

Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***RESEARCH AND DEVELOPMENT
DEPARTMENT***

REPORT NO. 03-15

ODOR MONITORING PROGRAM AT DISTRICT FACILITIES

DURING 2001

August 2003

Metropolitan Water Reclamation District of Greater Chicago

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**ODOR MONITORING PROGRAM AT DISTRICT FACILITIES
DURING 2001**

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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.

INTRODUCTION

The Research and Development (R&D) Department in conjunction with the Maintenance and Operations (M&O) Department has been carrying out an odor monitoring program at various District facilities for the past twelve years. The initial program started with the sludge processing and drying sites at LASMA, HASMA, Marathon, and Vulcan in 1990, and was expanded to the water reclamation plants (WRPs) and other drying sites. The latest additions were the Ridgeland and Stony Island sludge drying sites in 2001.

At each location a similar process is followed to monitor odors. R&D Department personnel, and at some facilities M&O Department 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 from 0, no odor, to 5, very strong odor. In recent years, in addition to the subjective odor measurements, an analysis of the ambient air for hydrogen sulfide is also conducted. These data are tabulated monthly.

The objective of all the programs is to collect and maintain a database of odor levels within and around each WRP, and

associated sludge processing areas. The data are used to study the trends in odor levels associated with WRP operations, and to correlate odor levels to conditions related to WRP operations or changing conditions within the WRP, such as installation of odor control equipment, or sometimes to conditions unrelated to the WRP. Since several residential areas surround the WRPs in the program, the odor monitoring activities are also designed to provide early warning of odorous conditions that develop within the WRPs, and to allow control of them before they come to the notice of the residents. If a very strong odor is observed, the incident is reported at the time of observation to the respective plant operating personnel.

An evaluation of the odor program has been made using the data for the year 2001. The odor monitoring data in terms of frequency of occurrence, locations of possible odor sources, and hydrogen sulfide levels has been reviewed and summarized.

A summary of the odor monitoring program is presented in Table 1. This table includes a brief description of the program with regard to when the monitoring began at each facility, the number of monitoring locations, the frequency of the monitoring, and who conducts the monitoring. The table also

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TABLE 1
ODOR MONITORING PROGRAM FOR 2001

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	13	1992	12	3 1	R&D M&O	Yes	0	--
Calumet SDS	9	1992	12	3 1	R&D M&O	Yes	0	--
Egan WRP	7	1993	12	1 **	R&D M&O**	Yes	3	2
Kirie WRP	17	1996	12	1 7*	R&D M&O	Yes	3	0
North Side WRP	13	1992	12	1 7**	R&D M&O**	Yes	3	1
Stickney WRP	19	1991	12	3 2	R&D M&O	Yes	5	0
HASMA, LASMA, Marathon, and Vulcan SPS	15	1990	12	3	R&D	Yes	1	0
Ridgeland SDS	4	2001	8	1 to 2	R&D	Yes	1	0
Stony Island SDS	4	2001	7	1	R&D	Yes	0	--

Note: SDS = Sludge Drying Site
SPS = Sludge Processing Site
WRP = Water Reclamation Plant

*At Kirie, M&O Department 7 days a week 3 times a day from May through November.

**The M&O Department conducts odor monitoring surveys depending upon conditions, but the data are not included in this report for 2001.

summarizes the odor complaints received and verified by each of the facilities during 2001.

Maps showing the odor monitoring sites at each WRP and Sludge Drying Area are presented in Appendix AI.

The number of monitoring locations at each facility varies from 4 to 19, depending upon the facility and previous odor conditions. Similarly, the frequency of the odor monitoring varies depending upon the potential for odor generation. The Calumet and Stickney WRPs and sludge drying areas are monitored from three to five days per week. At the Kirie WRP, the M&O Department had decided to monitor the facility every day, once per shift during the spring through fall months, as a result of complaints which had been received in the early 1990s.

Odor complaints in 2001 with regard to the various facilities were generally infrequent, from none to five in the year.

RESULTS AT DISTRICT FACILITIES IN 2001

The results of the various odor monitoring programs at each of the District facilities for 2001 are summarized in Table 2. The results have been divided into two major groups: detected odors, which includes the very strong, strong, and easily noticeable categories, and for all practical purposes nondetected odors which can vary from faint to no odor at all.

A general observation drawn from the table is that at those facilities where both R&D Department and M&O Department personnel conducted odor monitoring, the M&O Department personnel show a slightly lower frequency in odors detected. This may be due to the fact that the M&O Department personnel are exposed to the specific area on a daily basis as compared to the R&D Department personnel. Thus, they may not differentiate especially well between faint and easily noticeable odors.

Calumet WRP

In general, the majority of the odor monitoring observations ranged from faint to no odor; 72 percent of the time by R&D Department personnel and 94 percent of the time by M&O Department personnel, respectively. The strong odors that are observed occurred around the sludge concentration building,

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TABLE 2

ODOR MONITORING RESULTS FOR 2001

Facility	Departments Participating	Total Number of Odor Observations	Number of Observations Odors Were Detected			Number Non-Detects*	Percent Non-Detects
			Very Strong	Strong	Easily Noticeable		
Calumet WRP	R&D	1,872	0	12	518	1,342	72
	M&O	518	0	1	32	485	94
Calumet SDS	R&D	1,322	0	7	378	937	71
	M&O	316	0	1	8	307	97
o Egan WRP	R&D	352	0	2	51	299	85
Kirie WRP	R&D	879	0		115	764	87
	M&O	11,354	0	1	38	11,315	99
North Side WRP	R&D	670	0	1	153	516	77
Stickney WRP	R&D	2,818	0	18	900	1,900	67
	M&O	2,318	0	1	260	2,057	89
HASMA, LASMA, Marathon, and Vulcan SPS	R&D	2,166	0	16	596	1,554	72
Ridgeland SDS	R&D	264	0	2	80	182	70
Stony Island SDS	R&D	128	0	1	61	66	52

Note: SDS = Sludge Drying Site
 SPS = Sludge Processing Site
 WRP = Water Reclamation Plant

*Non-detects are all observations of faint odor to no odor.

with 6.4 percent of the observations registered as strong. Other areas which had easily noticeable odors were in the vicinity of the preliminary tanks, 73 percent of observations, sludge digester tanks, 30 percent of observations, lagoons 1, 2, 7, and 8, 30 to 31 percent of observations, and aeration Battery A, 23 percent of observations.

The hydrogen sulfide measurements made at the time of the odor monitoring by the R&D Department personnel are summarized in Table 3. As expected, the highest levels are in the vicinity of the sludge concentration building, averaging 103 ppbv. The next highest values were observed around the preliminary tanks, with average of 14.6 ppbv. The rest of the locations averaged between 5.8 and 7.9 ppbv, with a number of nondetectable observations.

Figure 1 summarizes the monthly observations of easily noticeable, strong, and very strong odors made during 2001 in terms of frequency of occurrence. The frequency of easily noticeable observations is only slightly higher in the summer period than the winter months.

Calumet Sludge Drying Areas

As with the Calumet WRP, the occurrence of strong odors was infrequent. The majority of the observations were

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TABLE 3

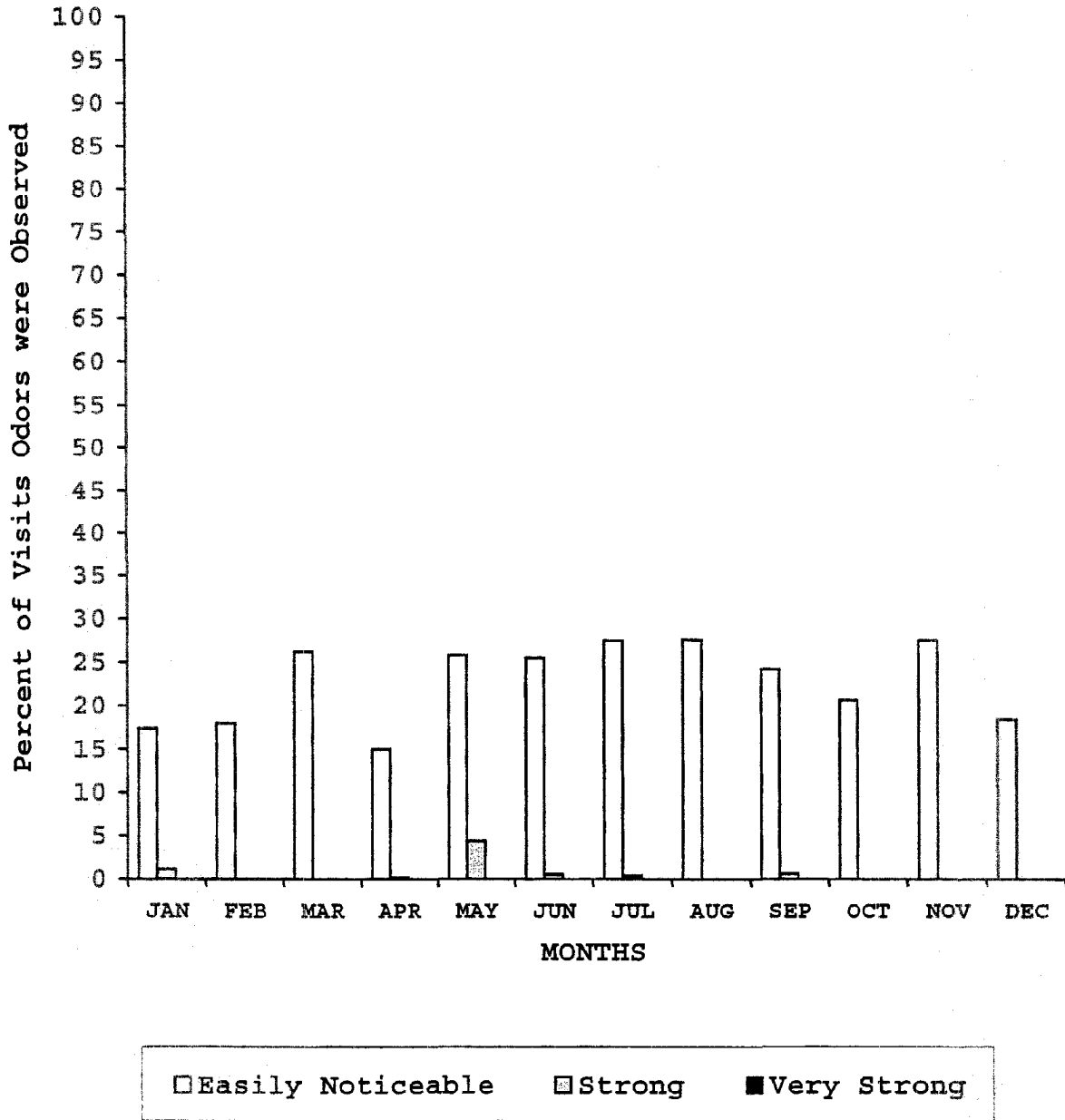
HYDROGEN SULFIDE READINGS AT
CALUMET WRP - 2001

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Plant Entrance	7.8	0	42
Lag. #16 SW Corner	5.8	0	13
Sludge Conc. Bldg.	103	1	2,400
Lag. #16 NE Corner	6.1	0	70
Sludge Digester Tanks	7.6	0	28
Aeration Battery A - West	6.4	0	53
TARP Pump Station	7.7	0	42
Preliminary Tanks	14.6	0	210
Gate Near Lag. #9	6.1	0	18
Between Lag. #7 & #8	7.3	0	27
Lagoon #1 & #2	7.1	0	29
Lagoon #3 & #4	6.2	0	23
Ellis Ave. & 130th St.	6.6	0	110

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FIGURE 1

ODOR OBSERVANCES AT CALUMET WRP - 2001



described as faint to no odor, 72 percent by the R&D Department and 94 percent by the M&O Department, respectively. Some strong odors were observed at the drying sites depending upon the activity at the time of observation, with most of the strong odors occurring at the East Drying Cells. Overall there were 13 strong odor observations out of 2,390 observations (0.5 percent). Easily noticeable odors occurred approximately 24 percent of the time around the drying areas.

The hydrogen sulfide levels averaged between 5.8 and 8.1 ppbv. A few values between 100 and 175 ppbv were observed as shown in Table 4.

Figure 2 presents the monthly frequency of occurrence of the easily noticeable, strong, and very strong odor observations. The easily noticeable odors fluctuated widely during the first half of 2001.

John E. Egan WRP

At the John E. Egan WRP the easily noticeable and stronger odor observations occurred 53 out of 352 times, or 15 percent. The easily noticeable odors were generally in the vicinity of the waste gas burner and the primary tanks, with 22 and 30 percent of the observations, respectively, being easily noticeable. In addition, there was one strong odor

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TABLE 4

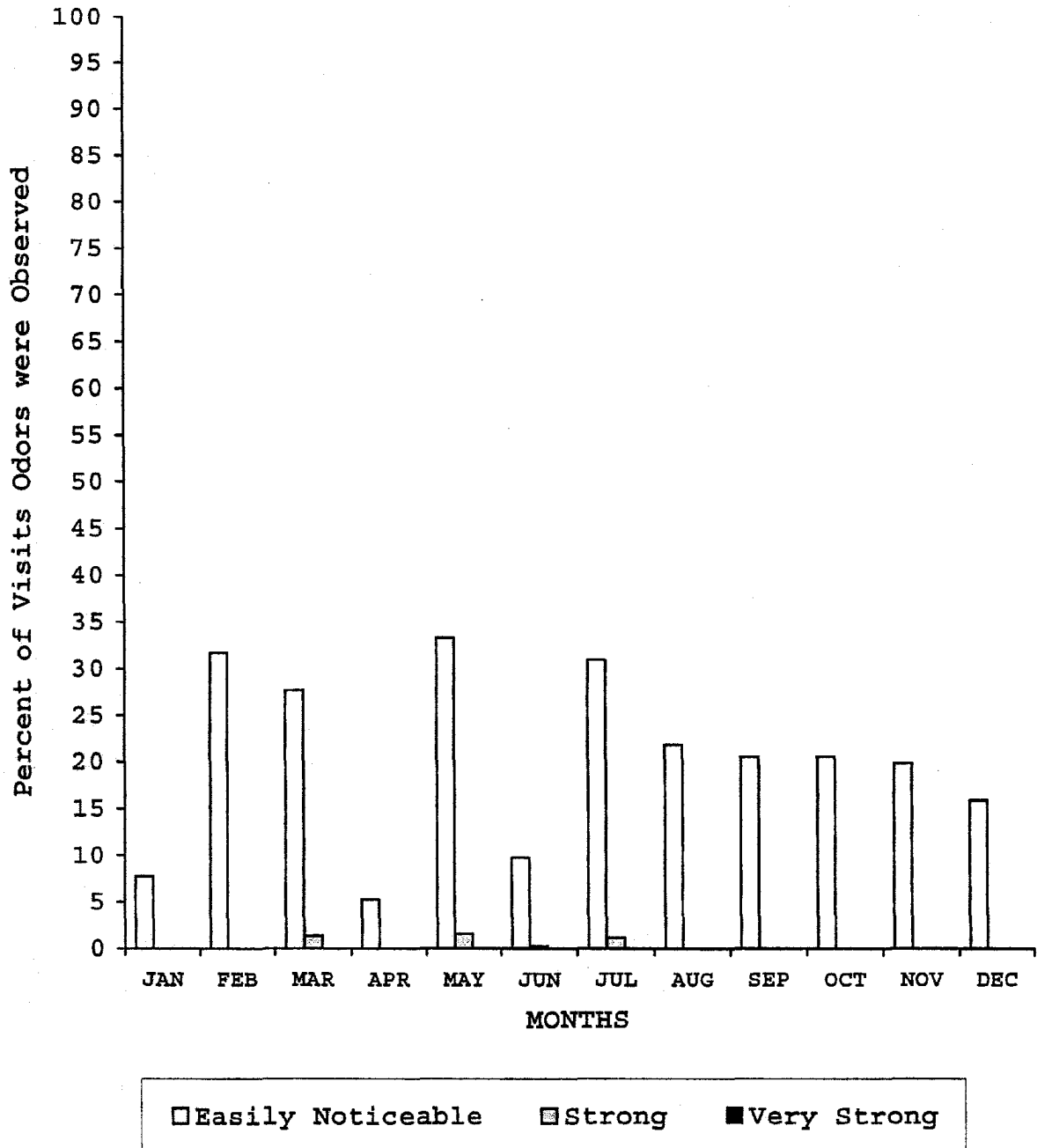
HYDROGEN SULFIDE READINGS AT
CALUMET SLUDGE DRYING AREAS - 2001

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
East Drying Cell #1 SW	5.8	0	20
Hopper Building	7.9	0	175
East Drying Cell #8 NW	6.8	0	69
East Drying Cell #8 NE	8.1	0	100
Truck Scale/Centrifuge	6.3	0	30
East Drying Cell #1 SE	7.1	0	110
West Drying Cell #1 @ Gate	7.5	0	65
West Drying Cell #4	6.7	0	34
Bituminous Road @ Gate	6.1	0	20

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FIGURE 2

ODOR OBSERVANCES AT CALUMET SLUDGE DRYING AREAS - 2001



observation at both of these locations in 2001. At the West and East Gates the odors were generally faint to no odor, 87 percent and 92 percent of the time, respectively.

The percentage of observations at which easily noticeable, strong, and very strong odors were observed during 2001 are plotted by month in Figure 3. There is no consistent pattern with respect to the time of the year.

The average hydrogen sulfide measurements ranged from 4.6 to 7.0 ppbv, as shown in Table 5. The highest levels, as expected, were observed in the vicinity of the waste gas burner.

James C. Kirie WRP

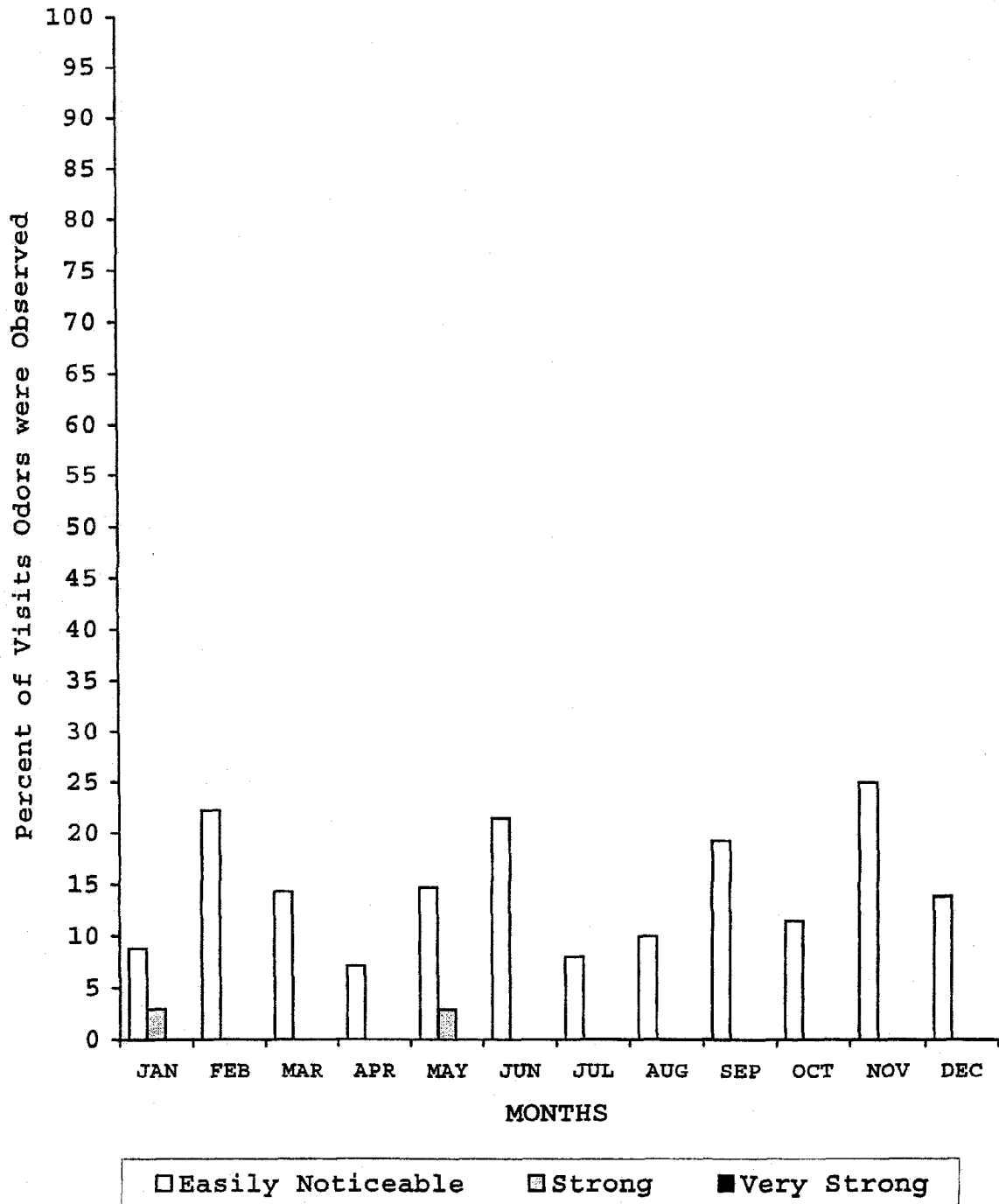
There were no very strong odors and only one strong odor observation at the James C. Kirie WRP during 2001. The strong odor was near the return sludge channel. Approximately 87 percent (R&D Department) to 99 percent (M&O Department) of the time for the overall WRP, faint or no odors were reported. The easily noticeable odors which occurred were generally in the vicinity of the return aeration channel, east gallery north channel, and air lift stations A1 and A2.

Figure 4 summarizes the observations of odor monitoring personnel during 2001 in terms of easily noticeable odor or greater. There were very few noticeable odors. It should be

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FIGURE 3

ODOR OBSERVANCES AT JOHN E. EGAN WRP - 2001



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TABLE 5

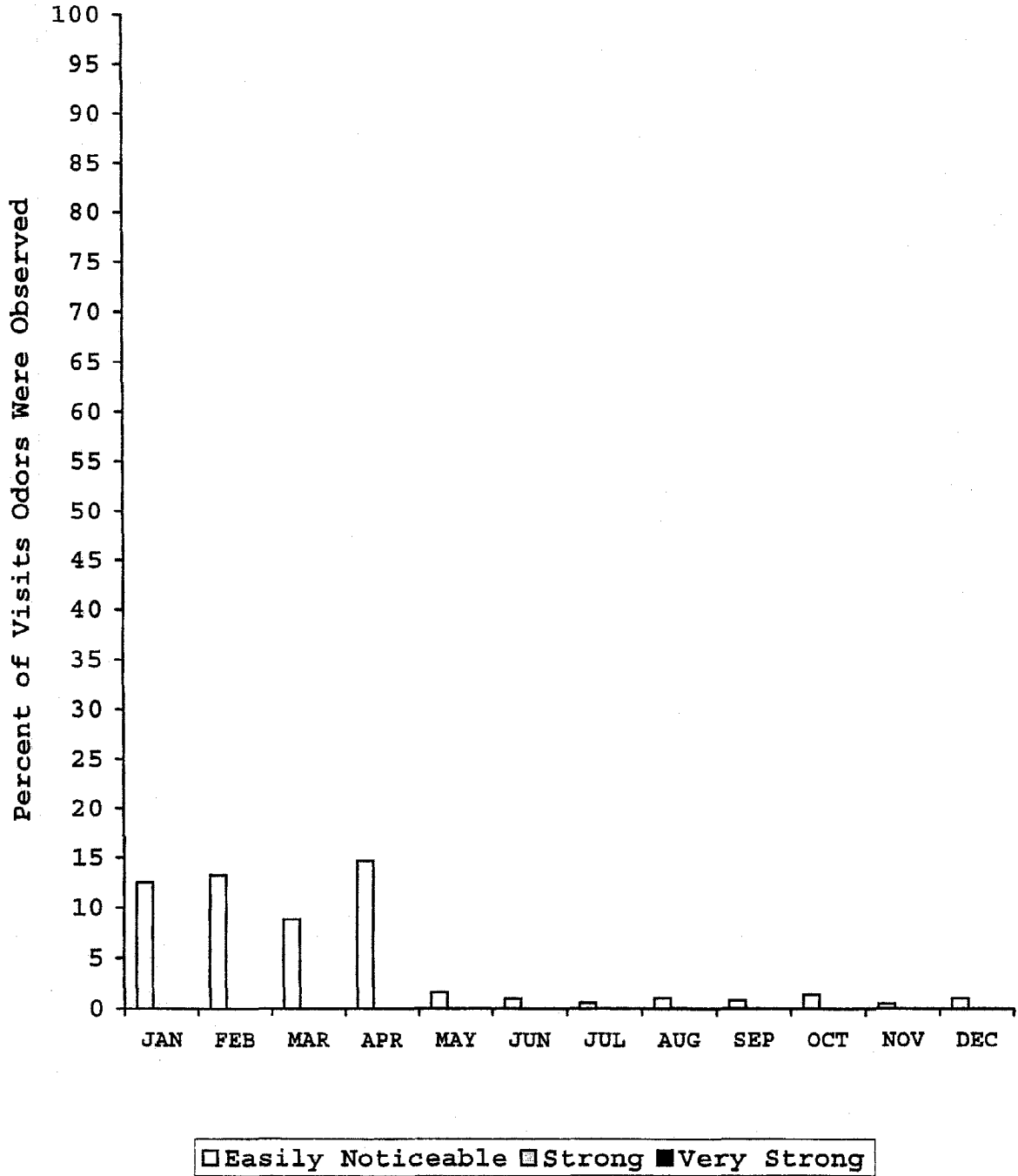
HYDROGEN SULFIDE READINGS AT
JOHN E. EGAN WRP - 2001

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
West Entrance Gate	4.7	0	13
Near Waste Gas Burner	7.0	0	37
Primary Tanks	5.4	0	23
South End "A" Drive	4.6	0	13
Final Tanks	5.3	0	14
East Entrance Gates	4.8	0	11
West of Storage Building	5.1	0	21

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FIGURE 4

ODOR OBSERVANCES AT JAMES C. KIRIE WRP - 2001



noted that from May through November M&O Department personnel conducted an odor monitoring survey three times a day, seven days a week, thus, there were a greater number of observations during these months as compared to December through March.

The measured hydrogen sulfide levels are summarized in Table 6. The highest levels of hydrogen sulfide were measured in the vicinity of the East Gallery, with an average of 10 ppbv and maximum of 150 ppbv. All the other locations had averages ranging from 5.1 to 6.1 ppbv.

North Side WRP

The majority of the observations at the North Side WRP were faint to no odor, 77 percent of the time. Only one strong odor observation occurred during 2001. The fairly noticeable odors occurred with greatest frequency around the preliminary tanks, 24 and 37 percent, the gallery building of Battery D mix channel, 15 percent, and the covered sludge concentration tanks, 22 percent.

The monthly percentage of observations at which easily noticeable, strong, and very strong odors were observed are shown in Figure 5. There is a slight trend of noticeable odors being generally higher in June and July and lower in the winter months.

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TABLE 6

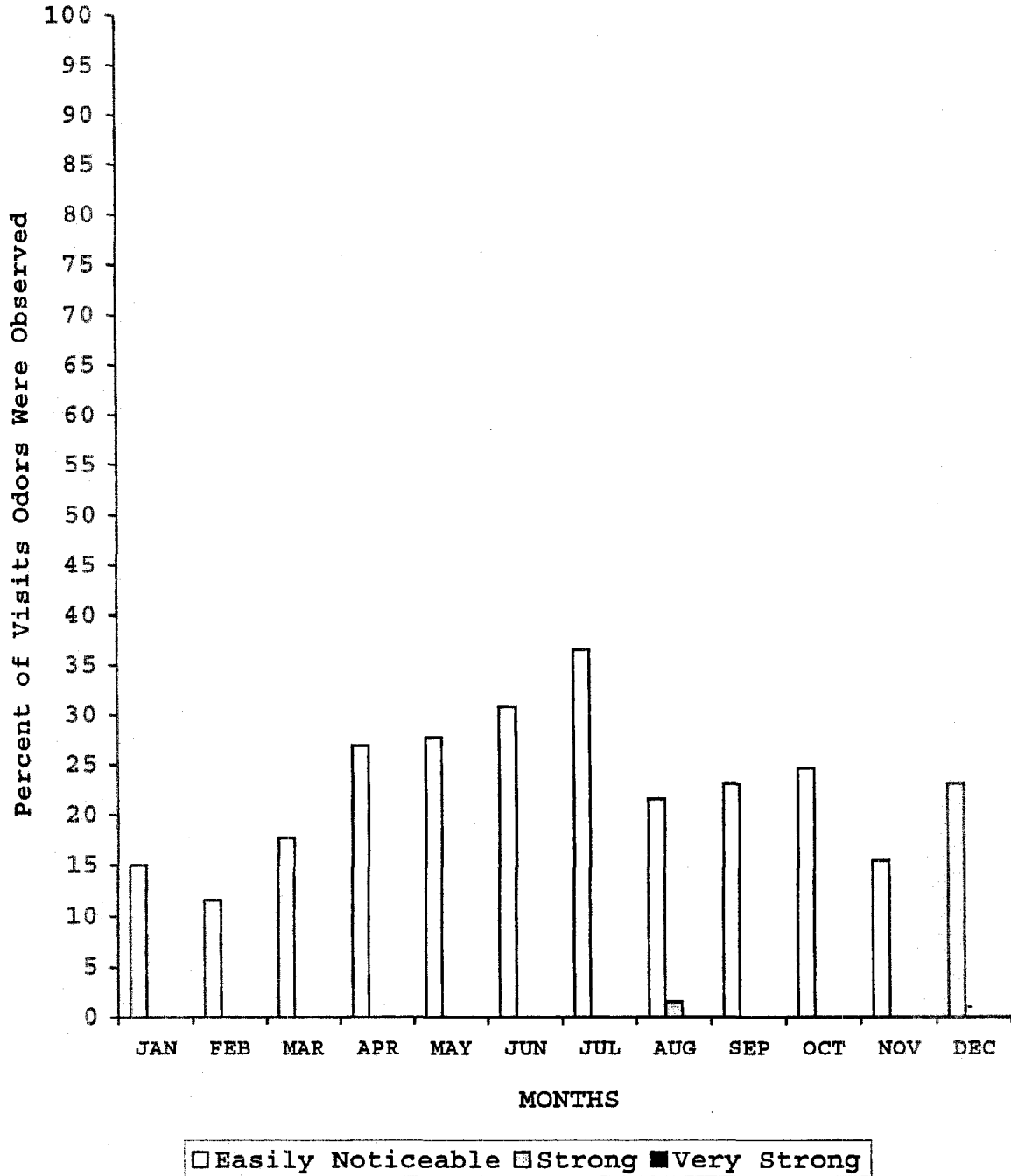
HYDROGEN SULFIDE READINGS AT
KIRIE WRP - 2001

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Plant Entrance	6.2	0	17
Pump Station	5.8	0	18
Air Lift B1	5.8	0	14
Road C-1	5.7	0	14
Return Channel	5.7	0	13
East Gallery - North	10.2	1	150
Road C-2	5.1	0	13
Road C-3	5.6	0	20
Road C-4	5.3	0	12
Air Lift A-1	5.4	0	14
Air Lift A-2	5.9	0	31
Road C-5	5.4	0	15
Road C-6	5.5	0	12
Road C-7	6.2	0	29
Air Lift B2	5.8	0	14
Ridge Lane - Point #1	6.1	0	14
Marshall and Pleasant Lane - Point #2	6.0	0	15

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FIGURE 5

ODOR OBSERVANCES AT NORTH SIDE WRP - 2001



The hydrogen sulfide levels are summarized in Table 7. The highest levels were observed in the vicinity of the Covered Sludge Concentration Tanks with an average of 28.5 ppbv. There was one high value on August 29, 2001, east of McCormick Road along the Howard Street Interceptor. This was quickly reduced by chlorination of the raw sewage. The rectangular preliminary Tank 3 had a range of 6 to 76 ppbv with average of 9.3 ppbv.

Stickney WRP

Overall, the majority of the observations were faint to no odor, with 67 percent of R&D Department and 89 percent of M&O Department observations, respectively. Overall, there were 19 strong odor observations, or 0.4 percent of the total number of observations. These occurred in the vicinity of the Imhoff tanks, the centrifuges, the sludge concentration tanks, the preliminary tanks, and along Laramie Avenue. These same locations had the majority of easily noticeable odors. At the predigestion centrifuges, approximately 74 percent of the observations were easily noticeable odors.

The Imhoff tanks (at Third Avenue and Fourth Avenue), the concentration tanks at G Street North, the preliminary tanks at Twelfth Avenue, and post-digestion centrifuges had easily

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TABLE 7

HYDROGEN SULFIDE READINGS AT
NORTH SIDE WRP - 2001

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Howard Street West End	6.1	0	13
Howard Street East of McCormick Road	13.8	0	270
McCormick Road	7.0	0	28
P&B Building	5.8	0	13
North Ave. Rect. Tank A6	5.5	0	14
North Ave. Rect. Tank B6	5.5	1	13
North Ave. Rect. Tank C6	6.5	0	37
Final Tank Batt. D3	5.8	0	13
Gallery Bldg. of Batt. D. Mix Channel	6.1	0	27
Main Street and Avenue E	6.0	0	27
Covered Weir Prel. Tank 10	7.3	0	23
Weir Rect. Prel. Tank 3	9.3	0	76
Main St. Covered Sludge Conc. Tanks	28.5	0	640

noticeable odors 43, 44.5, 33, and 24 percent of the time, respectively.

Figure 6 is a plot of the percentage of noticeable odors each month observed at the Stickney WRP. As can be seen from Figure 6, there appears to be no seasonal pattern in the odor observations. The few strong odor occurrences were spread out over the year.

The highest hydrogen sulfide levels were measured in the vicinity of the sludge concentration tanks at G Street and the preliminary tanks at Tenth Avenue, with an average level of 32.5 ppbv at both locations as shown in Table 8. The predigestion centrifuges, the concentration tanks at D Street, and the preliminary tanks at Twelfth Avenue had average hydrogen sulfide concentrations of 29.2, 25.5, and 25.2 ppbv, respectively. In general, the hydrogen sulfide levels are slightly higher than observed at the other District WRPs.

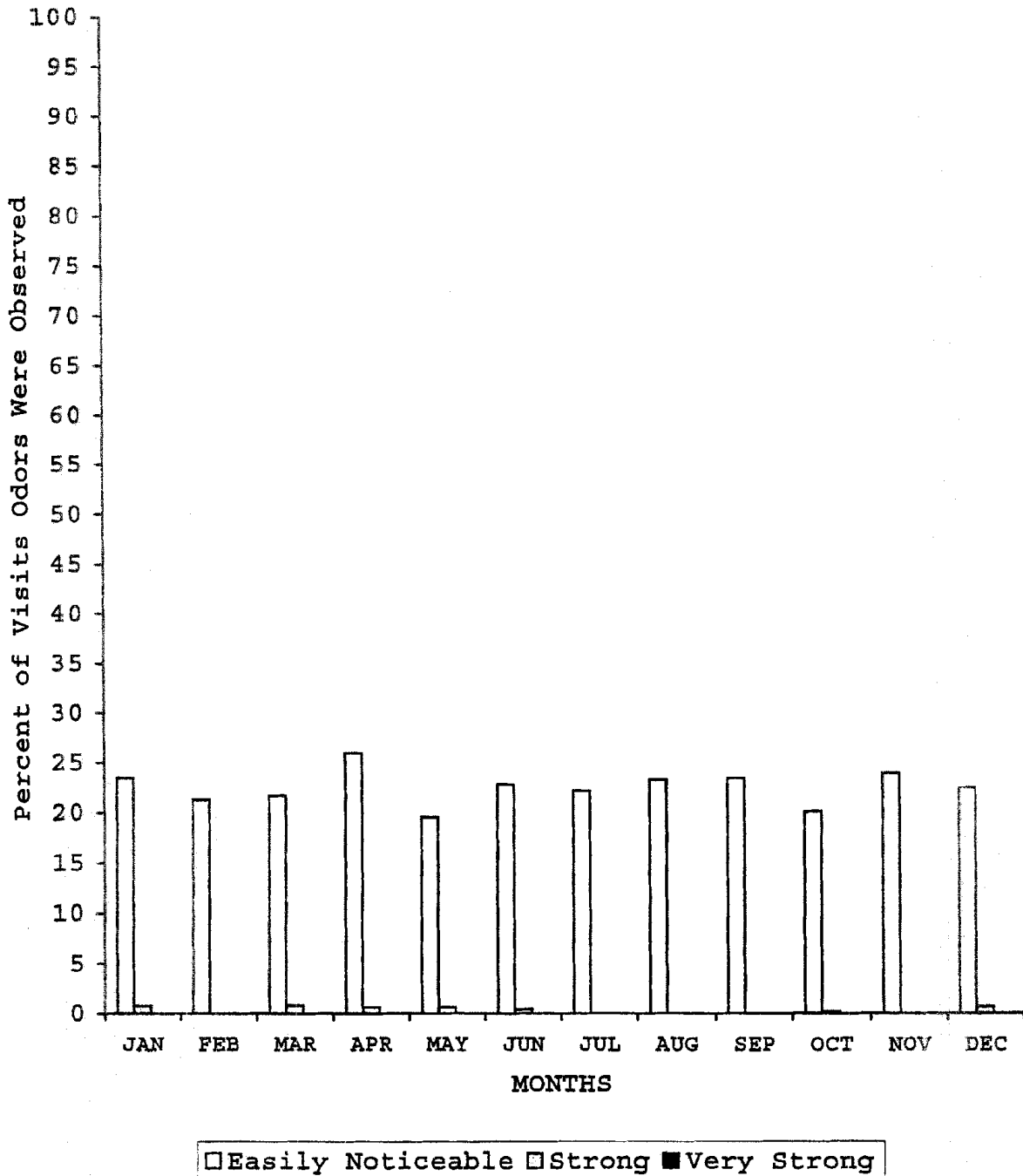
Stickney Sludge Drying and Management Areas

The Stickney Sludge Drying and Management Areas, consisting of HASMA, LASMA, Marathon, and Vulcan, had 72 percent of the observations in 2001 characterized as faint to no odor. There were only 16 strong odor observations out of 2,166 total observations. The strong odor observations were most

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FIGURE 6

ODOR OBSERVANCES AT STICKNEY WRP - 2001



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TABLE 8

HYDROGEN SULFIDE READINGS AT
STICKNEY WRP - 2001

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Imhoff B St./3rd Ave.	15.4	1	120
Imhoff B St./4th Ave.	18.2	0	92
Imhoff B St./5th Ave.	15.0	0	174
Digester 6th Ave. @ B St.	10.0	0	81
West Digester Cont. Bldg.	10.4	0	122
Centrifuges 6th Ave. @ Pre.	29.2	1	252
Centrifuges 6th Ave. @ Post	9.4	0	36
Concentration G St. North	32.5	3	238
Concentration D St. South	25.5	2	580
Preliminary 12th Ave.	25.2	0	390
Preliminary 10th Ave.	32.5	0	385
39th St./Central Ave.	7.8	0	38
39th St./Morton College Ent.	7.6	0	36
39th St./Dig. @ 57th Ave.	7.1	0	23
39th St./Between Austin and Lombard	8.1	0	210
Battery D, B St/13th Ave.	7.7	0	82

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TABLE 8 (Continued)

HYDROGEN SULFIDE READINGS AT
STICKNEY WRP - 2001

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Lombard Ave. @ Gate/39th St.	6.5	0	21
Laramie and 40th St.	8.9	0	29
Laramie and 39th St.	11.8	1	180

prominent in the vicinity of the TARP shaft at the Vulcan Site. The other strong odor observations were equally divided among the various areas depending upon the activity at the time. Easily noticeable odors were prevalent at the Marathon site, 50 percent of the observations, and at HASMA, 46.5 percent of the observations. The LASMA lagoon area ranged between 4 and 26 percent easily noticeable odors depending upon the location.

The percentage of observations at which easily noticeable, strong, and very strong odors were observed was plotted by month and are presented in Figure 7. As expected, the frequency of observed odors is highest during the late spring through early fall months when sludge processing and drying is being carried out.

The highest average hydrogen sulfide concentrations were observed by the TARP Drop Shaft, 19.3 ppbv, followed by LASMA Drying Cell 3E-3W at 11.7 ppbv, as shown in Table 9. The other locations had average hydrogen sulfide levels from 5.9 to 9.3 ppbv.

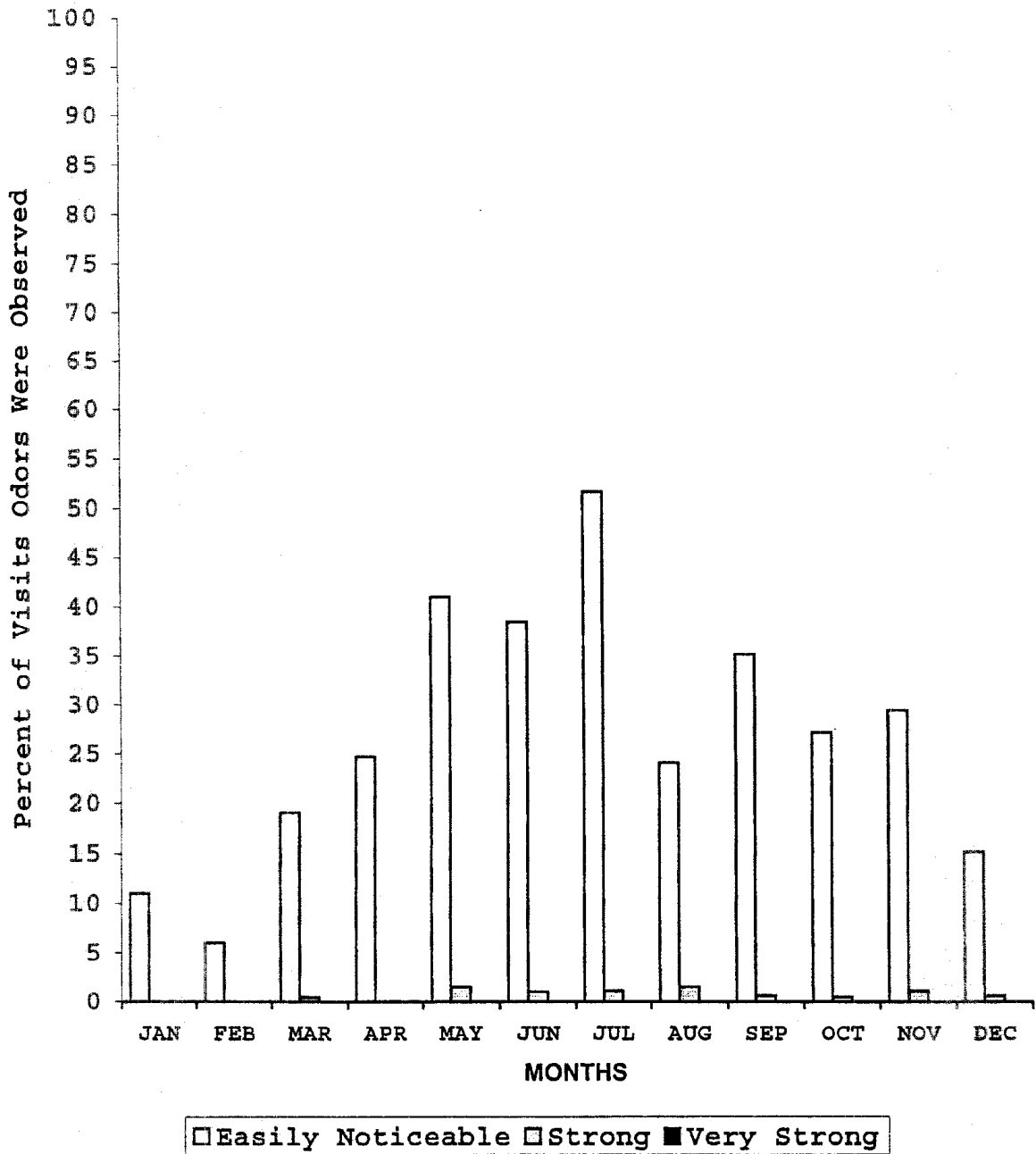
Ridgeland and Stony Island Drying Areas

The Ridgeland Drying Area had 69 percent of the observations characterized as faint to no odor. This is similar to

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FIGURE 7

ODOR OBSERVANCES AT HASMA, LASMA, VULCAN AND MARATHON SITES - 2001



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TABLE 9

HYDROGEN SULFIDE READINGS AT
STICKNEY SLUDGE DRYING AREAS - 2001

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
HASMA	9.2	0	80
Vulcan South	7.6	0	26
Vulcan North	9.3	0	79
Vulcan TARP Drop Shaft	19.3	0	450
Vulcan TARP Well	8.9	0	54
LASMA Lagoon 1	7.4	0	21
LASMA Lagoon 16	8.8	0	69
LASMA Lagoon 24	9.6	0	66
LASMA Lagoon 30	7.3	0	60
LASMA Cell 1E-1W	6.3	0	53
LASMA Cell 2E-2W	5.9	0	28
LASMA Cell 3E-3W	11.7	0	905
LASMA Cell 4E-4W	6.7	0	50
LASMA Cell 5E-5W	6.0	0	24
Marathon	7.6	0	68

what was observed at the Stickney and Calumet Drying Areas. There were two strong odor observations which occurred in the May and June of 2001. It should be noted that the odor monitoring program for this site was initiated in May 2001. The easily noticeable odors were 30 percent of the total observations.

A monthly summary of the observations at the Ridgeland Drying Area of easily noticeable, strong, and very strong odors during 2001 is presented in Figure 8 expressed as frequency of occurrence.

The average hydrogen sulfide levels at the various locations around the Ridgeland Drying Area ranged from 6.1 to 8.4 ppbv, as shown in Table 10.

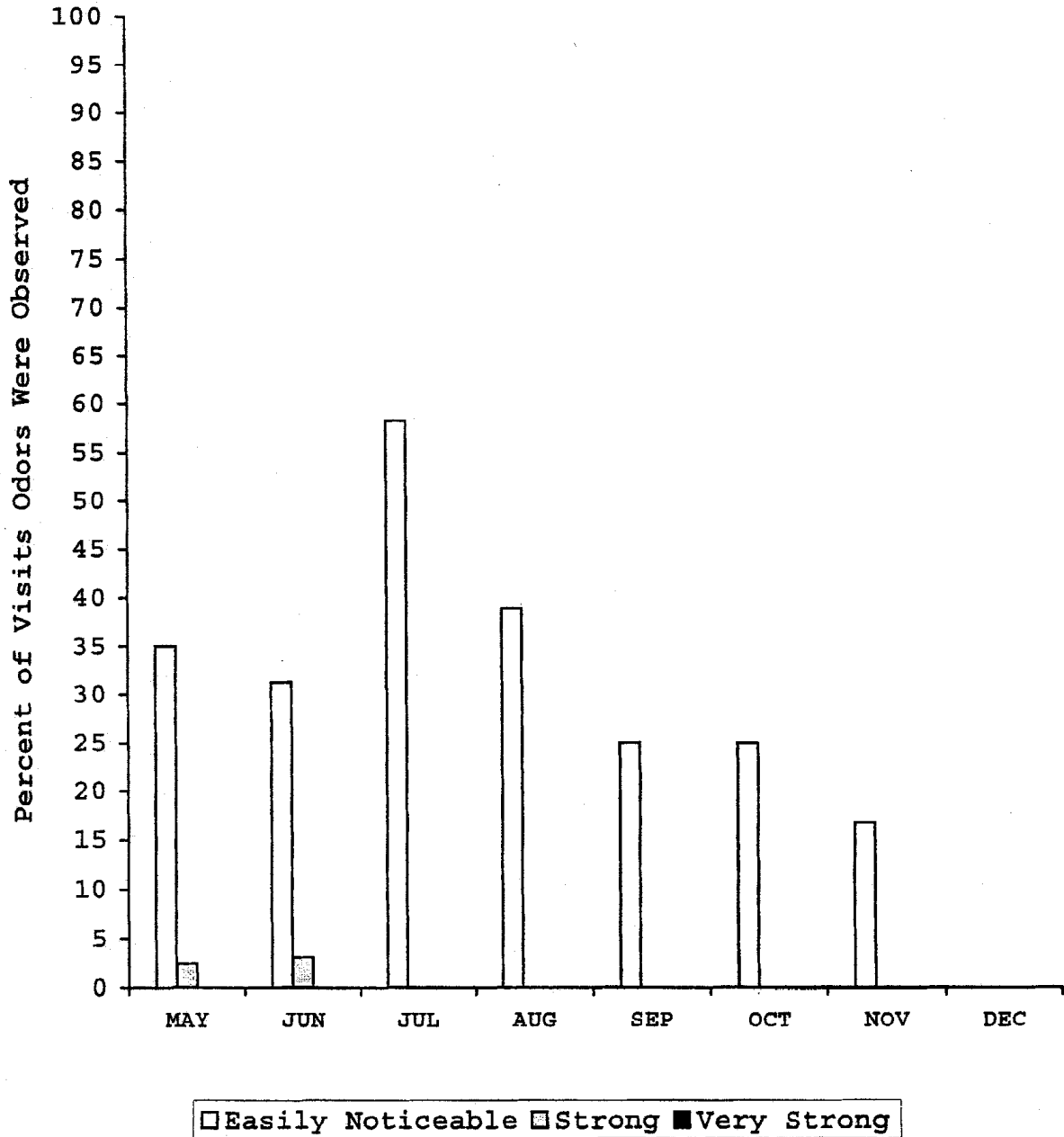
The Stony Island Drying Areas had 52 percent of the observations characterized as faint to no odor, with one strong odor observation in June 2001. Also note that the odor monitoring program was initiated in June 2001. The easily noticeable odors account for approximately 48 percent of the total observations.

A monthly summary of the observations at the Stony Island Drying Area of easily noticeable, strong, and very strong odors during 2001 is presented in Figure 9 expressed as frequency of occurrence.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE 8

ODOR OBSERVANCES AT RIDGELAND - 2001



METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

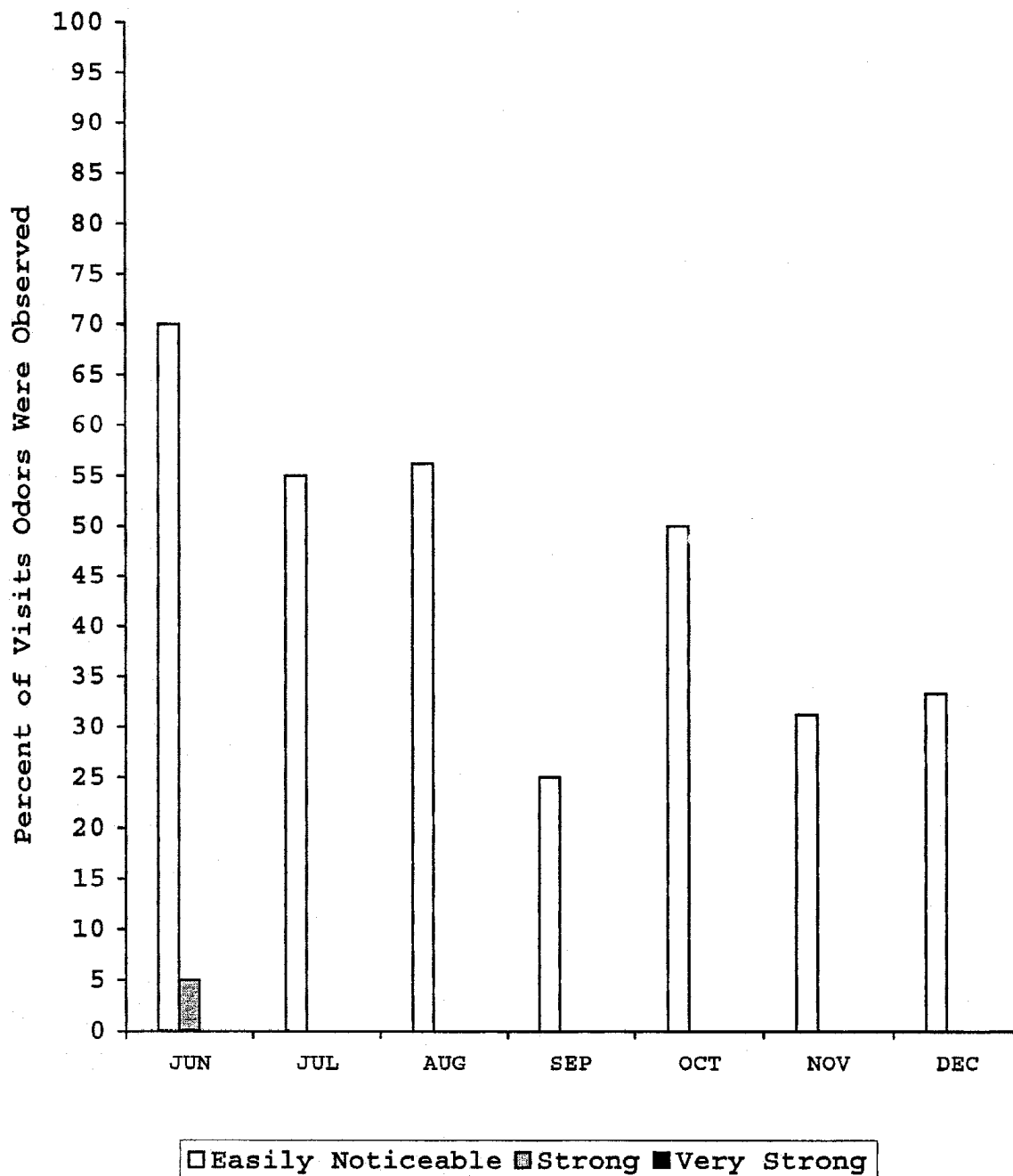
TABLE 10

HYDROGEN SULFIDE READINGS AT
RIDGELAND AND STONY ISLAND DRYING AREAS

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
<u>Ridgeland</u>			
SW Parking Area	7.4	0	58
North of Cell 2W	7.6	0	32
NE Corner Cell 5E	6.1	0	15
South of Cell 5	8.4	0	160
<u>Stony Island</u>			
Entrance 122nd St.	7.9	2	21
NE Corner Cell 5	12.2	1	48
South End Cells 4 & 7	9.1	0	29
West Side of Cell 3	11.7	0	59

FIGURE 9

ODOR OBSERVANCES AT STONY ISLAND - 2001



The average hydrogen sulfide levels around the Stony Island Drying Area, as shown in Table 10, varied from 7.9 to 12.2 ppbv.

SUMMARY

The District maintains a program of monitoring odors at various locations at the various WRPs and Sludge Drying Areas starting in 1990. Both R&D Department and M&O Department personnel make subjective observations regarding the type and intensity of any odor perceived. In 2001 the program included five of the District WRPs and all of the Sludge Management Areas. The number of locations at each facility varies from four to 19. The frequency of monitoring varies from one day per week at the Stony Island SDS to seven days per week during the summer months at the Kirie and North Side WRPs.

The M&O Department also maintains a record of calls received from the public with regard to odors. In 2001 the majority of the facilities received from none to three calls. The Stickney WRP received five calls, but none of the reported odors could be verified.

During 2001 no very strong odors were perceived at any of the facilities being monitored. The majority of the observations at the WRPs were generally characterized as faint to no odor. At the sludge drying areas, faint to no odor was recorded from 52 to 72 percent of the observations.

At each of the WRPs there are specific locations which have the noticeable odors. A summary of the locations which had occasional strong odors is presented in Table 11. As an example, at the Calumet WRP the main area of strong odor is in the vicinity of the Sludge Concentration Building, at the Stickney WRP the main areas are the preliminary tanks, sludge concentration tanks, Imhoff tanks, and centrifuges. While strong odors are generally infrequent, it shows there is the potential for odors from these areas.

The hydrogen sulfide levels followed a similar pattern as the odor observations with an occasional relatively high value (greater than 100 ppbv). It appears that the average level of hydrogen sulfide is between four and six ppbv at the WRPs, except for the Stickney WRP where average hydrogen sulfide levels along the periphery of the plant were seven to nine ppbv and 10 to 33 ppbv within the WRP.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 11

STRONG ODOR OBSERVATIONS - 2001

Facility	Number of Strong Odor Observations
Calumet WRP	
Sludge Concentration Building	12
Lagoons 3 and 4	1
Total	<u>13</u>
Calumet SDS	
East Drying Cells	4
Truck Scale/Centrifuge Building	3
West Drying Cells	1
Total	<u>8</u>
Egan WRP	
Waste Gas Burner	1
Primary Tanks	1
Total	<u>2</u>
Kirie WRP	
Return Channel	1
Total	<u>1</u>
North Side WRP	
Howard St. East of McCormick Rd.	1
Total	<u>1</u>

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 11 (Continued)

STRONG ODOR OBSERVATIONS - 2001

Facility	Number of Strong Odor Observations
Stickney WRP	
Imhoff Tanks	3
Centrifuges	3
Sludge Concentration Tanks	4
Preliminary Tanks	5
Along Laramie Ave.	4
Total	19
HASMA, LASMA, Vulcan SDS	
HASMA	4
Vulcan	2
Vulcan TARP Shaft	6
LASMA Lagoons	2
LASMA Drying Cells	2
Total	16
Ridgeland SDS	Total 2
Stony Island SDS	Total 1

RECOMMENDATIONS

Based upon an evaluation of the 2001 odor monitoring program, the following recommendations regarding changes in the odor monitoring program are offered.

1. The R&D Department will, depending on conditions, increase the frequency of monitoring at the HASMA, LASMA, Marathon, and Vulcan Sludge Processing Areas to four times a week during the summer months.
2. R&D Department and M&O Department personnel should confer regarding possible methods for reducing odors at the locations listed in Table 11 of this report.

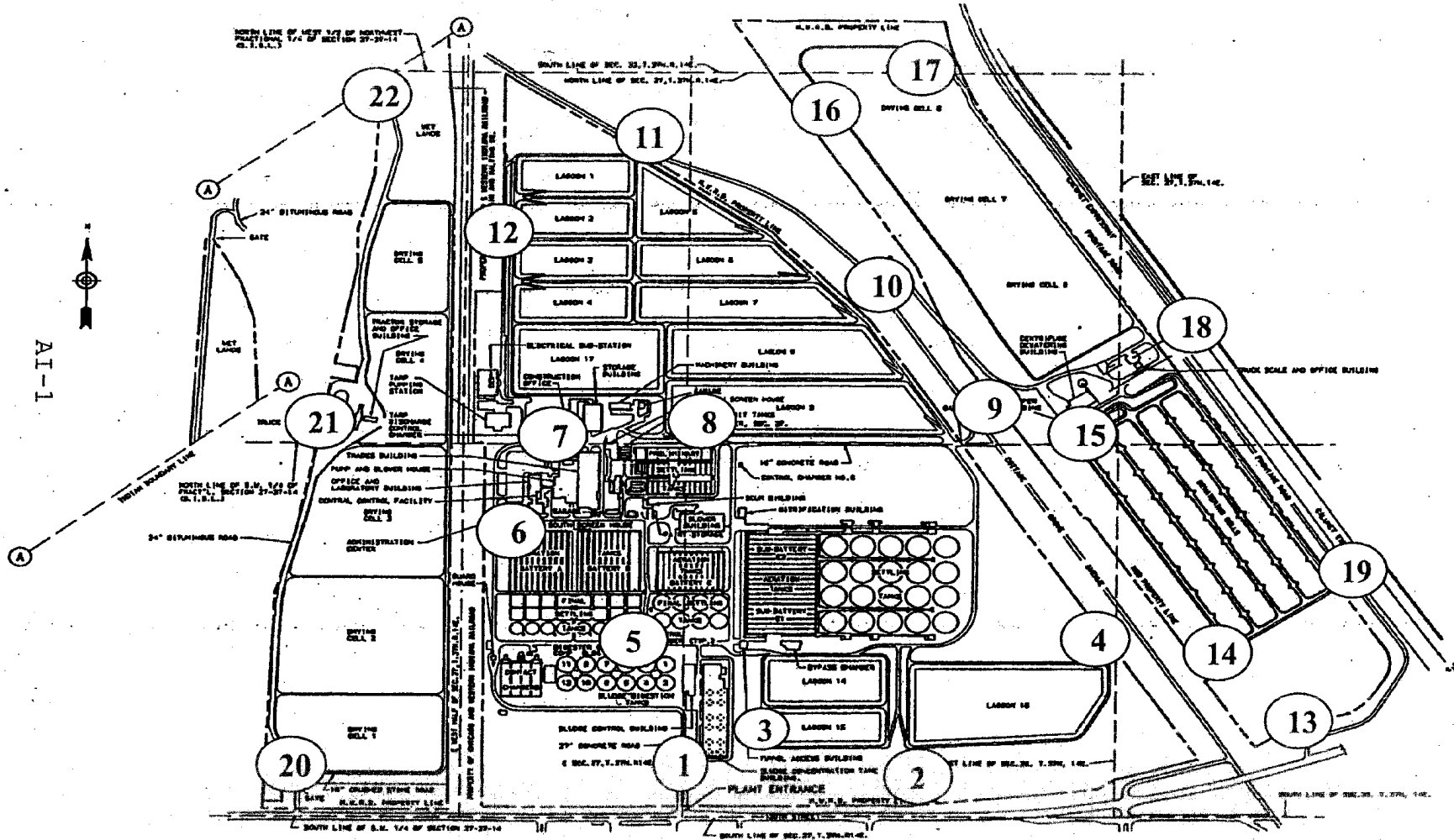
APPENDIX AI

LOCATION OF ODOR MONITORING STATIONS AT DISTRICT WRPS AND
SOLIDS DRYING AREAS

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE AI-1

CALUMET WRP AND CALUMET WRP SOLIDS DYING AREAS
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



METROPOLITAN WATER RECLAMATION DISTRICT
OF GREATER CHICAGO

LOCATION PLAN
CALUMET WRP

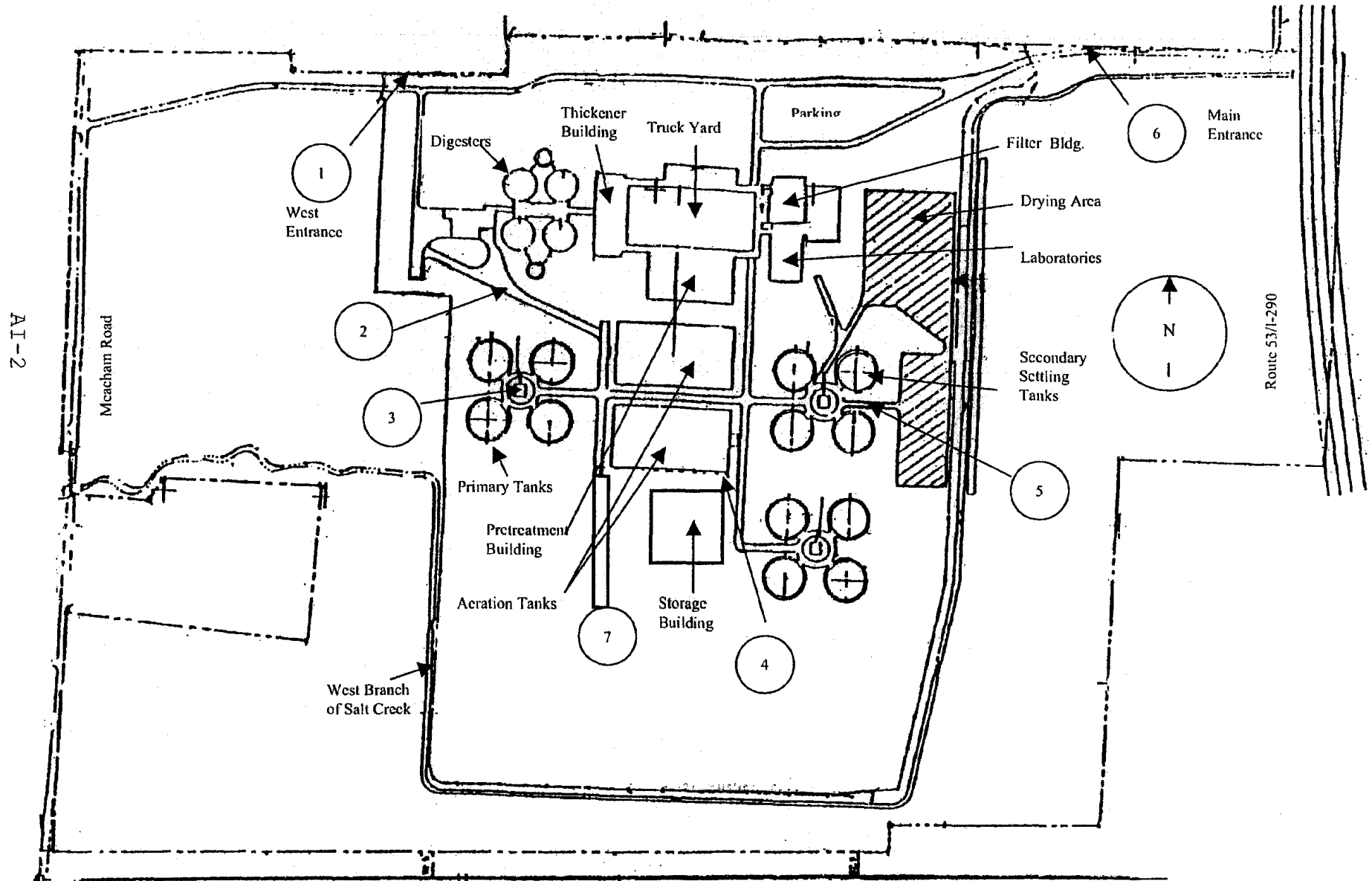
0 200 400 600 800
APPROXIMATE SCALE 1"=300'

AI-1

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE AI-2

JOHN E. EGAN WRP AND DRYING AREA
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS

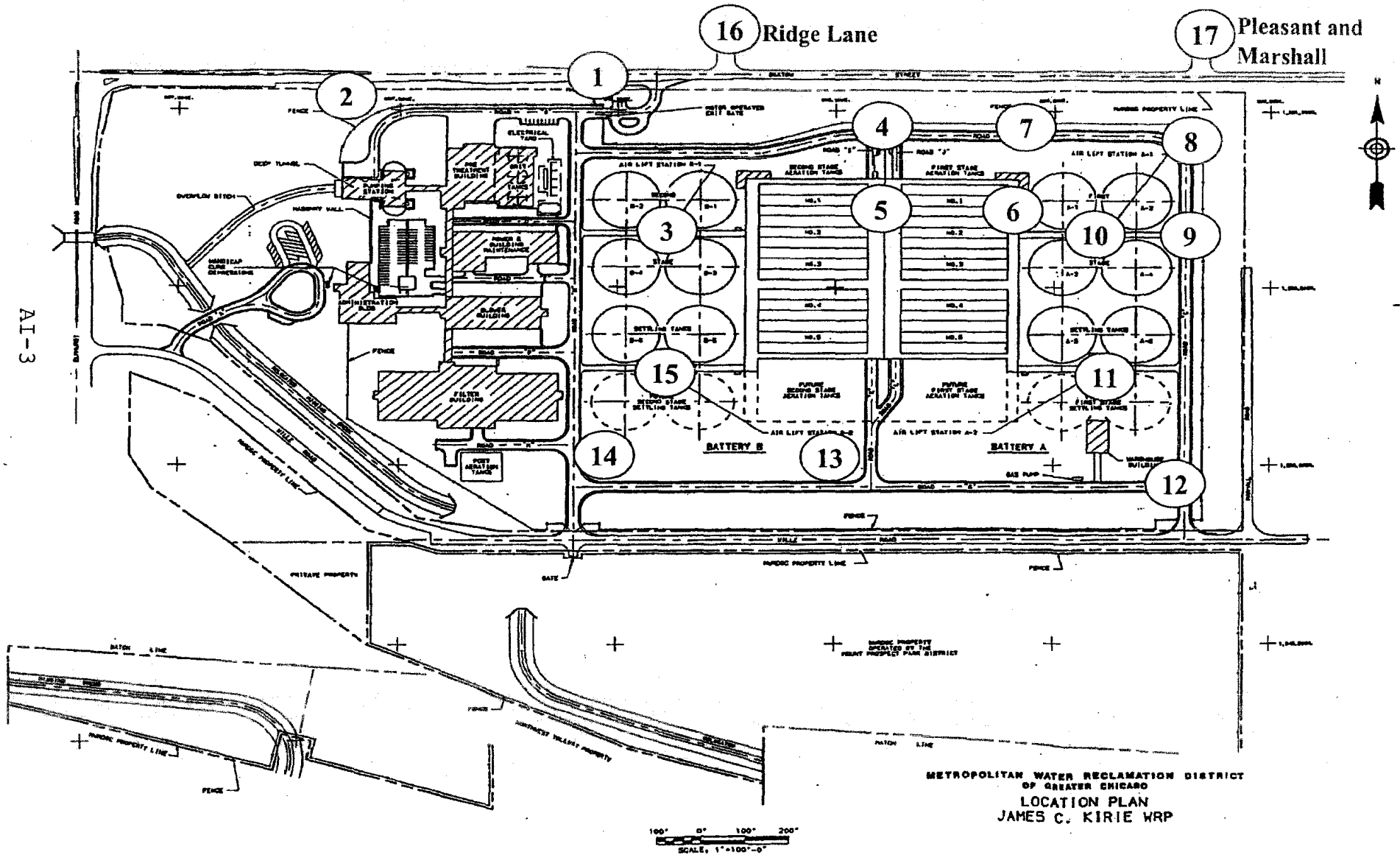


AI-2

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE AI-3

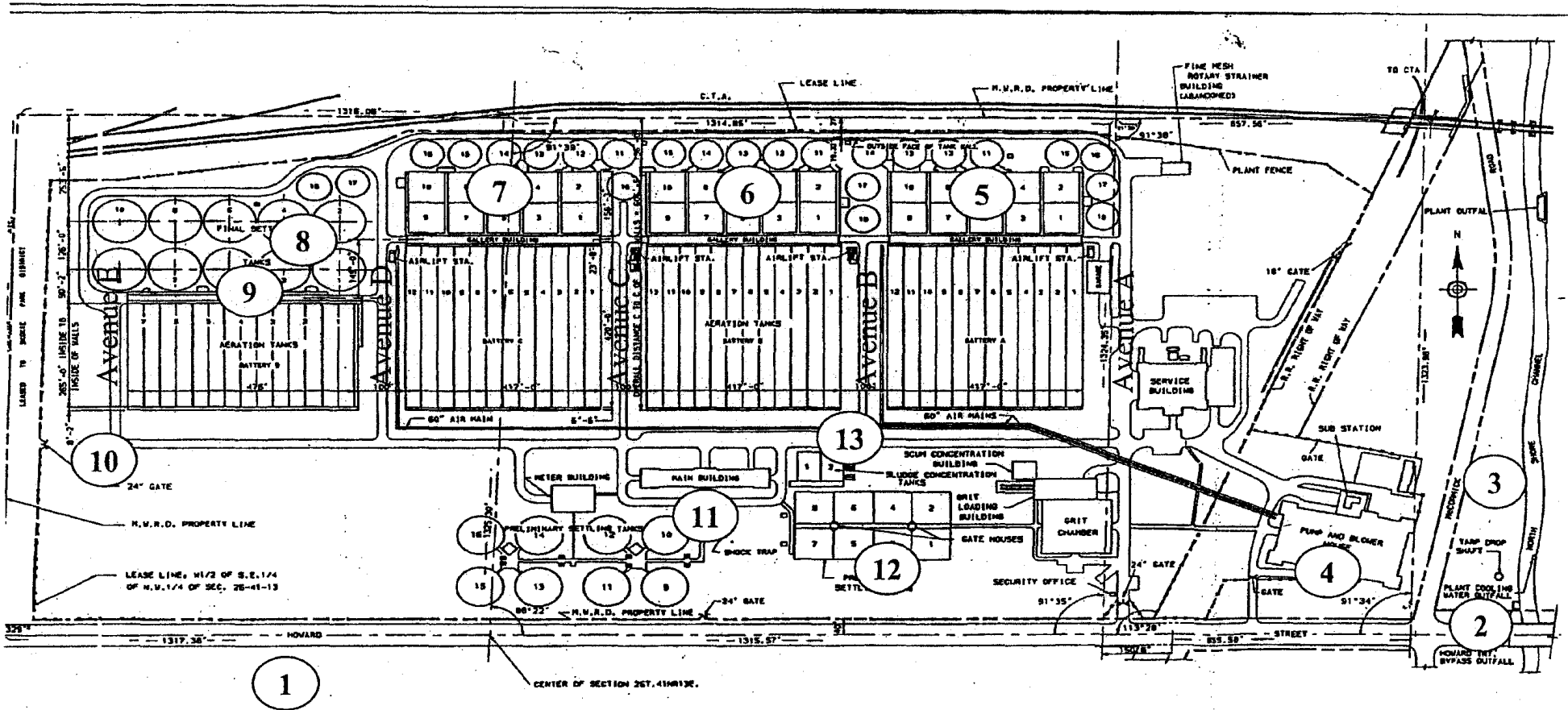
JAMES C. KIRIE WRP
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

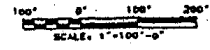
FIGURE AI-4

NORTH SIDE WRP
 NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



AI-4

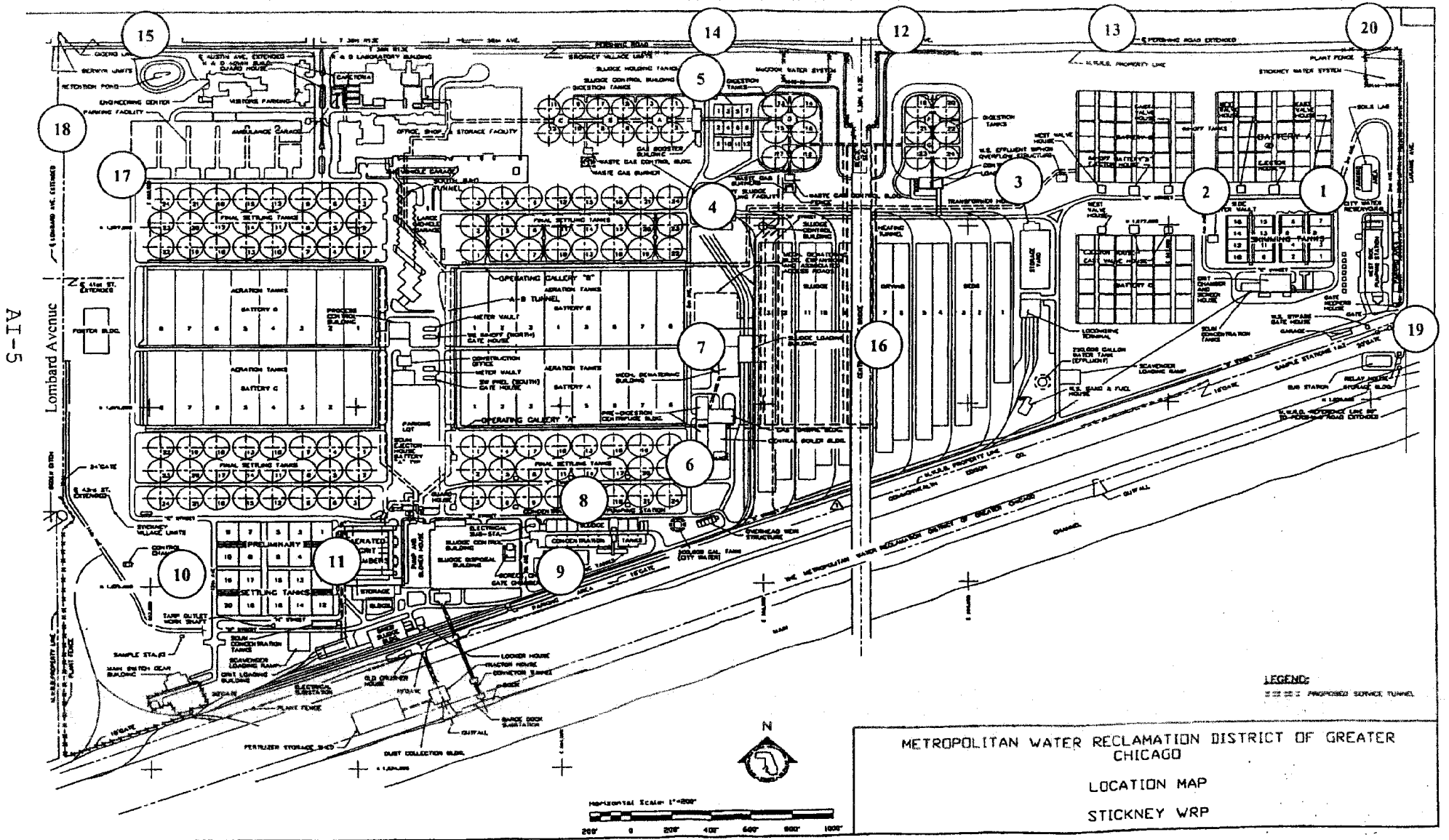
METROPOLITAN WATER RECLAMATION DISTRICT
 OF GREATER CHICAGO
 LOCATION PLAN
 NORTH SIDE WRP



METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE AI-5

STICKNEY WRP NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



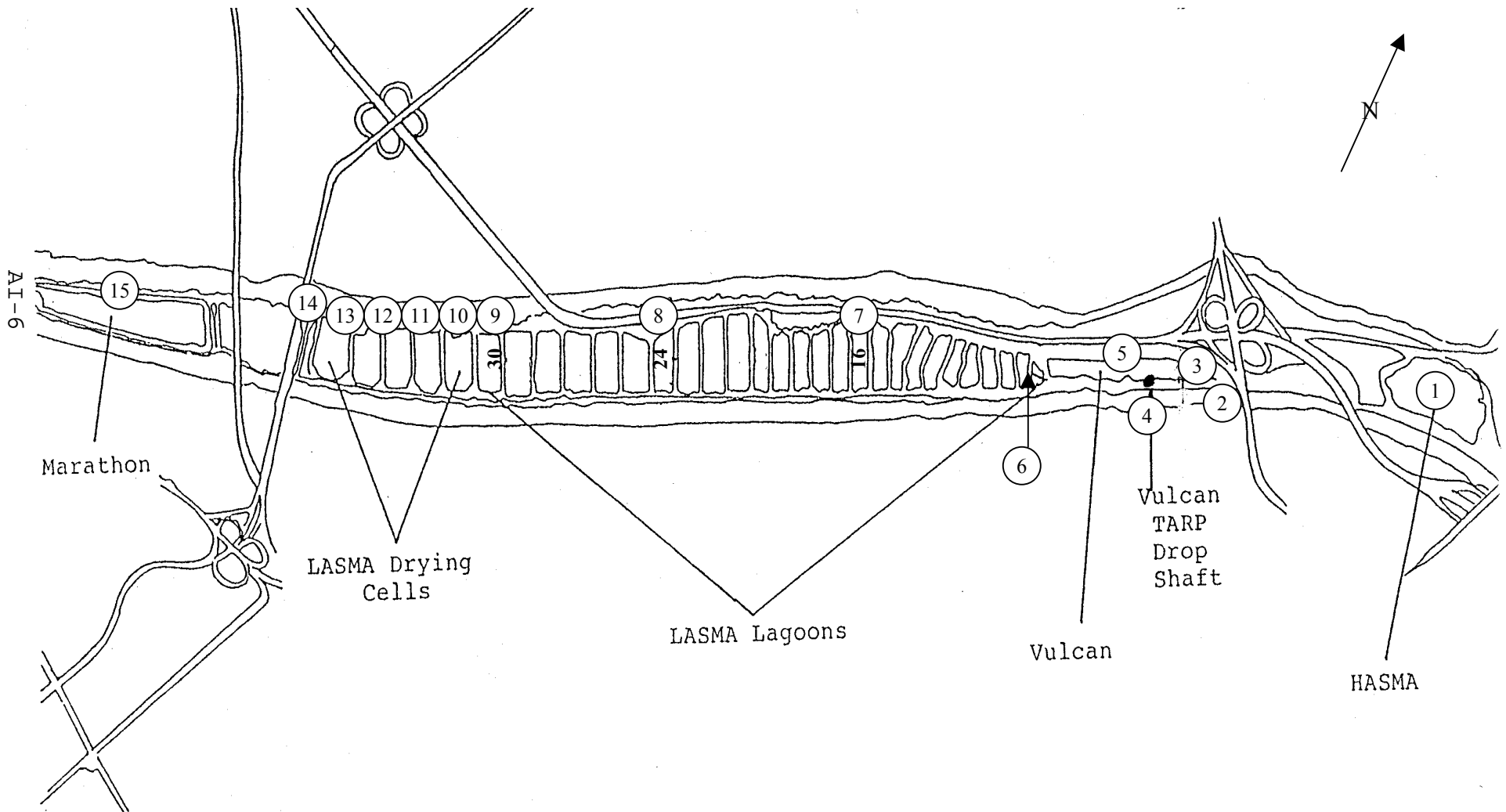
AI-5

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
LOCATION MAP
STICKNEY WRP

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE AI-6

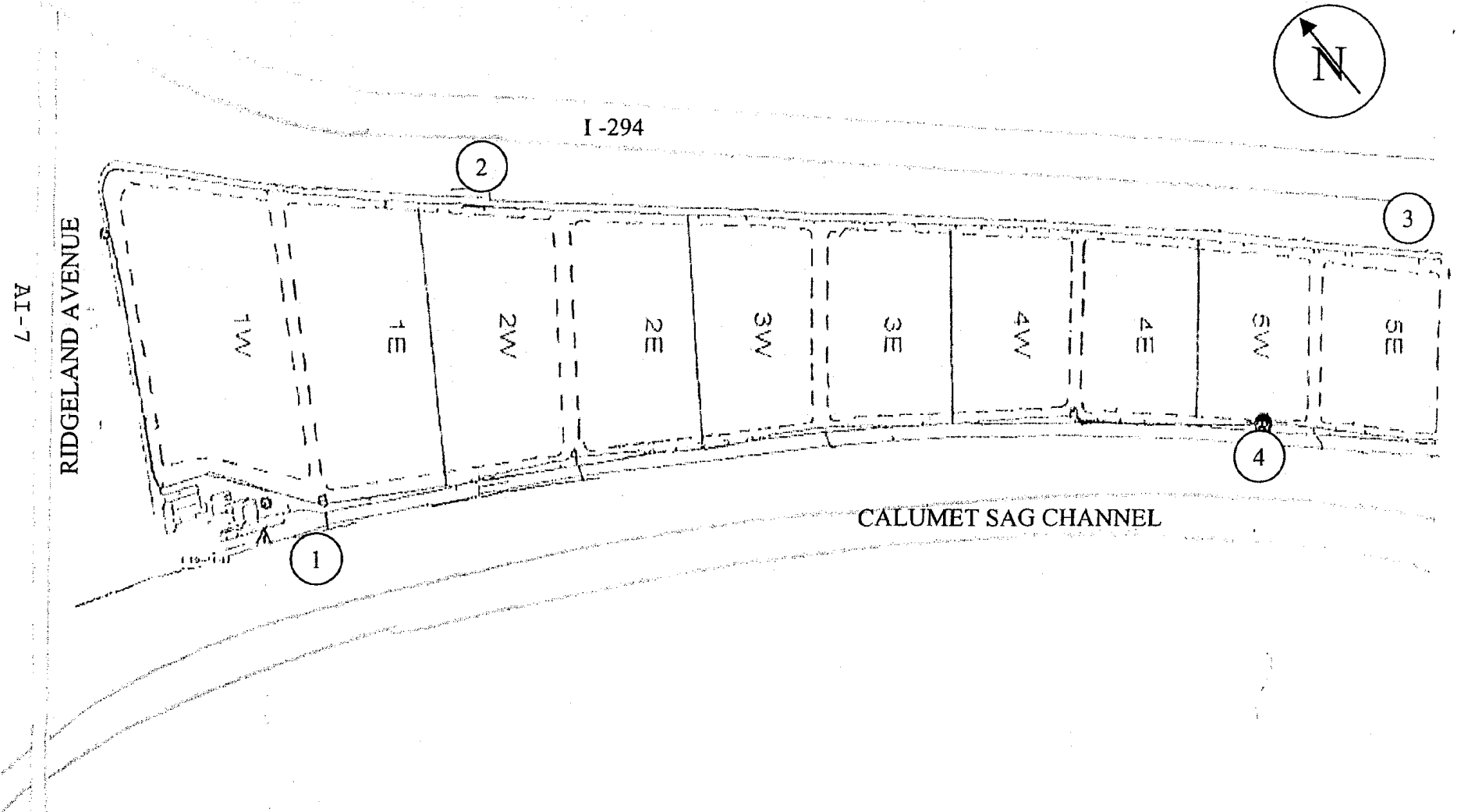
STICKNEY SOLIDS DRYING SITES (HASMA, VULCAN, LASMA AND MARATHON)
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE AI-7

RIDGELAND AVENUE SOLIDS DRYING AREA (RASMA)
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE AI-8

STONY ISLAND DRYING AREA
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS

