

*Protecting Our Water Environment*



*Metropolitan Water Reclamation District of Greater Chicago*

***MONITORING AND RESEARCH  
DEPARTMENT***

***REPORT NO. 13-37***

***ODOR MONITORING PROGRAM AT THE METROPOLITAN WATER  
RECLAMATION DISTRICT OF GREATER CHICAGO'S SOLIDS DRYING  
AND SOLIDS PROCESSING FACILITIES DURING 2012***

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ODOR MONITORING PROGRAM AT THE METROPOLITAN WATER RECLAMATION  
DISTRICT OF GREATER CHICAGO'S SOLIDS DRYING AND SOLIDS PROCESSING  
FACILITIES DURING 2012

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## **DISCLAIMER**

Mention of proprietary equipment and chemicals 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 solids drying site (SDS), one solids processing site (SPS), and five solids drying areas (SDAs) since 1990. Both the Monitoring and Research Department (M&R) and Maintenance and Operations Department (M&O) personnel made subjective observations regarding the type and intensity of any odor perceived. The M&R staff recorded instantaneous hydrogen sulfide (H<sub>2</sub>S) measurements using a handheld monitor at each monitoring site. The number of locations at each facility varied from 4 to 17. The frequency of monitoring varied from one to three days 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. In this report, only data from the solids drying sites, drying areas, and processing site are presented.

During 2012, two very strong odors were observed at the SDS, SDAs, and SPS. At all the solids drying and processing sites that were monitored, the observations were characterized as faint to no odor from 66 to 96 percent of the time.

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

The H<sub>2</sub>S levels generally followed a pattern similar to the odor observations with occasional high values. The average level of H<sub>2</sub>S ranges from 5.4 to 22.4 ppbv (parts per billion by volume) at the SDS, SDAs, and SPS.

TABLE 1: STRONG AND VERY STRONG ODOR OBSERVATIONS – 2012

Facility	Number of Strong Odor Observations	Number of Very Strong Odor Observations	Total Number of Observations
<b>Calumet SDS</b>			
Drying Cell #1 SW	6		
Drying Cell #8 NW	1		
Drying Cell #8 NE	3		
East Drying Cell #1 SE	7	1	
West Drying Cell #1 at Gate	3		
West Drying Cell #4	<u>5</u>		
Total	25	<u>1</u>	1,156
<b>HASMA, Marathon, and Vulcan SDAs, and LASMA SPS</b>			
HASMA	10	1	
HASMA Center	11		
Vulcan South	2		
Vulcan North	4		
Vulcan TARP DS	7		
Vulcan TARP Well	2		
Lagoon #24	5		
Lagoon #30	2		
Cell 2E – 2W	3		
Cell 3E – 3W	1		
Cell 5E – 5W	1		
Marathon	4		
Marathon West	<u>6</u>	<u>1</u>	
Total	58	<u>1</u>	1,580



TABLE 1 (Continued): STRONG AND VERY STRONG ODOR OBSERVATIONS – 2012

Facility	Number of Strong Odor Observations	Number of Very Strong Odor Observations	Total Number of Observations
RASMA SDA <sup>1</sup>	<u>0</u>	<u>0</u>	0
	Total 0	0	
Stony Island SDA			
Entrance @ 122nd St.	0		
NE Corner Cell #5	<u>0</u>	<u>0</u>	
	Total 0	0	337

<sup>1</sup>RASMA was not used as a biosolids drying site during 2012.

DS = Drop shaft.

HASMA = Harlem Avenue Solids Management Area.

LASMA = Lawndale Avenue Solids Management Area.

RASMA = Ridgeland Avenue Solids Management Area.

SDA = Solids Drying Area.

SDS = Solids Drying Site.

SPS = Solids Processing Site.

TARP = Tunnel and Reservoir Plan.

## INTRODUCTION

M&R in conjunction with M&O has been conducting an odor monitoring program at various District solids drying and processing facilities for the past 23 years. The program was initiated by M&R to monitor the solids processing and drying sites at the Lawndale Avenue Solids Management Area (LASMA), Harlem Avenue Solids Management Area (HASMA), Marathon, and Vulcan in 1990, and was expanded to the Ridgeland Avenue Solids Management Area (RASMA) and Stony Island solids drying sites in 2001 as part of the District's Solids Drying Area Permits.

At each location a similar procedure is followed to monitor odors. M&R personnel, and at some facilities M&O personnel, visit various stations 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, no odor; 1, very faint; 2, faint; 3, easily noticeable; 4, strong; and 5, very strong odor. In addition to the subjective odor measurements, the ambient air is sampled and analyzed for H<sub>2</sub>S using a Jerome Model 631-X H<sub>2</sub>S analyzer.

The objective of this program is to collect and maintain a database of odor levels within and around each solids drying and processing facility. This data can be used to study the trends in odor levels associated with solids drying and processing operations and to correlate odor levels to conditions related to solids drying and processing operations or changing conditions within the facility.

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, and who conducts the monitoring.

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

The number of monitoring locations at each facility varies from 4 to 17, depending upon the size of the facility and the history of odor episodes in those facilities. The solids drying and processing facilities are monitored from one to three days per week.

In 2012, odor complaints were received only at the Calumet SDS. The two complaints received were both verified.

This report presents the odor monitoring data for the year 2012. The odor monitoring data in terms of frequency of occurrence, locations of possible odor sources, and H<sub>2</sub>S levels have been reviewed and summarized.

TABLE 2: ODOR MONITORING PROGRAM FOR 2012

Facility	Number of Locations Monitored	Year Began	Months of Year	Days per Week	Departments Participating	H <sub>2</sub> S Measured	Number of Odor Complaints	Number of Complaints Verified
Calumet SDS	9	1992	12	3 2	M&R M&O	Yes	2	2
HASMA, Vulcan, and Marathon SDAs, and LASMA SPS	17	1990	12	3	M&R	Yes	0	0
RASMA SDA	4	2001	12	1 to 2	M&R	Yes	0	0
Stony Island SDA	4	2001	12	1	M&R	Yes	0	0

Note: HASMA = Harlem Avenue Solids Management Area  
 LASMA = Lawndale Avenue Solids Management Area  
 ND = Not determined.  
 RASMA = Ridgeland Avenue Solids Management Area  
 SDA = Solids Drying Area.  
 SDS = Solids Drying Site.  
 SPS = Solids Processing Site.  
 M&R = Monitoring and Research.  
 M&O = Maintenance and Operations.

## **ODOR MONITORING PROGRAM AT THE METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO'S SOLIDS DRYING AND SOLIDS PROCESSING FACILITIES IN 2012**

The results of the various odor monitoring programs at each of the monitored sites for 2012 are summarized in [Table 3](#). The results have been divided into two major groups: detected odors, which include the very strong, strong, and easily noticeable odor categories, and non-detected odors, which are either faint, very faint, or no odor.

A general observation drawn from the table is that at the Calumet SDS, where both M&R and M&O personnel conducted odor monitoring, the M&O personnel show a lower percentage of odors detected. This may be due to the fact that the M&O personnel are exposed to the specific area on a daily basis as compared to the M&R personnel which can result in olfactory desensitization. Thus, they may not differentiate especially well between faint and easily noticeable odors.

### **Calumet Solids Drying Site**

The Calumet SDS consists of the East SDA, located east of the Calumet Water Reclamation Plant (WRP), and the West SDA, located west of the Calumet WRP. The occurrence of strong odors at the drying areas, which also includes the non-operational centrifuge building located at the East SDA, was infrequent. The majority of the observations were described as faint to no odor. One very strong odor was detected in 2012. Strong odors were observed at the SDS in February and July through December. Strong odors were observed mostly under five percent of the time on a monthly basis except for July. Easily noticeable odors occurred between 8 and 27 percent of the time throughout the various locations. [Figure 1](#) presents the monthly frequency of occurrence of the easily noticeable, strong, and very strong odor observations. The easily noticeable odors were highest during August 2012.

The average H<sub>2</sub>S levels were between 6.6 and 22.4 ppbv, as shown in [Table 4](#). The highest value observed (1,200 ppbv) was at East Drying Cell #1 SW.

Two odor complaints were received with regard to the Calumet SDS during 2012.

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

The HASMA, Vulcan, and Marathon SDAs and the LASMA SPS had 66 percent of the total observations characterized as faint to no odor. There was one very strong and 58 strong odor observations out of 1,580 total observations. The strong odor observations were spread among the various locations (HASMA, HASMA Center, Vulcan, LASMA Cells, Lagoons 24 and 30, and Marathon) depending upon the activity at the time.

TABLE 3: ODOR MONITORING RESULTS FOR 2012

Facility	Departments Participating	Total Number of Observations	Number of Observations Odors were Detected			Number Non-Detects <sup>1</sup>	Percent Non-Detects
			Very Strong	Strong	Easily Noticeable		
Calumet SDS	M&R	723	1	25	177	520	72
	M&O	433	0	0	27	406	94
HASMA, Vulcan, and Marathon SDAs, and LASMA SPS	M&R	1,580	1	58	478	1,043	66
4 RASMA SDA <sup>2</sup>	M&R	0	0	0	0	0	0
Stony Island SDA	M&R	337	0	0	14	323	96

Note: HASMA = Harlem Avenue Solids Management Area.  
 LASMA = Lawndale Avenue Solids Management Area.  
 RASMA = Ridgeland Avenue Solids Management Area.  
 SDA = Solids Drying Area.  
 SDS = Solids Drying Site.  
 SPS = Solids Processing Site.  
 M&R = Monitoring and Research.  
 M&O = Maintenance and Operations.

<sup>1</sup>Non-detects are all observations of faint, very faint, or no odor.

<sup>2</sup>RASMA SDA was not used as a biosolids drying site during 2012.

FIGURE 1: PERCENT OF AVERAGE MONTHLY ODOR OBSERVANCES AT THE CALUMET WATER RECLAMATION PLANT SOLIDS DRYING SITES – 2012

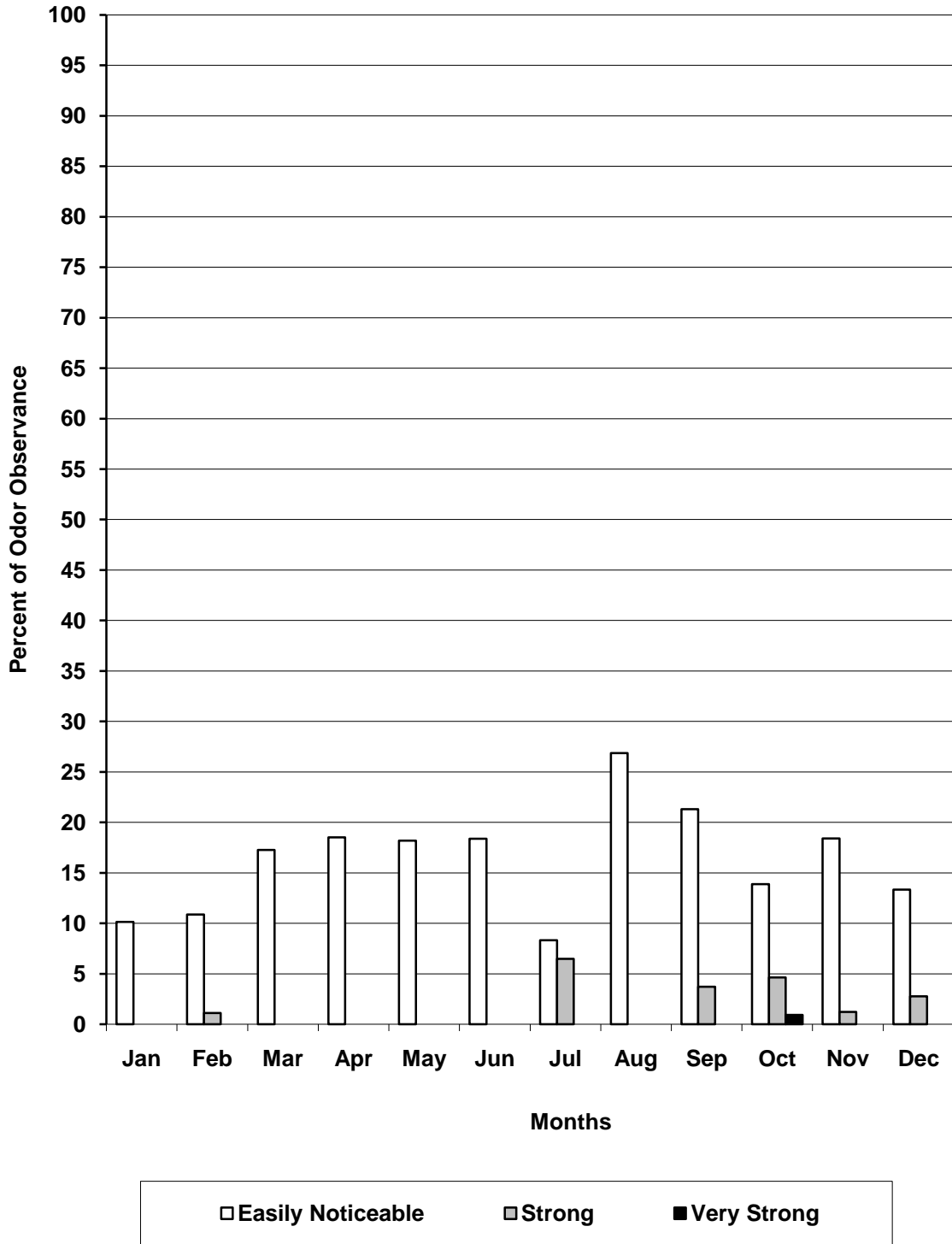


TABLE 4: HYDROGEN SULFIDE READINGS AT THE CALUMET  
SOLIDS DRYING SITES – 2012

Location	Hydrogen Sulfide, ppbv <sup>1</sup>		
	Mean	Minimum	Maximum
East Drying Cell #1 SW (14) <sup>2</sup>	22.4	2	1,200
Hopper Building (15)	7.5	0	43
East Drying Cell #8 NW (16)	10.1	0	140
East Drying Cell #8 NE (17)	7.8	0	38
Truck Scale/Centrifuge (18)	8.5	0	61
East Drying Cell #1 SE (19)	20.5	0	880
West Drying Cell #1 @ Gate (20)	6.6	0	56
West Drying Cell #4 (21)	6.7	0	39
Bituminous Road @ Gate (22)	9.3	1	290

<sup>1</sup> ppbv = Parts per billion by volume.

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

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. The frequency of observed odors is generally highest during the spring through the summer months (April through August) when solids processing and drying is being carried out. The easily noticeable odor observations ranged from 44 to 70 percent during this time period.

The average H<sub>2</sub>S levels at the various locations around these SDAs and SPS ranged from 6.4 to 12.1 ppbv as shown in Table 5.

No odor complaints were received in 2012 with regard to these solids drying and processing facilities.

### **Ridgeland Avenue Solids Management Area and Stony Island Solids Drying Areas**

The RASMA SDA was not used as a biosolids drying site during 2012.

The Stony Island SDA had 96 percent of the observations characterized as faint to no odor, with no strong or very strong odor observations in 2012. The easily noticeable odors accounted for approximately four percent of the total observations.

A monthly summary of the observations at the Stony Island SDA of easily noticeable, strong, and very strong odors during 2012 is presented in Figure 3 expressed as frequency of occurrence.

The average H<sub>2</sub>S levels around the Stony Island SDA, as shown in Table 6, varied from 5.4 to 5.7 ppbv.

No odor complaints were received in 2012 with regard to the RASMA and Stony Island SDAs.



FIGURE 2: PERCENT OF AVERAGE MONTHLY ODOR OBSERVANCES AT THE HARLEM AVENUE SOLIDS MANAGEMENT AREA, VULCAN, MARATHON SOLIDS DRYING AREAS AND LAWDALE AVENUE SOLIDS MANAGEMENT AREA SOLIDS PROCESSING SITE – 2012

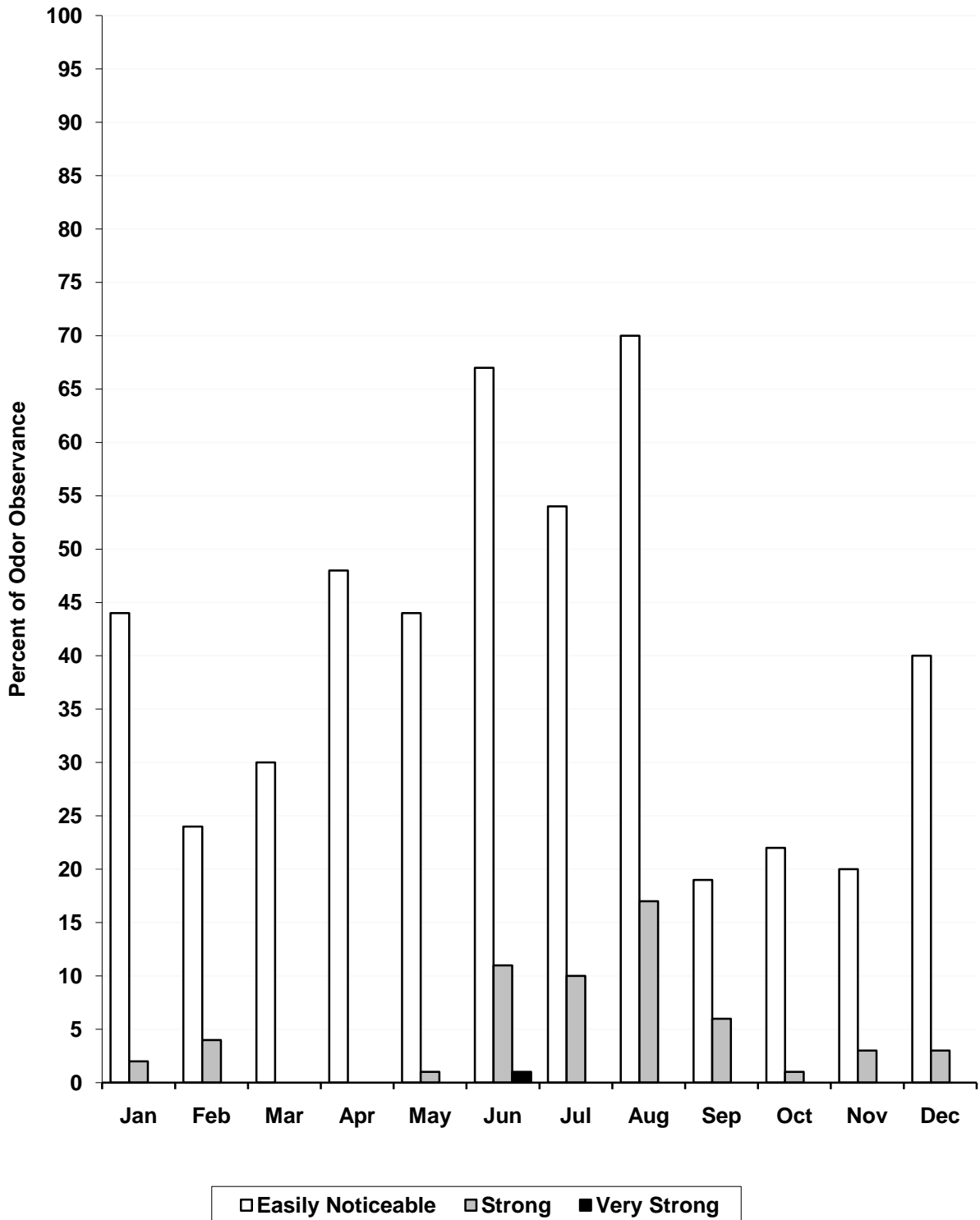


TABLE 5: HYDROGEN SULFIDE READINGS AT THE HARLEM AVENUE SOLIDS MANAGEMENT AREA, VULCAN, MARATHON SOLIDS DRYING AREAS, AND LAWNSDALE AVENUE SOLIDS MANAGEMENT AREA SOLIDS PROCESSING SITE – 2012

Location	Hydrogen Sulfide, ppbv <sup>1</sup>		
	Mean	Minimum	Maximum
HASMA (1) <sup>2</sup>	12.1	0	140
HASMA Center (1.5)	11.6	0	110
Vulcan South (2)	8.8	0	81
Vulcan North (3)	9.6	0	82
Vulcan TARP Drop Shaft (4)	8.6	0	52
Vulcan TARP Well (5)	7.2	0	34
LASMA Lagoon 1 (6)	6.9	0	30
LASMA Lagoon 16 (7)	6.4	0	19
LASMA Lagoon 24 (8)	11.9	0	48
LASMA Lagoon 30 (9)	8.4	0	110
LASMA Cell 1E-1W (10)	7.3	0	27
LASMA Cell 2E-2W (11)	7.2	0	30
LASMA Cell 3E-3W (12)	7.5	0	55
LASMA Cell 4E-4W (13)	7.5	0	32
LASMA Cell 5E-5W (14)	7.7	0	43
Marathon (15)	7.0	0	28
Marathon West (16)	7.9	0	39

<sup>1</sup>ppbv = Parts per billion by volume.

<sup>2</sup>Numbers in parentheses correspond to Station numbers in [Figure AI-2](#).

FIGURE 3: PERCENT OF AVERAGE MONTHLY ODOR OBSERVANCES AT THE STONY ISLAND SOLIDS DRYING AREA – 2012

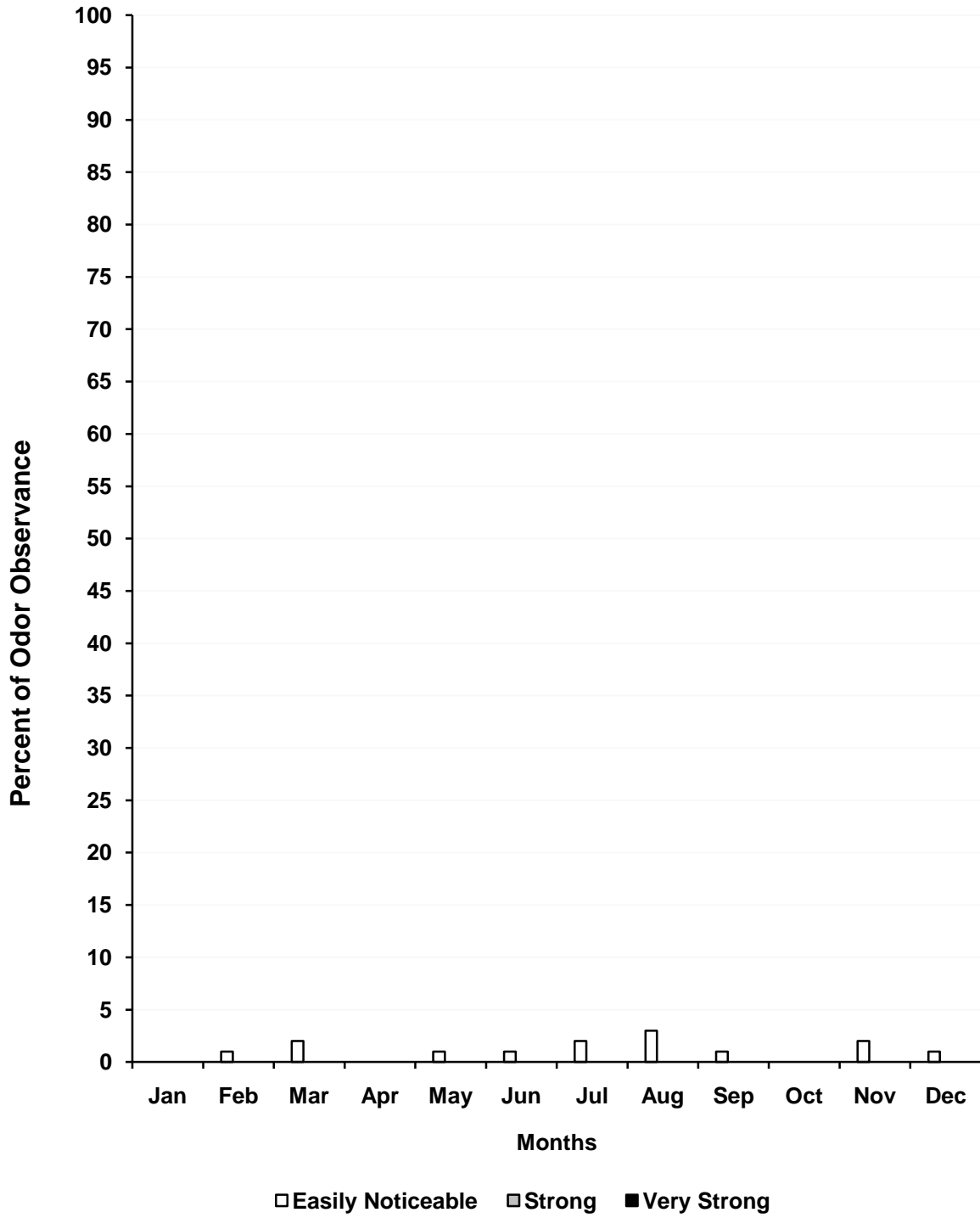


TABLE 6: HYDROGEN SULFIDE READINGS AT THE RIDGELAND AVENUE SOLIDS MANAGEMENT AREA AND STONY ISLAND SOLIDS DRYING AREA – 2012

Location	Hydrogen Sulfide, ppbv <sup>1</sup>		
	Mean	Minimum	Maximum
RASMA			
SW Parking Area (1) <sup>2</sup>	0	0	0
North of Cell 2W (2)	0	0	0
NE Corner Cell 5E (3)	0	0	0
South of Cell 5 (4)	0	0	0
Stony Island			
Entrance 122nd St (1) <sup>3</sup>	5.7	0	11
NE Corner Cell 5 (2)	5.4	0	11
South End Cells 4 & 7 (3)	5.7	0	12
West Side of Cell 3 (4)	5.6	0	13

<sup>1</sup>ppbv = Parts per billion by volume.

<sup>2</sup>Numbers in parentheses correspond to Station numbers in Figure AI-3.

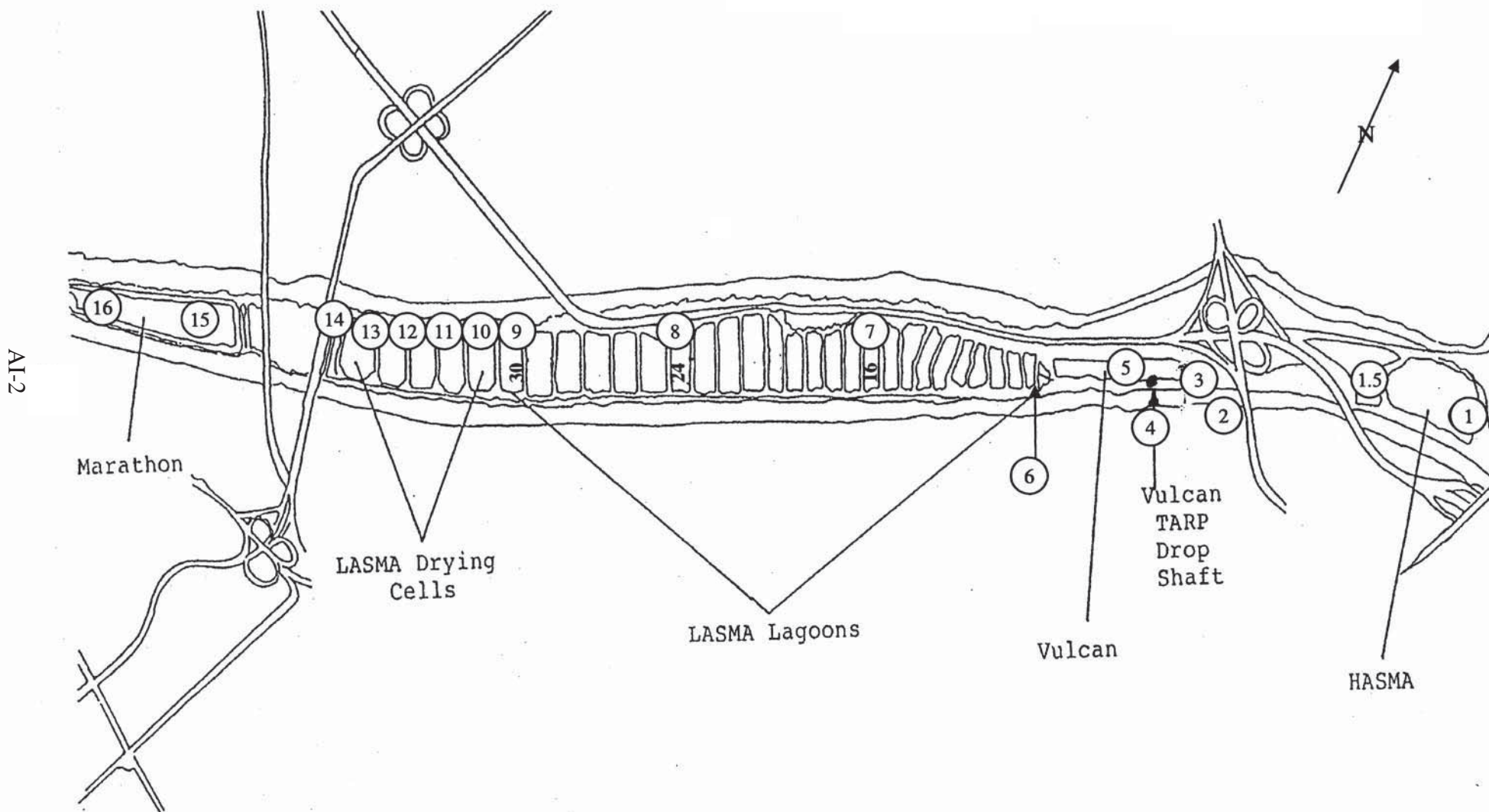
<sup>3</sup>Numbers in parentheses correspond to Station numbers in Figure AI-4.

APPENDIX AI

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



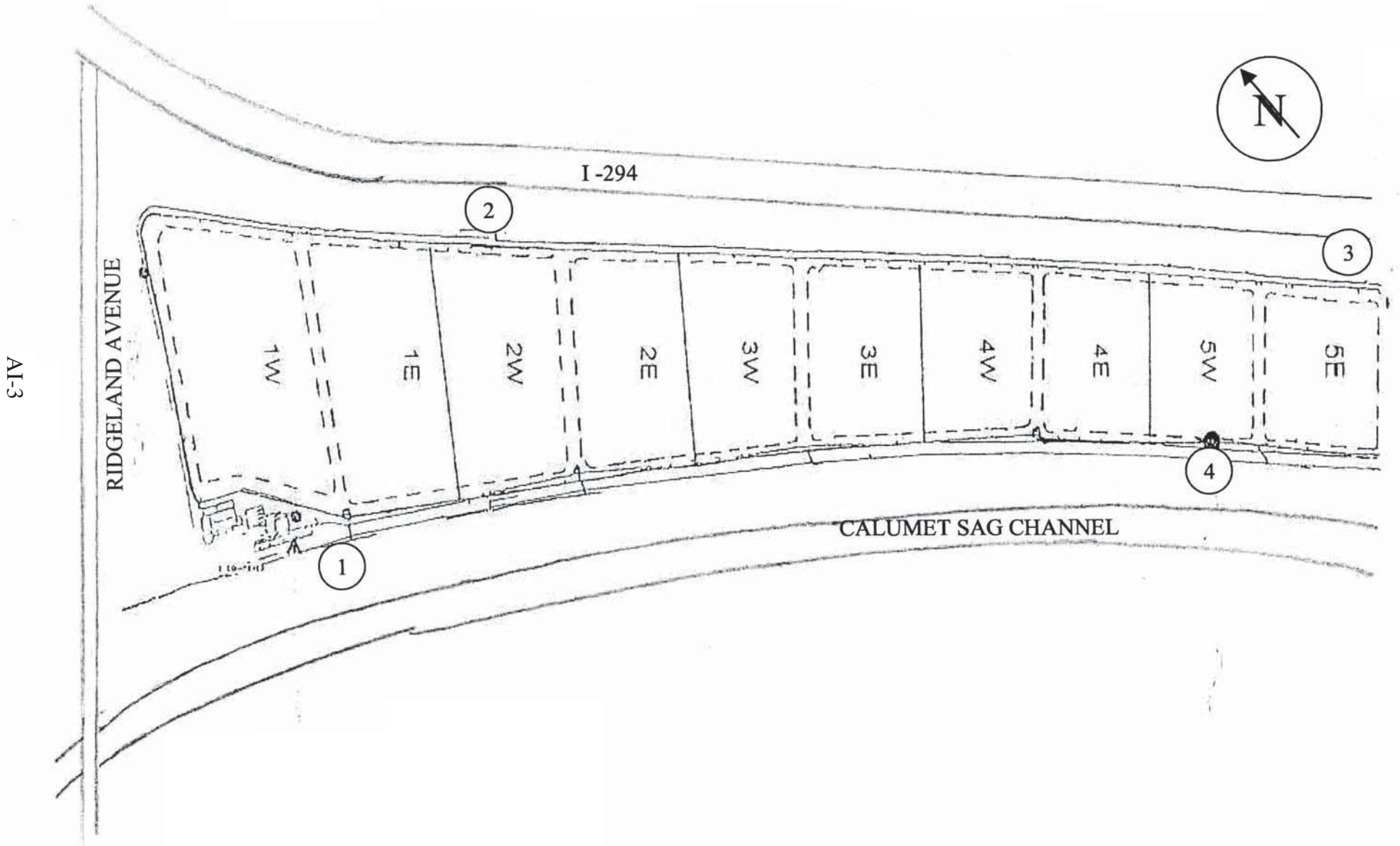
TABLE AI-2: HARLEM AVENUE SOLIDS MANAGEMENT AREA, VULCAN, AND MARATHON SOLIDS DRYING SITES AND LAWNSDALE AVENUE SOLIDS MANAGEMENT AREA SOLIDS PROCESSING SITE\*



\*Numbered circles indicate odor monitoring stations.



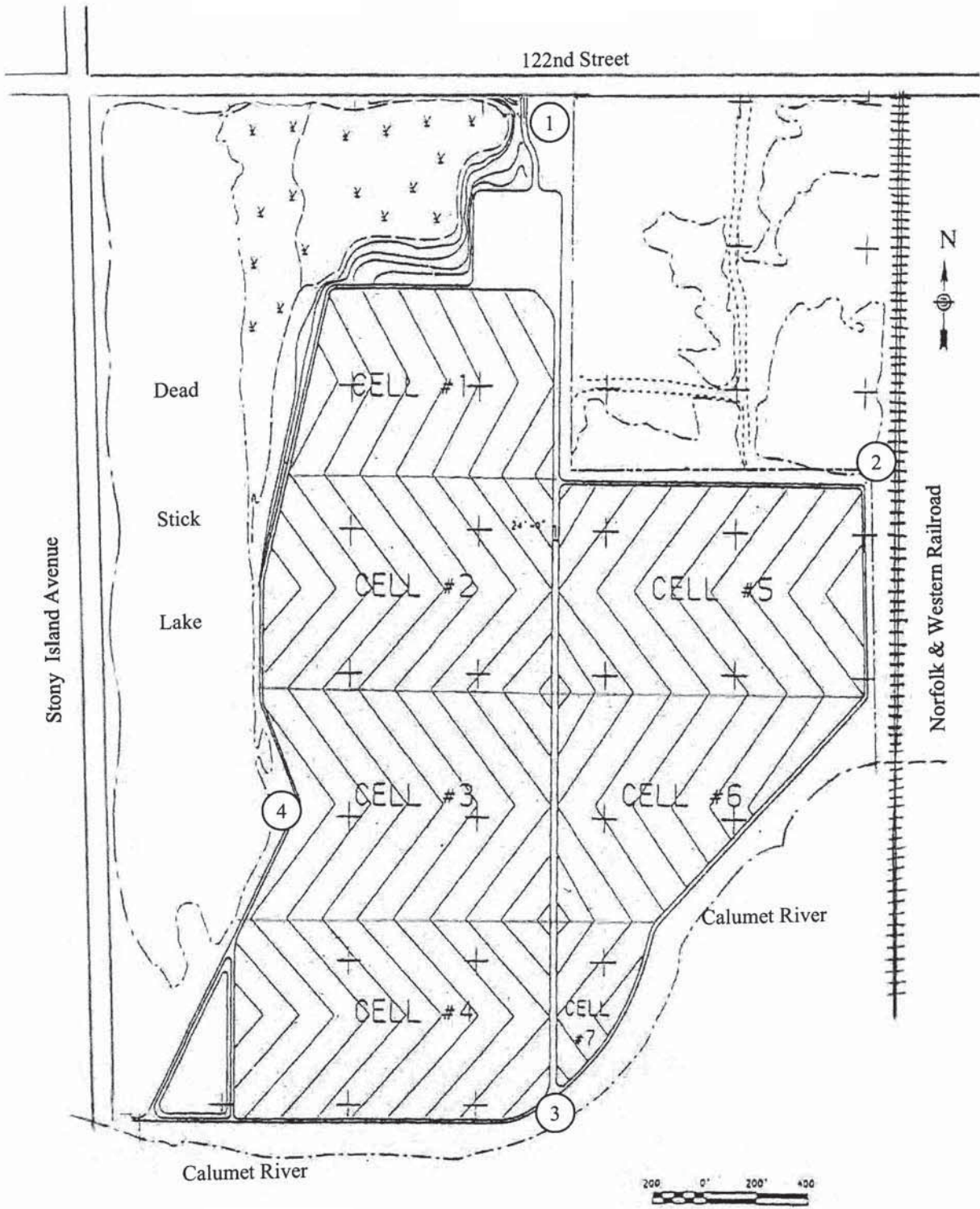
TABLE AI-3: RIDGELAND AVENUE SOLIDS MANAGEMENT AREA SOLIDS DRYING AREA\*



\*Numbered circles indicate odor monitoring stations.



TABLE AI-4: STONY ISLAND SOLIDS DRYING AREA\*



\*Numbered circles indicate odor monitoring stations.