2024

Facility	Departments Participating	Total Number of Observations	Number of Observations Significant Odors Detected			Number Insignificant Odors ¹	Percent Insignificant Odors
			Very Strong	Strong	Easily Noticeable		
Calumet WRP SDS	M&R	451	0	4	45	402	89%
HASMA, Marathon, Vulcan SDAs, and LASMA SPS	M&R	774	0	12	109	653	74%

Note: HASMA = Harlem Avenue Solids Management Area.
 LASMA = Lawndale Avenue Solids Management Area.
 M&R = Monitoring and Research Department.
 SDA = Solids Drying Area.
 SDS = Solids Drying Site.
 SPS = Solids Processing Site.
 WRP = Water Reclamation Plant.

¹Insignificant odors are all observations of faint, very faint, or no odor.

FIGURE 1: PERCENT MONTHLY ODOR OBSERVANCES AT
THE CALUMET SOLIDS DRYING SITE – 2024

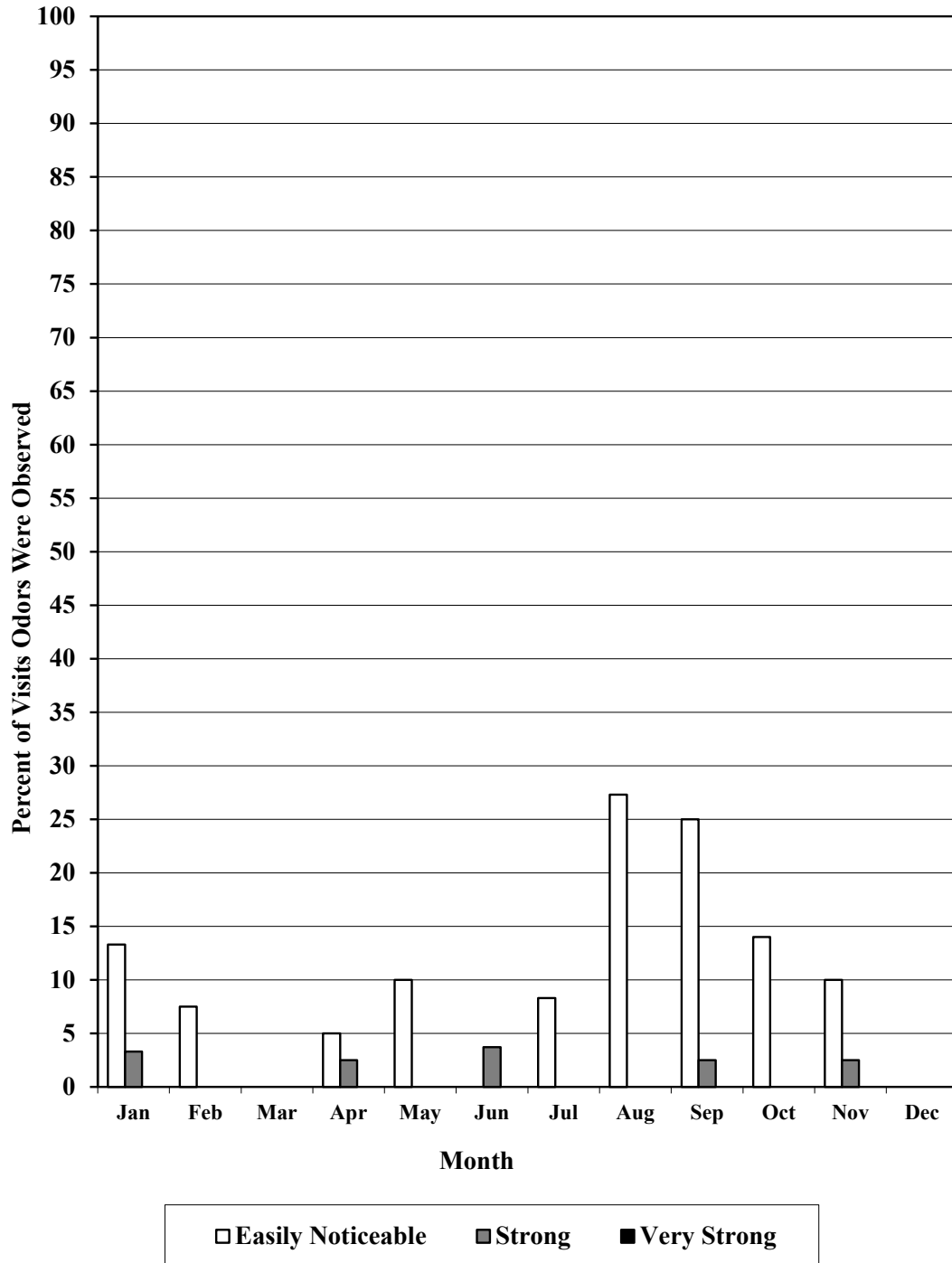


TABLE 4: HYDROGEN SULFIDE READINGS AT THE CALUMET
SOLIDS DRYING SITE FOR 2024

Location ²	Hydrogen Sulfide, ppbv ¹		
	Mean ³	Percent of Readings Below the Detection Limit	Maximum
CALSMA W Cell 1 Gate (1)	0.80	79.59%	6.51
CALSMA W Cell 4 @ Scale House (2)	0.98	81.63%	8.61
N. of CALSMA W. At N. Gate (3)	1.02	87.76%	26.56
CALSMA E. SW Corner of Cell 5 (19)	0.82	81.40%	7.25
CALSMA E. SE Corner of Cell 5 (20)	0.69	83.33%	8.30
CALSMA E. NE Corner of Cell 8 (21)	1.08	85.71%	23.61
CALSMA E. NW Corner of Cell 8 (22)	1.03	90.48%	25.24
CALSMA E., E. of Cell 1 (23)	0.63	85.71%	8.22
CALSMA E., S. of Cell 1 (24)	0.33	92.86%	7.13
CALSMA E., W. of Cell 1 (25)	0.52	90.24%	7.91

Note: CALSMA = Calumet Solids Management Area.

¹ppbv = parts per billion by volume.

²Numbers in parentheses correspond to Station numbers in [Figure AI-1](#).

³Mean values are calculated using the average of all recordings by the Jerome hydrogen sulfide analyzer. The detection limit for the Jeromes is 3 ppbv but may display 0~3 ppbv on the meter. If the measurement was below the detection limit, the value displayed was used to calculate the mean whether it was 0 or some other number in between 0 and 3. (The Royal Society of Chemistry, Analytical Methods Committee Technical Brief No. 5, Apr 2001.)

FIGURE 2: PERCENT MONTHLY ODOR OBSERVANCES AT THE HARLEM AVENUE SOLIDS MANAGEMENT AREA, VULCAN SOLIDS DRYING AREAS, MARATHON SOLIDS DRYING AREAS, AND LAWNGDALE AVENUE SOLIDS MANAGEMENT AREA SOLIDS PROCESSING SITE – 2024

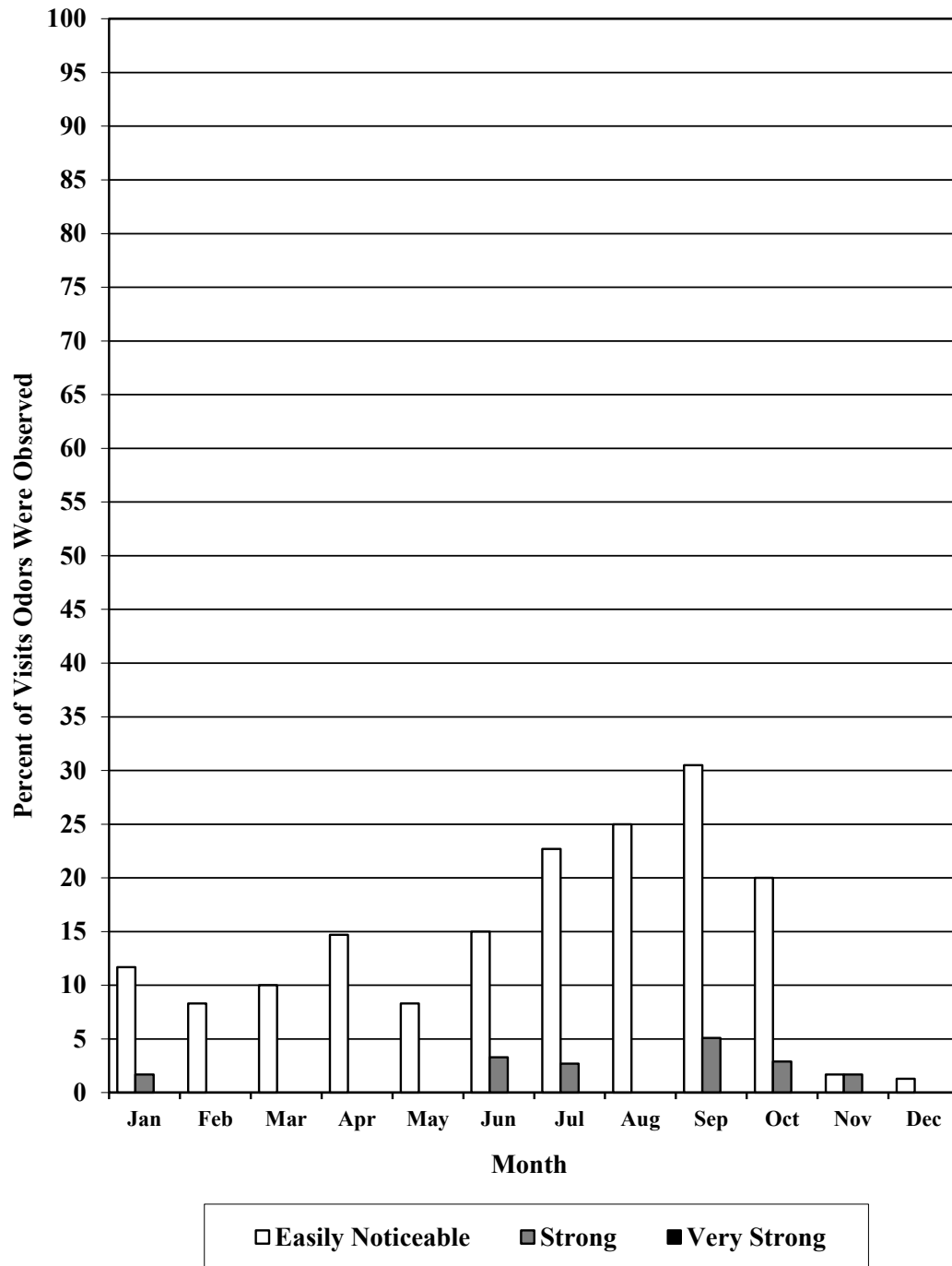


TABLE 5: HYDROGEN SULFIDE READINGS AT THE HARLEM AVENUE SOLIDS MANAGEMENT AREA, VULCAN SOLIDS DRYING AREAS, MARATHON SOLIDS DRYING AREAS, AND LAWNDALE AVENUE SOLIDS MANAGEMENT AREA SOLIDS PROCESSING SITE FOR 2024

Location ²	Hydrogen Sulfide, ppbv ¹		
	Mean ³	Percent of Readings Below the Detection Limit	Maximum
HASMA E. (1)	1.56	62.00%	9.53
HASMA Center (2)	1.41	80.00%	20.14
Vulcan NE (3)	1.29	70.00%	9.12
Vulcan Construction Shaft (4)	3.93	70.00%	105.3
Vulcan NW (5)	2.63	66.00%	22.3
Vulcan TARP Well (6)	3.34	68.00%	62.31
LASMA Lagoon 24 (11)	1.73	60.00%	11.49
LASMA Lagoon 20 (12)	0.80	82.00%	7.25
LASMA Cell 1E-1W (13)	0.48	87.50%	5.12
LASMA Cell 2E-2W (14)	0.32	91.84%	5.50
LASMA Cell 3E-3W (15)	0.46	87.76%	4.79
LASMA Cell 4E-4W (16)	0.27	93.88%	5.58
LASMA Cell 5E-5W (17)	0.25	93.88%	4.74
Marathon NE (18)	0.28	92.00%	4.18
Marathon SW (19)	0.24	94.00%	4.62

Note: HASMA = Harlem Avenue Solids Management Area.

LASMA = Lawndale Avenue Solids Management Area.

TARP = Tunnel and Reservoir Plan.

¹ppbv = parts per billion by volume.

²Numbers in parentheses correspond to station numbers in [Figure AI-2](#).

³Mean values are calculated using the average of all recordings by the Jerome hydrogen sulfide analyzer. The detection limit for the Jeromes is three ppbv but may be displayed as zero ppbv on the meter. If the measurement was below the detection limit, the value displayed was used to calculate the mean whether it was zero or another number between zero and three. (The Royal Society of Chemistry, Analytical Methods Committee Technical Brief No. 5, Apr 2001.)

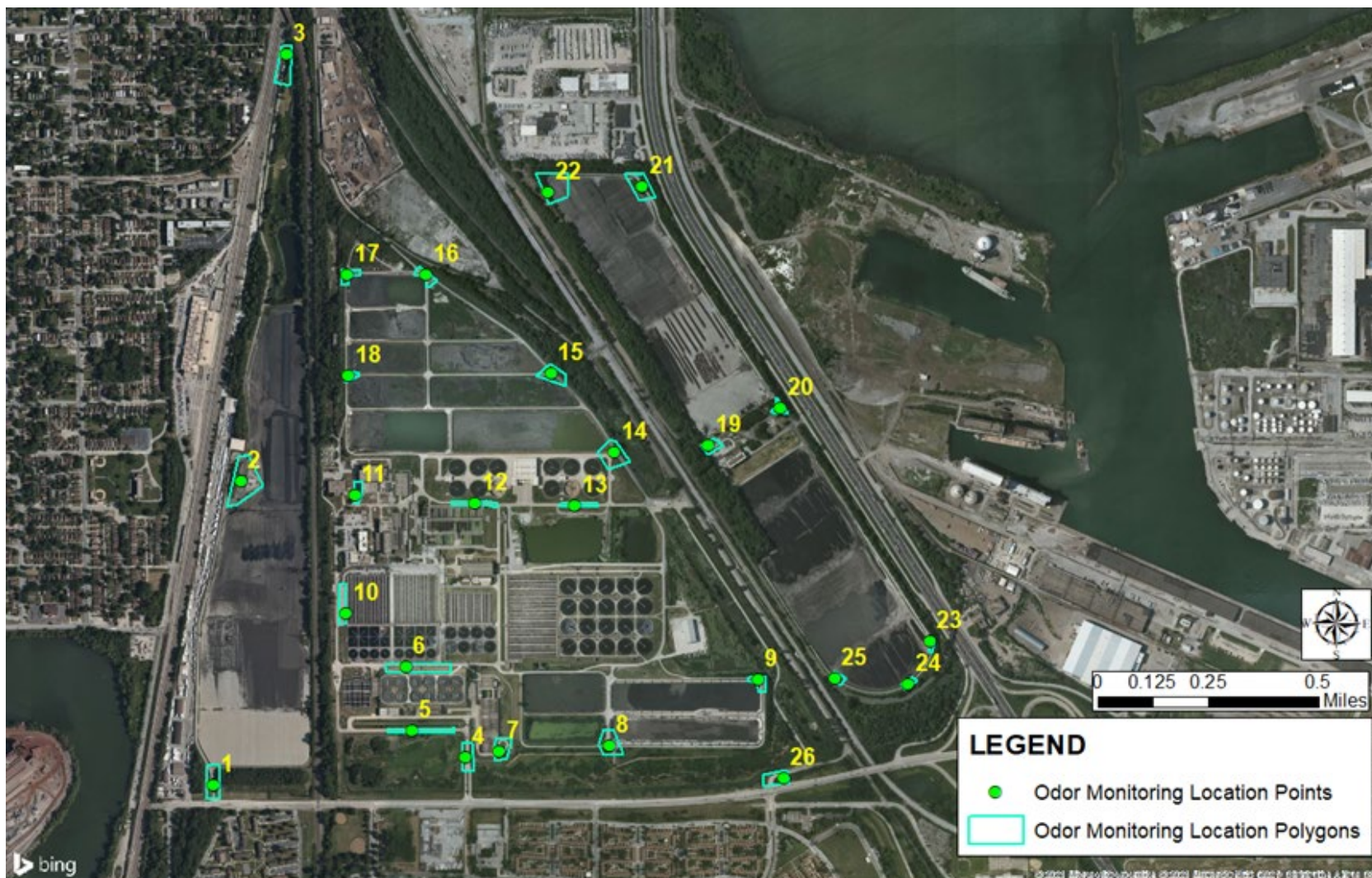
2024



APPENDIX AI

LOCATION OF ODOR MONITORING STATIONS AT THE METROPOLITAN WATER
RECLAMATION DISTRICT OF GREATER CHICAGO SOLIDS DRYING AREAS AND
SOLIDS PROCESSING SITES

FIGURE AI-1: ODOR MONITORING LOCATIONS AT THE CALUMET WATER RECLAMATION PLANT
AND SOLIDS DRYING SITES*



*Location 1–3 and 19–25 are odor monitoring locations for solids drying sites.

FIGURE AI-2: ODOR MONITORING LOCATIONS IN THE NORTHERN PORTION OF THE HARLEM AVENUE SOLIDS MANAGEMENT AREA, VULCAN, AND MARATHON SOLIDS DRYING AREAS, AND LAWNSDALE AVENUE SOLIDS MANAGEMENT AREA SOLIDS PROCESSING SITES*



*Locations 1–6 are odor monitoring locations for solids drying areas.

FIGURE AI-3: ODOR MONITORING LOCATIONS IN THE SOUTHERN PORTION OF THE HARLEM AVENUE SOLIDS MANAGEMENT AREA, VULCAN, AND MARATHON SOLIDS DRYING AREAS, AND LAWNSDALE AVENUE SOLIDS MANAGEMENT AREA SOLIDS PROCESSING SITES*



*Locations 11–19 are odor monitoring locations for solids drying areas and solids processing sites.