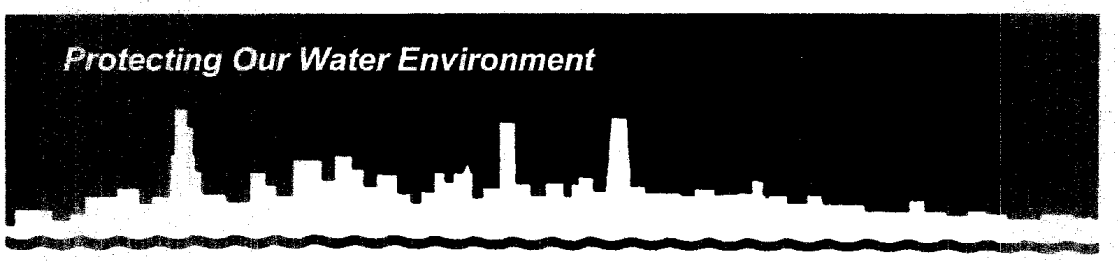

Metropolitan Water Reclamation District of Greater Chicago

RESEARCH AND DEVELOPMENT DEPARTMENT

REPORT NO. 04-17

ODOR MONITORING PROGRAM AT DISTRICT FACILITIES DURING 2003

September 2004

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ODOR MONITORING PROGRAM AT DISTRICT FACILITIES DURING 2003

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September 2004

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Thanks are also due Ms. Laura Franklin, Principal Office Support Specialist, for her diligence in typing this report.

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 14 years. The initial program started with the solids 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 solids drying sites in 2001.

At each location a similar procedure 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 addition to the subjective odor measurements, an analysis of the ambient air for hydrogen sulfide using a Jerome Model 631-X hydrogen sulfide meter is also conducted.

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

This report presents the odor monitoring data for the year 2003. 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 summarizes the odor complaints received and verified by each of the facilities during 2003.

Maps showing the odor monitoring sites at each WRP and Solids 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. The Calumet and Stickney WRPs and solids drying areas are monitored from three to five days per week. At the Kirie WRP, the M&O Department monitors the facility every day, once per shift, during the spring through fall months.

Odor complaints in 2003 with regard to the various facilities were very infrequent, ranging from none to three at a given facility during the year.

TABLE 1: ODOR MONITORING PROGRAM FOR 2003

Facility	Number of Locations Monitored	Year Began	Months of Year	Days Per Week	Departments Participating	H_2S Measured	Number of Odor Complaints	Number of Complaints Verified
Calumet WRP	13	1992	12	3 2	R&D M&O	Yes	0	--
Calumet SDS	9	1992	12	3 2	R&D M&O	Yes	0	--
Egan WRP	7	1993	12	1 **	R&D M&O**	Yes	1	0
Kirie WRP	17	1996	12	1 7*	R&D M&O	Yes	0	--
North Side WRP	13	1992	12	1 **	R&D M&O**	Yes	0	--
Stickney WRP	19	1991	12	3 2	R&D M&O	Yes	3	0
HASMA, LASMA, Marathon, and Vulcan SPS	17	1990	12	3	R&D	Yes	1	1
Ridgeland SDS	4	2001	8	1 to 2	R&D	Yes	0	--
Stony Island SDS	4	2001	7	1	R&D	Yes	0	--

Note: SDS = Solids Drying Site
SPS = Solids 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 periodic odor monitoring surveys at these facilities depending upon conditions, but the data are not included in this report for 2003.

RESULTS AT DISTRICT FACILITIES IN 2003

The results of the various odor monitoring programs at each of the District facilities for 2003 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 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; 74 percent of the time by R&D Department personnel and 96 percent of the time by M&O Department personnel, respectively. The strong odors that are observed occurred around the sludge concentration building and preliminary tanks, with 1.2 and 1.7 percent, respectively, of the observations registered as strong. Other areas which had easily noticeable odors were in the vicinity of the preliminary tanks, 48 percent of observations, sludge concentration tanks, 39 percent of observations, sludge digester tanks, 29 percent of observations, the plant entrance, 19 percent of observations, and aeration Battery A, 16 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

TABLE 2: ODOR MONITORING RESULTS FOR 2003

Facility	Departments Participating	Total Number of Observations	Number of Observations Odors Were Detected			Number Non-Detects*	Percent Non-Detects
			Very Strong	Strong	Easily Noticeable		
Calumet WRP	R&D	1,857	0	5	483	1,369	74
	M&O	1,272	0	2	42	1,228	96
Calumet SDS	R&D	1,285	0	2	308	975	76
	M&O	874	0	1	21	852	97
Egan WRP	R&D M&O**	364	0	1	45	318	87
Kirie WRP	R&D	595	0	0	95	500	84
	M&O	10,045	0	1	59	9,985	99
North Side WRP	R&D M&O**	673	0	1	202	470	70
Stickney WRP	R&D	2,774	0	35	1,019	1,720	62
	M&O	2,242	0	1	255	1,986	88
HASMA, LASMA, Marathon, and Vulcan SPS	R&D	2,298	0	7	760	1,531	67
Ridgeland SDS	R&D	196	0	0	24	172	88
Stony Island SDS	R&D	392	0	16	132	148	62

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

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

**The M&O Department conducts periodic odor monitoring surveys at these facilities, but the data are not included in this Table.

TABLE 3: HYDROGEN SULFIDE READINGS AT CALUMET WRP—2003

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Plant Entrance (1)[1]	8.5	0	39
Lagoon #16 SW Corner (2)	9.2	0	120
Sludge Conc. Bldg. (3)	26.1	1	555
Lagoon #16 NE Corner (4)	9.9	0	81
Sludge Digester Tanks (5)	11.2	2	138
Aeration Battery A—West (6)	12.2	0	330
TARP Pump Station (7)	12.1	0	320
Preliminary Tanks (8)	12.4	0	118
Gate Near Lagoon #9 (9)	8.6	0	38
Between Lagoon #7 & #8 (10)	9.0	0	49
Lagoon #1 & #2 (11)	7.7	0	37
Lagoon #3 & #4 (12)	8.2	0	103
Ellis Ave. & 130th St. (13)	7.7	0	20

[1]Numbers in parenthesis correspond to Station numbers in Figure AI-1.

vicinity of the sludge concentration building, averaging 26.1 ppbv. The rest of the locations averaged between 6.2 and 12.2 ppbv, with a number of nondetectable observations.

Figure 1 summarizes all the monthly observations of easily noticeable, strong, and very strong odors made during 2003 in terms of frequency of occurrence. The frequency of easily noticeable observations showed no seasonal trend, ranging between 10 and 22 percent each month.

Calumet Solids Drying Areas

As with the Calumet WRP, the occurrence of strong odors at the drying areas was infrequent. The majority of the observations were described as faint to no odor, 76 percent by the R&D Department and 97 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. At East Drying Cell #1 strong odors occurred 0.8 percent of the time, and at West Drying Cell #4, 0.4 percent of the time. Easily noticeable odors occurred between 1.2 and 26 percent of the time around the drying areas.

The hydrogen sulfide levels averaged between 7.2 and 10.4 ppbv. The highest value observed was 170 ppbv, with the next highest value being 93 ppbv 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 were more frequent during the summer months of 2003 and ranged from 5 to 23 percent.

John E. Egan WRP

At the John E. Egan WRP the easily noticeable and stronger odor observations occurred 46 out of 364 times, or 12.6 percent. The easily noticeable odors were generally in the vicinity of the

FIGURE 1: ODOR OBSERVANCES AT CALUMET WRP—2003

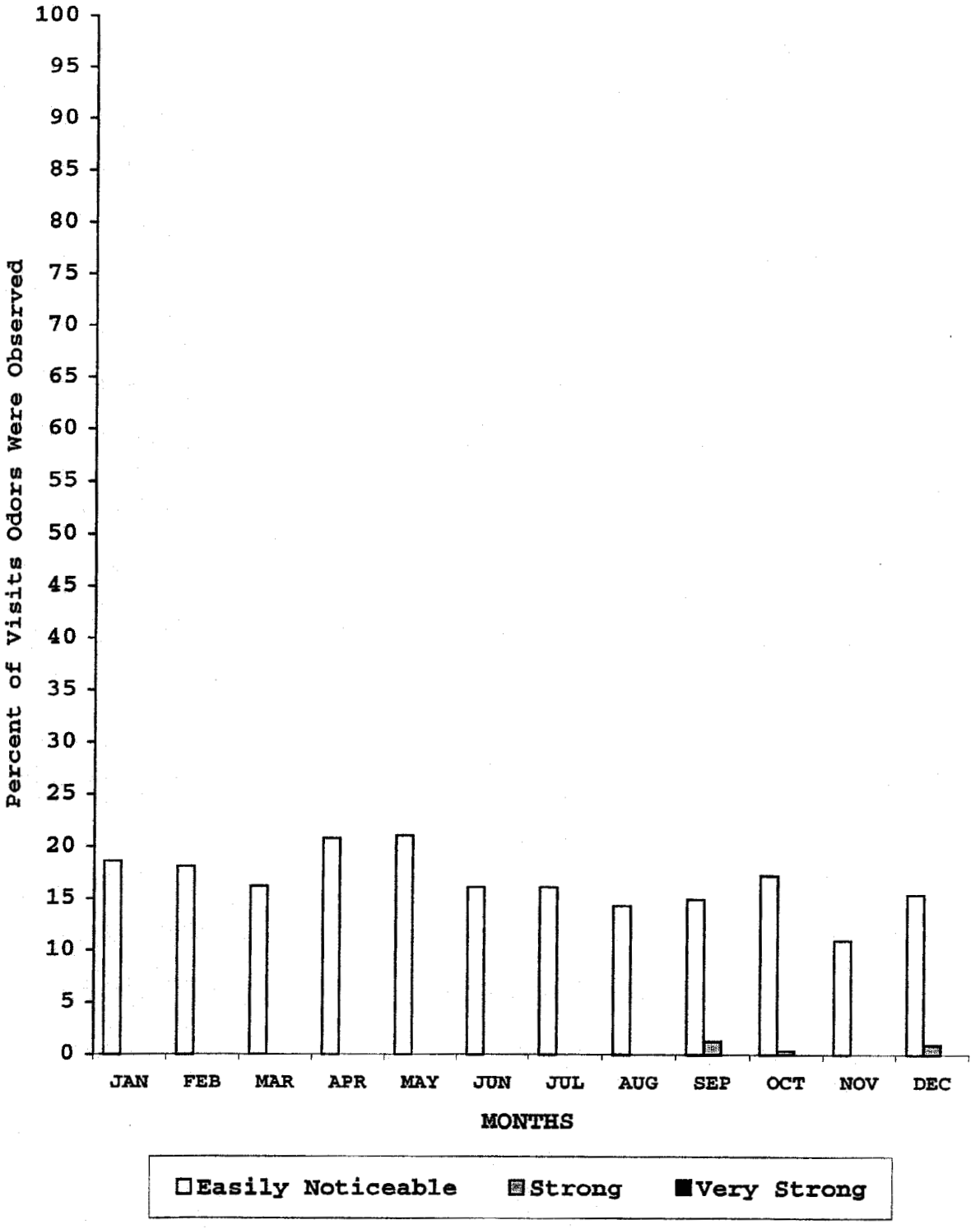
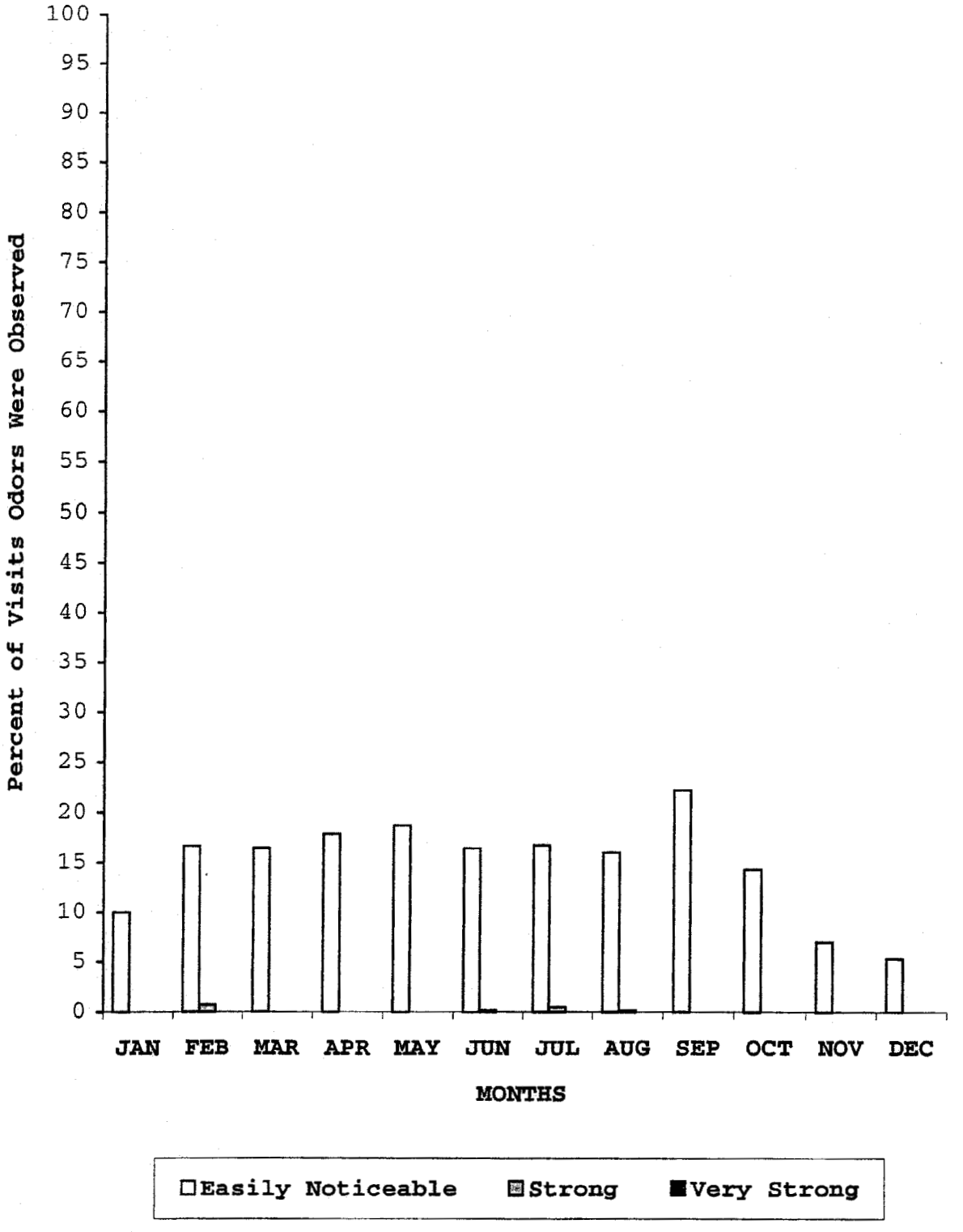


TABLE 4: HYDROGEN SULFIDE READINGS AT CALUMET SOLIDS DRYING AREAS—2003

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
East Drying Cell #1 SW (14)[1]	8.3	0	54
Hopper Building (15)	10.4	0	90
East Drying Cell #8 NW (16)	9.4	0	93
East Drying Cell #8 NE (17)	8.5	0	83
Truck Scale/Centrifuge (18)	8.2	1	29
East Drying Cell #1 SE (19)	8.7	0	69
West Drying Cell #1 @ Gate (20)	8.8	0	73
West Drying Cell #4 (21)	9.5	0	170
Bituminous Road @ Gate (22)	7.2	0	24

[1]Numbers in parenthesis correspond to Station numbers in Figure AI-1.

FIGURE 2: ODOR OBSERVANCES AT CALUMET SLUDGE DRYING AREAS—2003



waste gas burner and the primary tanks, with 23 and 35 percent of the observations, respectively, being easily noticeable. There were no very strong odor observations and only one strong odor observation at the Egan WRP locations in 2003. At the West and East Gates the odors were generally faint to no odor, 94 percent and 98 percent of the time, respectively.

The percentage of observations at which easily noticeable, strong, and very strong odors were observed during 2003 are plotted by month in Figure 3. The frequency of observance varied from zero in August to 21 percent in November.

The average hydrogen sulfide measurements ranged from 6.2 to 11.8 ppbv, as shown in Table 5. The highest level was observed in the vicinity of the waste gas burner.

James C. Kirie WRP

There were no very strong and only one strong odor observations at the James C. Kirie WRP during 2003. Approximately 84 percent (R&D Department) and 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 and air lift stations A1 and A2, ranging between 21 and 34 percent.

Figure 4 summarizes the observations of odor monitoring personnel during 2003 in terms of easily noticeable odor or greater. There were very few noticeable odors. It should be 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.

FIGURE 3: ODOR OBSERVANCES AT JOHN E. EGAN WRP—2003

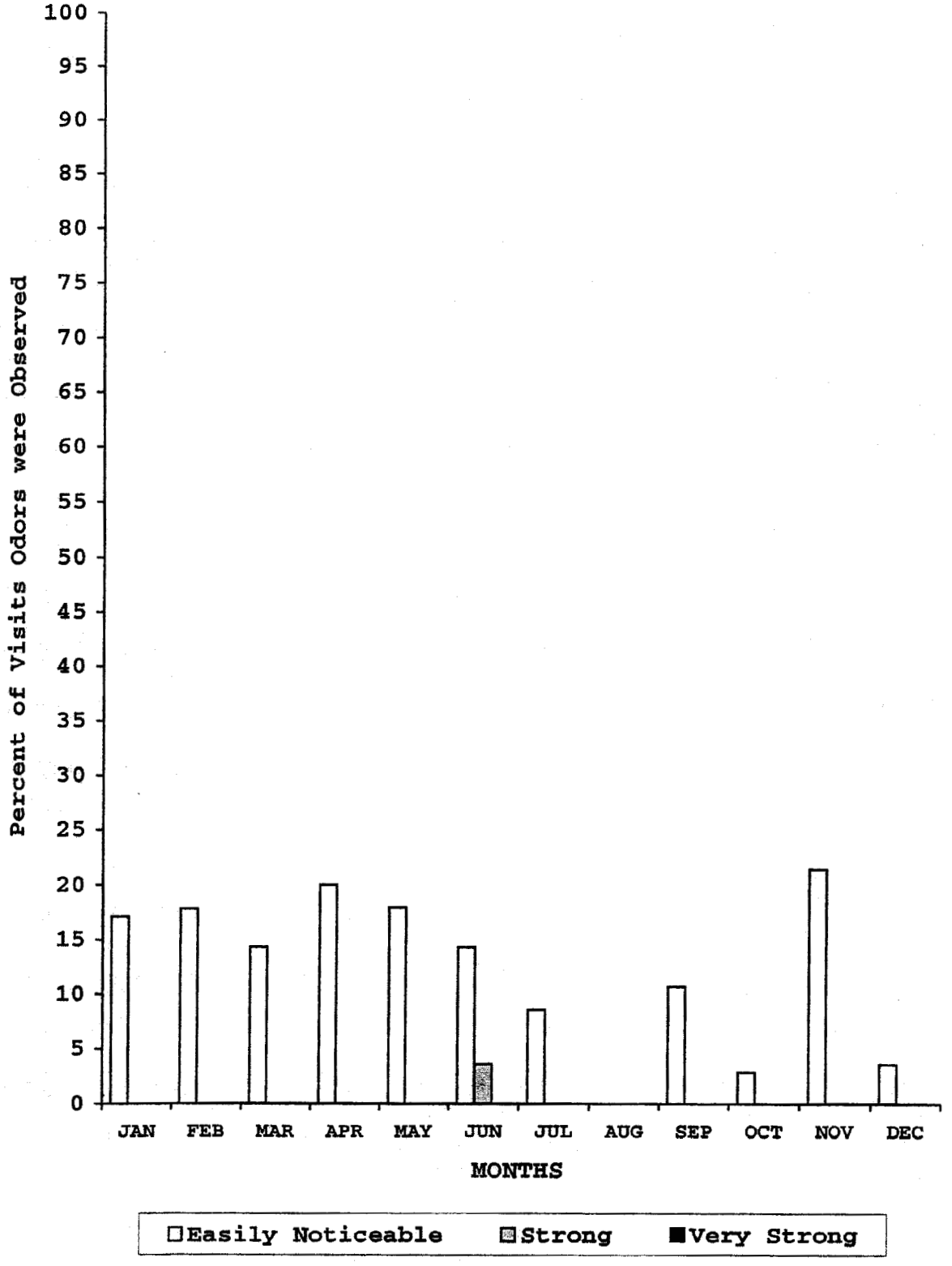
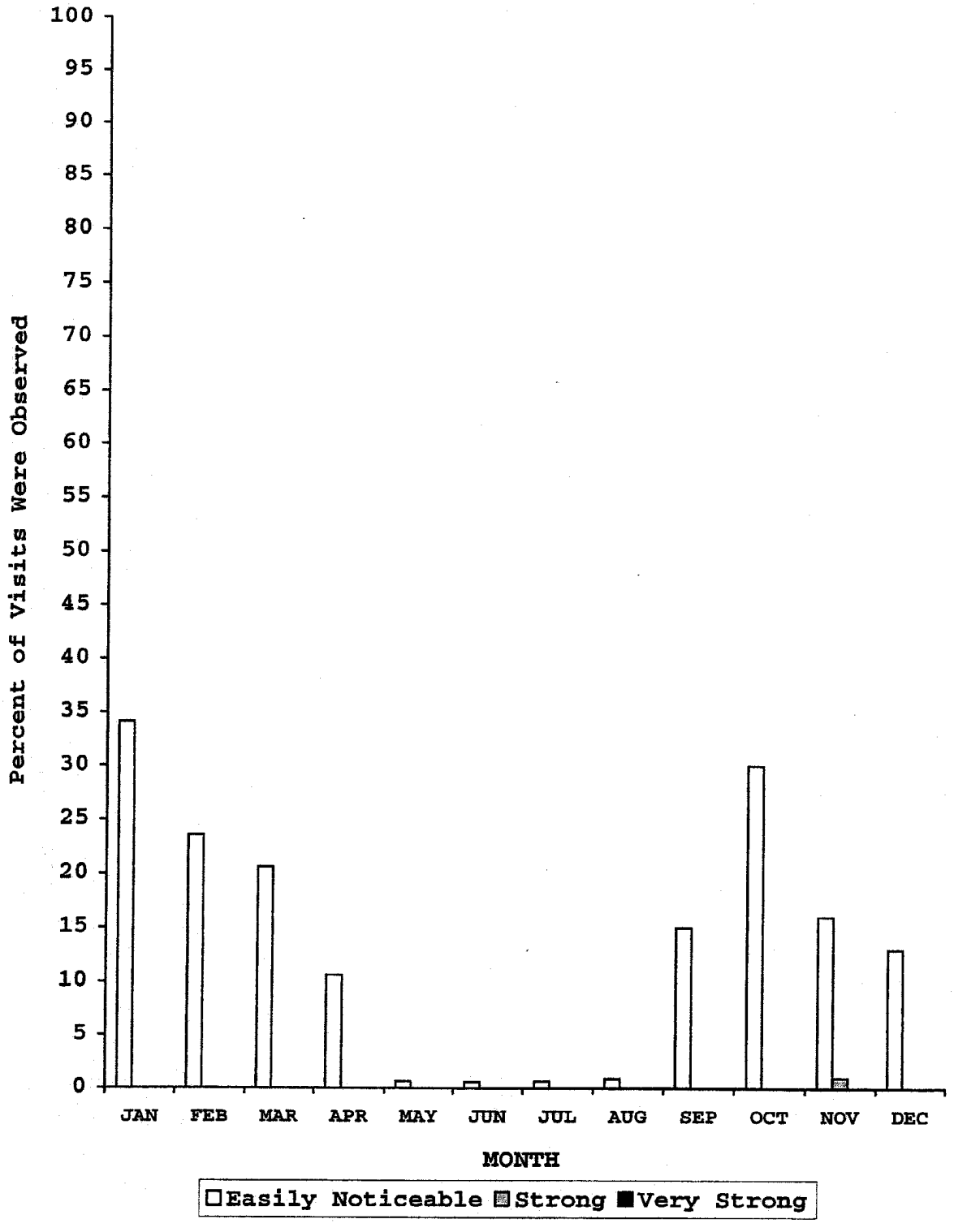


TABLE 5: HYDROGEN SULFIDE READINGS AT JOHN E. EGAN WRP—2003

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
West Entrance Gate (1)[1]	6.7	0	15
Near Waste Gas Burner (2)	11.8	2	110
Primary Tanks (3)	7.9	0	21
South End "A" Drive (4)	7.2	1	15
Final Tanks (5)	7.9	0	18
East Entrance Gates (6)	6.2	0	14
West of Storage Building (7)	6.9	0	15

[1]Numbers in parenthesis correspond to Station numbers in Figure AI-2.

FIGURE 4: ODOR OBSERVANCES AT JAMES C. KIRIE WRP—2003



The measured hydrogen sulfide levels are summarized in Table 6. The highest average levels of hydrogen sulfide were measured in the vicinity of Air Lift B1 and Road C-1, with averages of 7.5 ppbv and 7.3 ppbv, respectively. All the other locations had averages ranging from 5.9 to 7.2 ppbv.

North Side WRP

The majority of the observations at the North Side WRP were faint to no odor, 70 percent of the time in 2003. There were no strong or very strong odor observations at this WRP during 2003. The easily noticeable odors occurred with greatest frequency around Preliminary Tank #3, 92 percent, Preliminary Tank #10, 61 percent, the gallery building of Battery D mix channel, 56 percent, and the covered sludge concentration tanks, 69 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 through September and lower in the winter months.

The hydrogen sulfide levels are summarized in Table 7. The highest levels were generally observed in the vicinity of the Covered Sludge Concentration Tanks with an average of 10.1 ppbv. There was one high value (2,100 ppbv) east of McCormick Road along the Howard Street Interceptor. This was quickly reduced by chlorination of the raw sewage. The next highest value at this location was 280 ppbv.

TABLE 6: HYDROGEN SULFIDE READINGS AT KIRIE WRP—2003

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Plant Entrance (1)[1]	6.9	1	18
Pump Station (2)	7.0	1	17
Air Lift B1 (3)	7.5	1	17
Road C-1 (4)	7.3	0	31
Return Channel (5)	7.0	0	25
East Gallery—North (6)	6.6	1	16
Road C-2 (7)	6.8	0	51
Road C-3 (8)	6.4	0	18
Road C-4 (9)	5.9	0	17
Air Lift A-1 (10)	7.1	1	16
Air Lift A-2 (11)	6.6	0	17
Road C-5 (12)	7.1	1	15
Road C-6 (13)	7.2	0	17
Road C-7 (14)	6.5	0	15
Air Lift B2 (15)	7.2	0	17
Ridge Lane—Point #1 (16)	6.6	1	15
Marshall and Pleasant (17) Lane—Point #2	6.8	0	18

[1]Numbers in parenthesis correspond to Station numbers in Figure AI-3.

FIGURE 5: ODOR OBSERVANCES AT NORTH SIDE WRP—2003

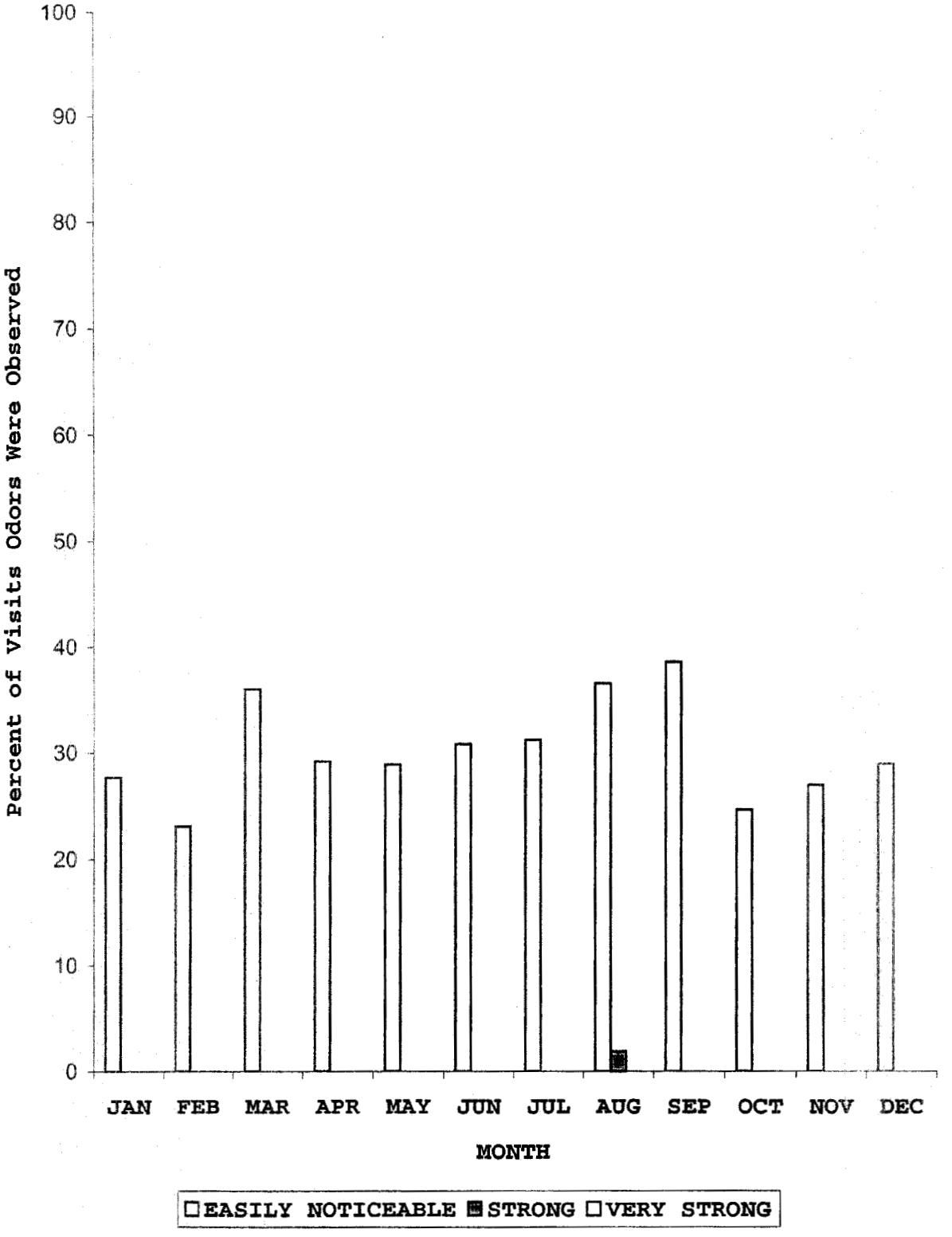


TABLE 7: HYDROGEN SULFIDE READINGS AT NORTH SIDE WRP—2003

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Howard Street West End (1)[1]	7.6	0	17
Howard Street East (2) of McCormick Road	55.2	0	2,100*
McCormick Road (3)	8.0	0	26
P&B Building (4)	8.2	0	19
North Ave. Rect. Tank A6 (5)	7.4	0	15
North Ave. Rect. Tank B6 (6)	6.3	0	16
North Ave. Rect. Tank C6 (7)	8.0	0	20
Final Tank Batt. D3 (8)	8.6	0	17
Gallery Bldg. of Batt. D (9). Mix Channel	6.0	1	19
Main Street and Avenue E (10)	5.5	1	17
Covered Weir Prel. Tank 10 (11)	9.5	0	160
Weir Rect. Prel. Tank 3 (12)	7.7	2	80
Main St. Covered Sludge (13) Conc. Tanks	10.1	0	125

[1]Numbers in parenthesis correspond to Station numbers in Figure AI-4.
*Next highest value was 280 ppbv.

Stickney WRP

Overall, the majority of the observations were faint to no odor, with 62 percent of R&D Department and 88 percent of M&O Department observations, respectively. Overall, there were 36 strong odor observations, or 0.7 percent of the total number of observations. These occurred in the vicinity of the Imhoff tanks, the centrifuges, the sludge concentration tanks, and the preliminary tanks. These same locations had the majority of easily noticeable odors. At the predigestion centrifuges, approximately 59 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 Tenth and Twelfth Avenues, and the post-digestion centrifuges had easily noticeable odors 45, 48, 48, 42, 44, and 39 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 a slight seasonal pattern in the odor observations, with the lowest percentages occurring in January and December. The few strong odor occurrences were spread out over the year.

The hydrogen sulfide levels measured in the vicinity of the sludge concentration tanks at G Street and the preliminary tanks at Tenth and Twelfth Avenues had average levels of 50.2, 104, and 36 ppbv, respectively, as shown in Table 8. The pre-digestion centrifuges and the concentration tanks at D Street had average hydrogen sulfide concentrations of 133 and 33.2 ppbv, respectively. In general, the hydrogen sulfide levels are slightly higher than observed at the other District WRPs.

FIGURE 6: ODOR OBSERVANCES AT STICKNEY WRP—2003

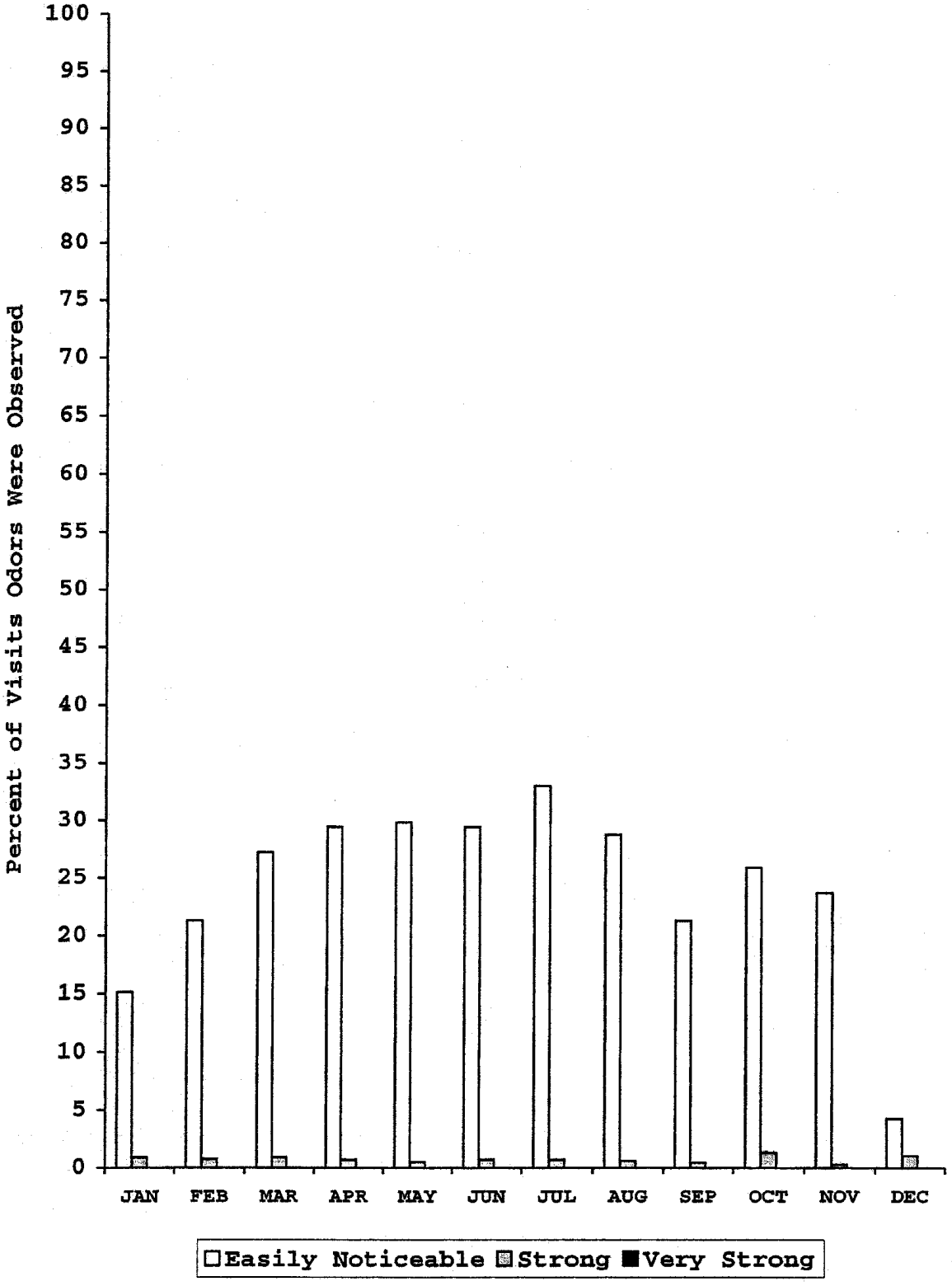


TABLE 8: HYDROGEN SULFIDE READINGS AT STICKNEY WRP—2003

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Imhoff B St./3rd Ave. (1)[1]	21.9	0	250
Imhoff B St./4th Ave. (2)	18.1	0	210
Imhoff B St./5th Ave. (3)	12.4	3	66
Digester 6th Ave. @ B St. (4)	10.1	0	45
West Digester Cont. Bldg. (5)	9.9	0	48
Centrifuges 6th Ave. @ Pre. (6)	133.2	3	1,800
Centrifuges 6th Ave. @ Post (7)	14.2	2	111
Concentration G St. North (8)	50.2	2	400
Concentration D St. South (9)	31.2	0	260
Preliminary 12th Ave. (10)	36	2	570
Preliminary 10th Ave. (11)	104	0	2,200
39th St./Central Ave. (12)	10.5	1	90
39th St./Morton College Ent. (13)	9.8	0	80
39th St./Dig. @ 57th Ave. (14)	10.1	0	102
39th St./Between Austin and Lombard (15)	8.1	0	28
Battery D, B St/13th Ave. (16)	9.9	0	110
Lombard Ave. @ Gate/39th St. (18)	8.6	1	49
Laramie and 40th St. (19)	11.0	0	62
Laramie and 39th St. (20)	11.2	0	70

[1]Numbers in parenthesis correspond to Station numbers in Figure AI-5.

Stickney Solids Drying and Management Areas

During 2003, an additional monitoring location was added at the Northwest end of the Marathon Drying Area. The Stickney Solids Drying and Management Areas, consisting of HASMA, LASMA, Marathon, and Vulcan, had 67 percent of the observations in 2003 characterized as faint to no odor. There were only 17 strong odor observations out of 2,298 total observations. The strong odor observations in the vicinity of the TARP shaft at the Vulcan Site were only 0.68 percent as compared to 6.6 percent in 2002. The strong odor observations were divided among the various areas (HASMA, Vulcan, LASMA Cell 1, and LASMA Cell 3) depending upon the activity at the time. Easily noticeable odors were generally observed at the west end of the Marathon site, 67 percent of the observations, at the south side of the Vulcan site, 45 percent of the observations, and at HASMA, 37 percent of the observations. The LASMA lagoon area ranged between 10 and 33 percent easily noticeable odors depending upon the location. The LASMA Drying Cell areas ranged between 26 and 38 percent of the observations.

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. The frequency of observed odors is generally highest during the late spring through early fall months when solids processing and drying is being carried out. The few strong odor observations are spread out over May to October.

The hydrogen sulfide concentrations were generally low, with the maximum values less than 14 ppbv and the average concentrations ranging between 5.1 and 7.2 ppbv as shown in Table 9.

FIGURE 7: ODOR OBSERVANCE ON DISTRICT PROPERTY AT HASMA, LASMA, VULCAN, AND MARATHON SITE—2003

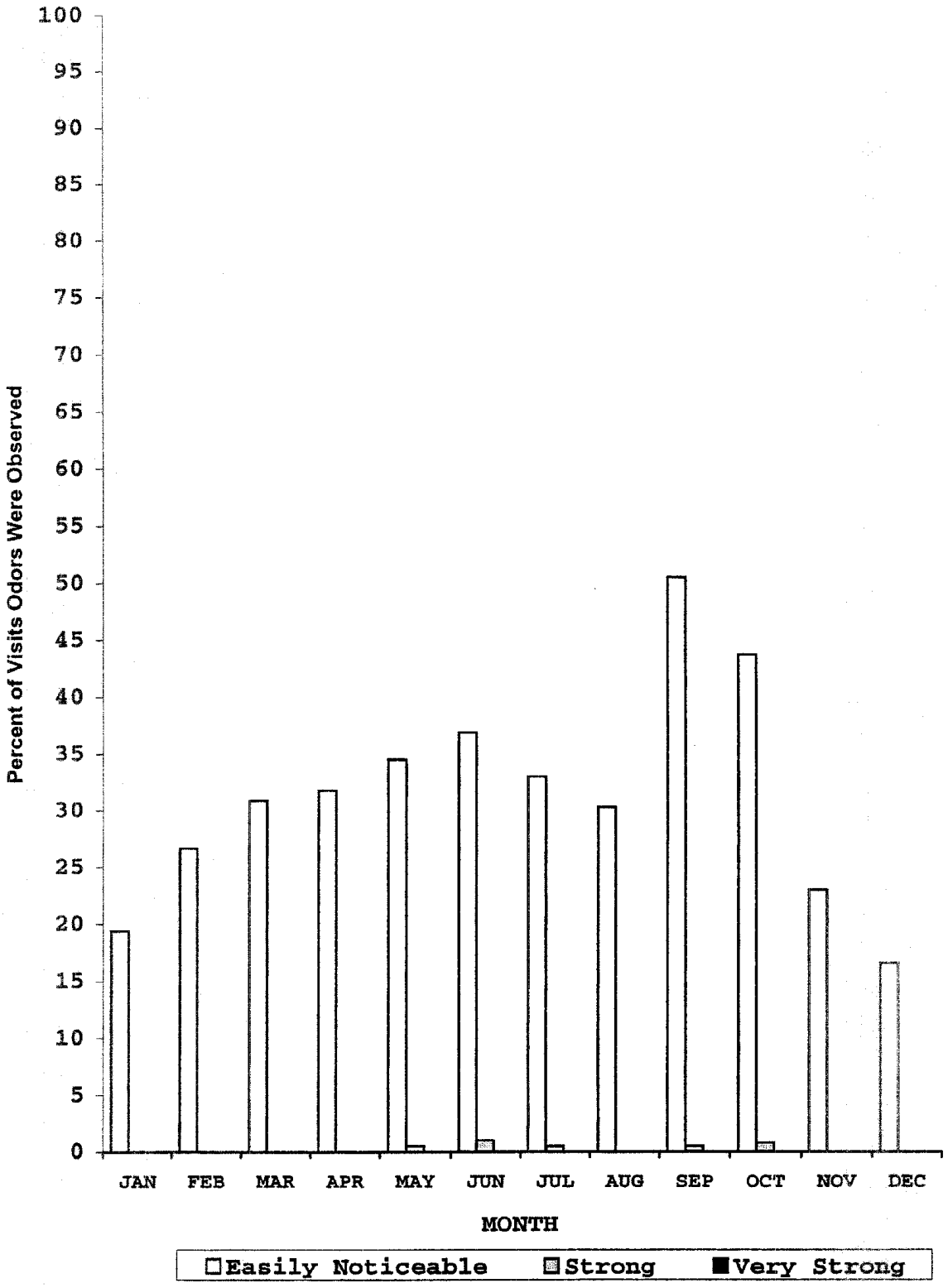


TABLE 9: HYDROGEN SULFIDE READINGS AT STICKNEY SOLIDS DRYING AREAS—2003

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
HASMA (1)[1]	5.6	3	10
Hasma Center (1.5)	5.7	3	10
Vulcan South (2)	7.1	3	14
Vulcan North (3)	7.0	5	11
Vulcan TARP Drop Shaft (4)	6.4	3	13
Vulcan TARP Well (5)	7.2	5	13
LASMA Lagoon 1 (6)	7.1	3	13
LASMA Lagoon 16 (7)	6.4	2	11
LASMA Lagoon 24 (8)	6.3	1	10
LASMA Lagoon 30(9)	6.2	3	12
LASMA Cell 1E-1W (10)	6.2	4	11
LASMA Cell 2E-2W (11)	5.1	3	9
LASMA Cell 3E-3W (12)	5.9	4	10
LASMA Cell 4E-4W (13)	5.3	3	9
LASMA Cell 5E-5W (14)	5.9	3	10
Marathon (15)	5.7	3	10
Marathon West (16)	5.6	10	9

[1]Numbers in parenthesis correspond to Station numbers in Figure AI-6.

Ridgeland and Stony Island Drying Areas

The Ridgeland Drying Area had 88 percent of the observations characterized as faint to no odor. This is similar to what was observed at the Stickney and Calumet Drying Areas. There were no strong or very strong odor observations during 2003. The easily noticeable odors were 12 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 2003 is presented in Figure 8 expressed as frequency of occurrence. As expected, easily noticeable odors occurred only during the June through November period.

The average hydrogen sulfide levels at the various locations around the Ridgeland Drying Area ranged from 6.0 to 8.9 ppbv, as shown in Table 10.

The Stony Island Drying Areas had 62 percent of the observations characterized as faint to no odor, with 16 strong odor observations in 2003. The easily noticeable odors account for approximately 34 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 2003 is presented in Figure 9 expressed as frequency of occurrence.

The average hydrogen sulfide levels around the Stony Island Drying Area, as shown in Table 10, varied from 7.9 to 15.3 ppbv.

FIGURE 8: ODOR OBSERVANCES AT RIDGELAND—2003

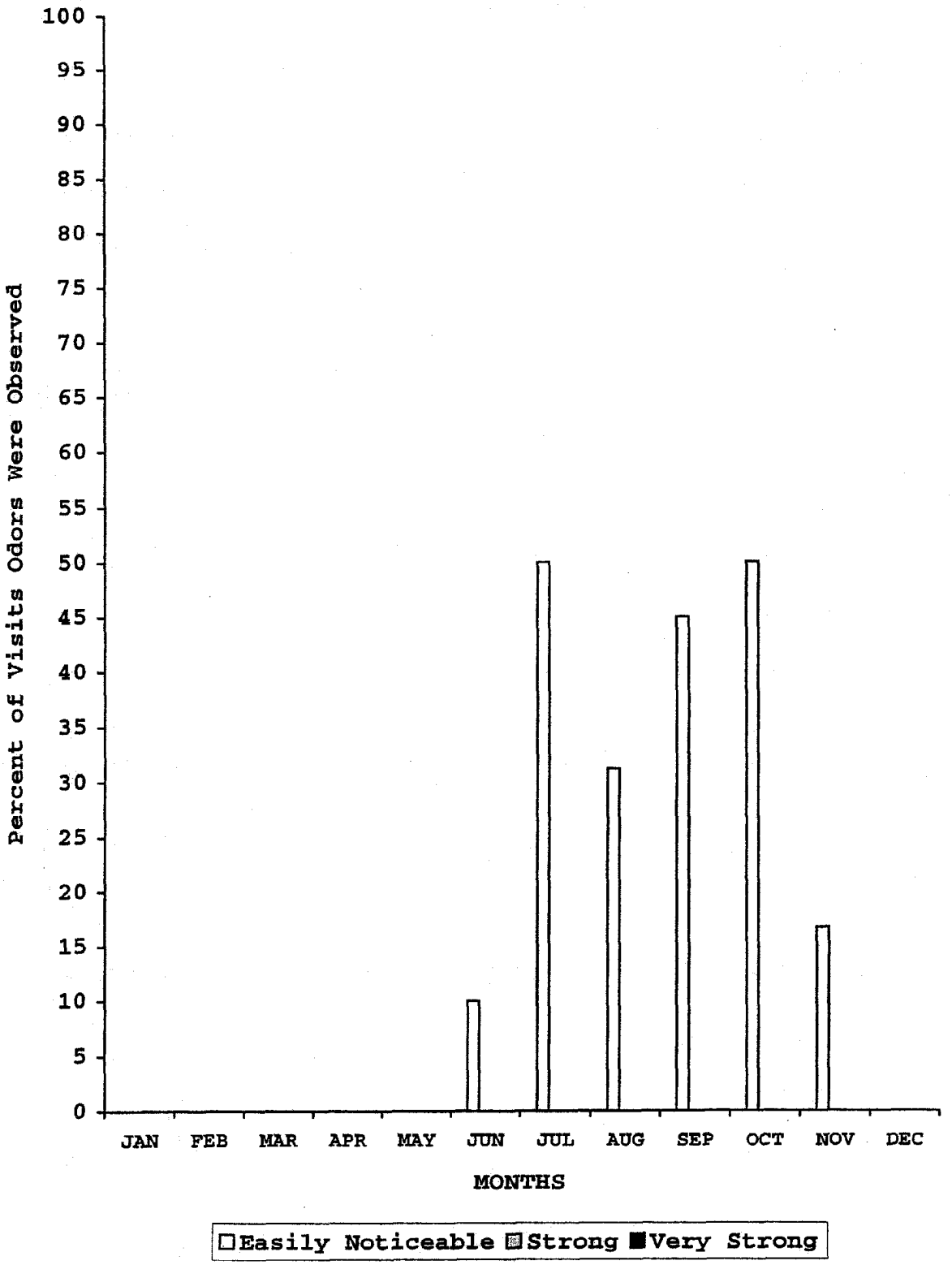
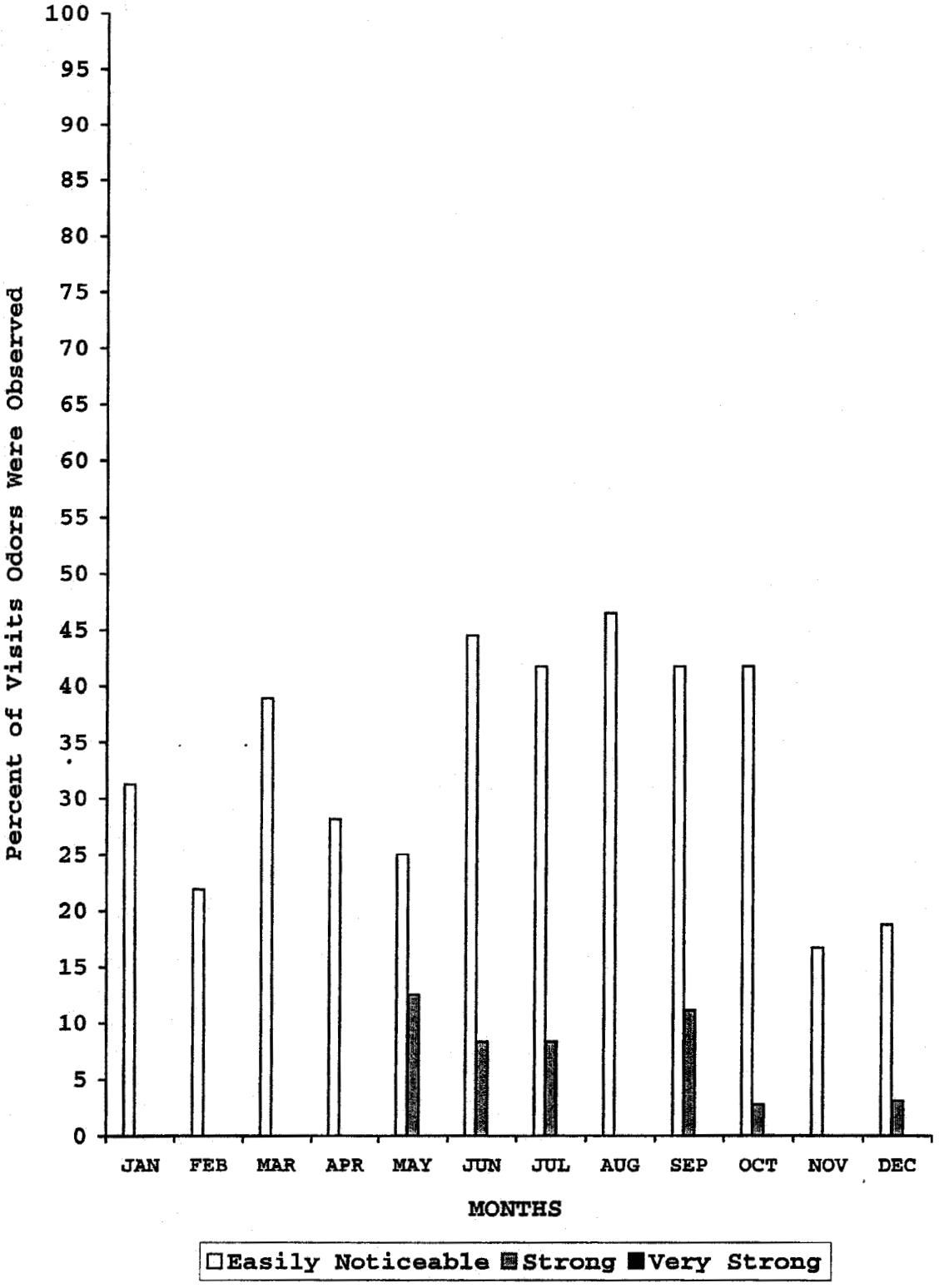


TABLE 10: HYDROGEN SULFIDE READINGS AT RIDGELAND AND STONY ISLAND DRYING AREAS—2003

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Ridgeland			
SW Parking Area (1)[1]	6.0	0	18
North of Cell 2W (2)	7.5	0	18
NE Corner Cell 5E (3)	8.9	0	54
South of Cell 5 (4)	7.2	0	16
Stony Island			
Entrance 122nd St (1)[2]	7.9	1	30
NE Corner Cell 5 (2)	13.4	0	60
South End Cells 4 & 7 (3)	8.7	0	35
West Side of Cell 3 (4)	15.3	1	102

[1]Numbers in parenthesis correspond to Station numbers in Figure AI-7.
[2]Numbers in parenthesis correspond to Station numbers in Figure AI-8.

FIGURE 9: ODOR OBSERVANCES AT STONY ISLAND—2003



SUMMARY

The District maintains a program of monitoring odors at various locations at the various WRPs and Solids Drying Areas which started in 1990. Both R&D Department and M&O Department personnel make subjective observations regarding the type and intensity of any odor perceived. In 2003 the program included five of the District WRPs and all of the Solids Management Areas. The number of locations at each facility varies from 4 to 19. The frequency of monitoring varies from one day per week at the Ridgeland 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 2003 the various facilities received from none to three calls each. Only one of the complaints was confirmed as resulting from odors emanating from a District facility.

During 2003 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 solids drying areas, faint to no odor was recorded from 62 to 88 percent of the observations.

At each of the WRPs there are specific locations which have 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 and the preliminary tanks. 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. As previously noted, the strong odors occurring along Laramie Avenue were identified as typical odors coming from the Koppers plant, which is just east of the Stickney WRP.

TABLE 11: STRONG ODOR OBSERVATIONS—2003

Facility	Number of Strong Observations	Total Number of Observations
Calumet WRP		
Sludge Concentration Building	3	
Preliminary Tanks	4	
	Total 7	3,130
Calumet SDS		
Drying Cell #1 SE	2	
West Drying Cell #4	1	
	Total 3	2,159
Egan WRP	Total 1	364
Kirie WRP	Total 1	10,640
North Side WRP	Total 1	673
Stickney WRP		
Imhoff Tanks	9	
Centrifuges (Pre and Post)	8	
Sludge Concentration Tanks	7	
Preliminary Tanks	7	
Laramie Ave. & 40th St.	4	
Laramie Ave. & 39th St.	1	
	Total 36	5,016
HASMA, LASMA, Vulcan SDS		
HASMA	2	
Vulcan TARP Shaft	1	
LASMA TARP Well (North)	1	
LASMA Drying Cells	3	
Marathon	0	
	Total 7	2,298
Ridgeland SDS	Total 0	196
Stony Island SDS	Total 16	392

Note: There were no very strong odor observations at any of the facilities.

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 seven ppbv at the WRPs. At the Stickney WRP the average hydrogen sulfide levels along the periphery of the plant were eight to 11 ppbv and 10 to 133 ppbv within the WRP.

APPENDIX AI

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

FIGURE AI-1: CALUMET WRP AND CALUMET WRP SOLIDS DRYING AREAS
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS

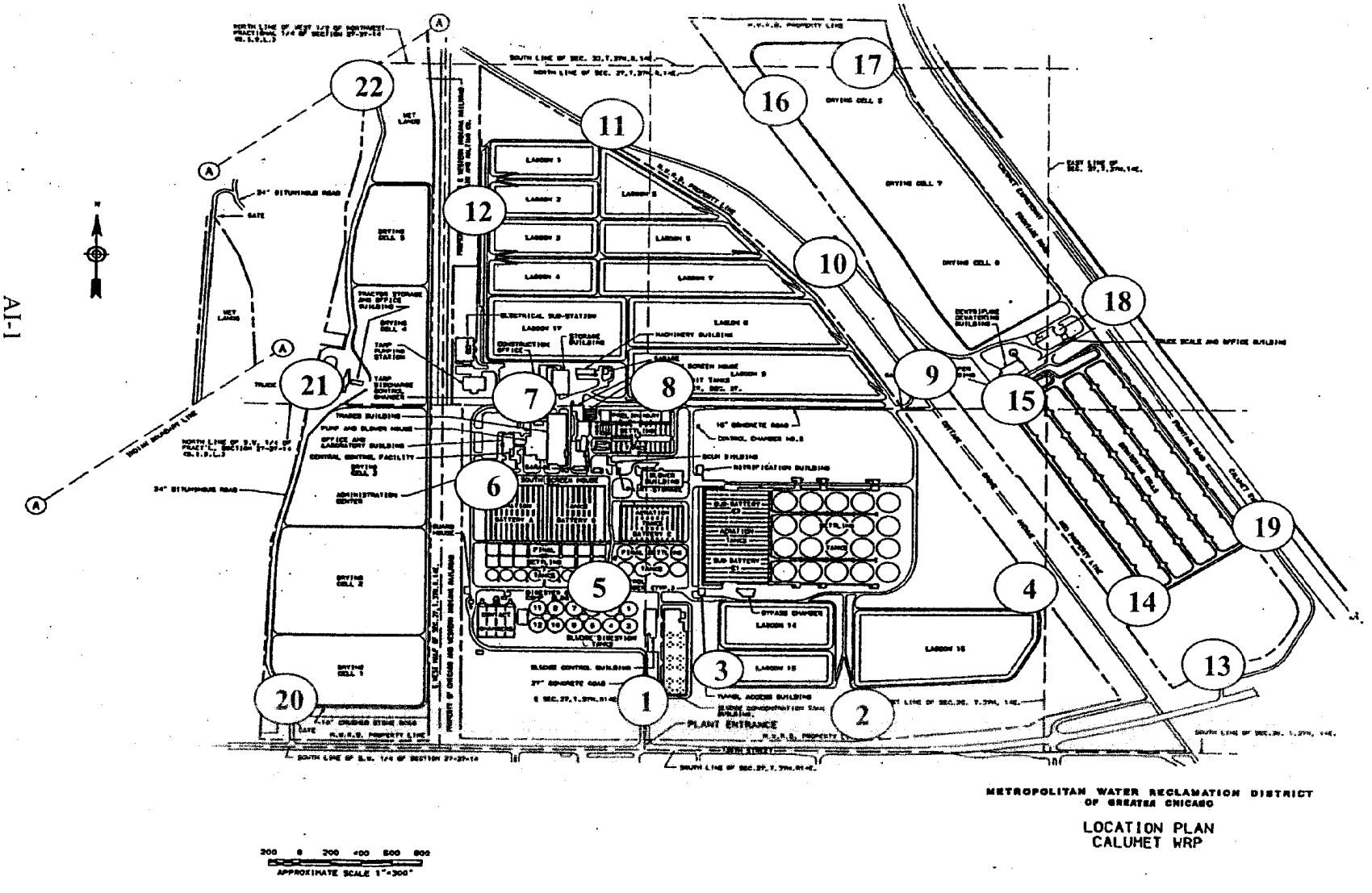


FIGURE AI-2: JOHN E. EGAN WRP AND DRYING AREA
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS

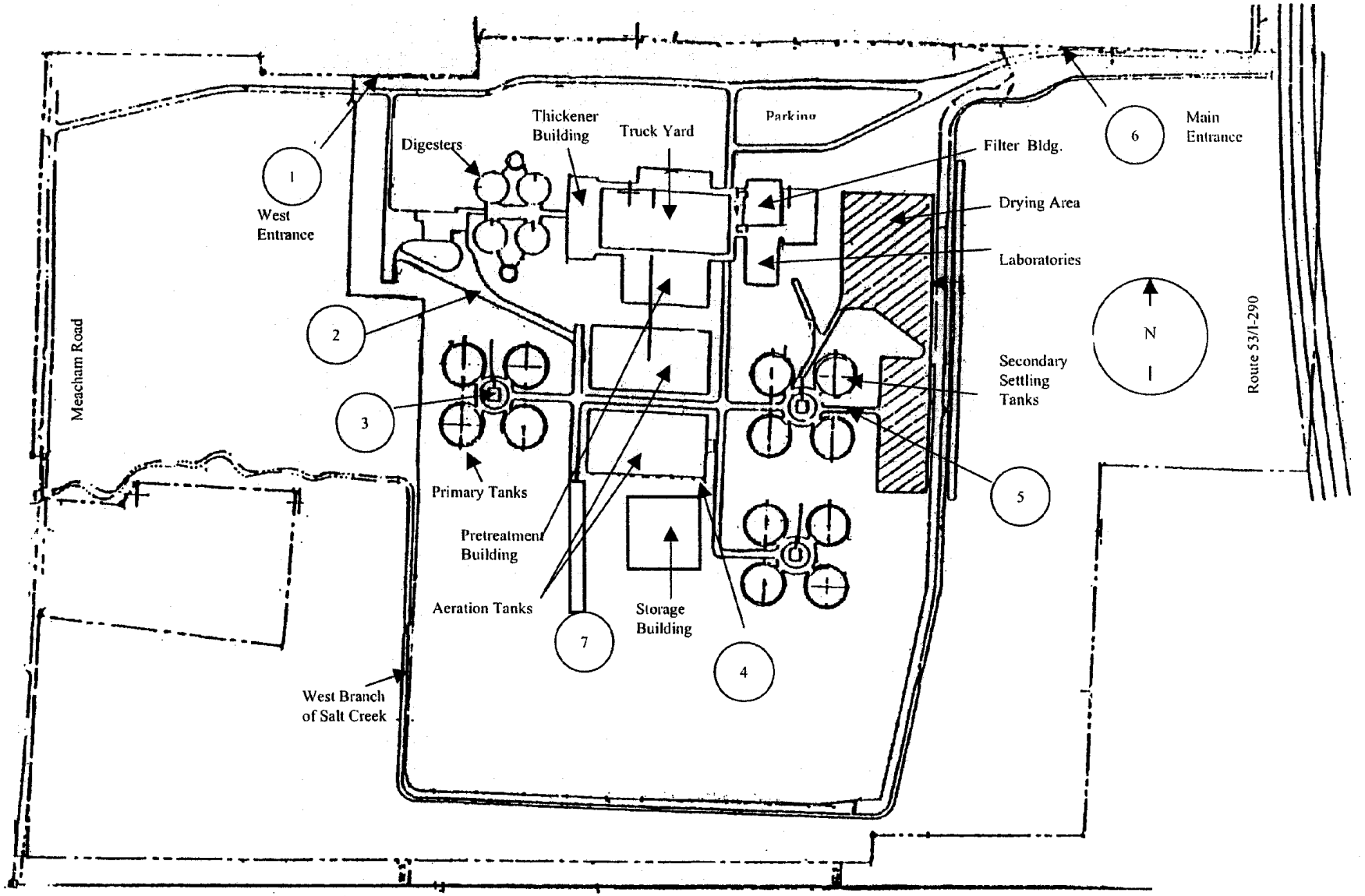


FIGURE AI-3: JAMES C. KIRIE WRP
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS

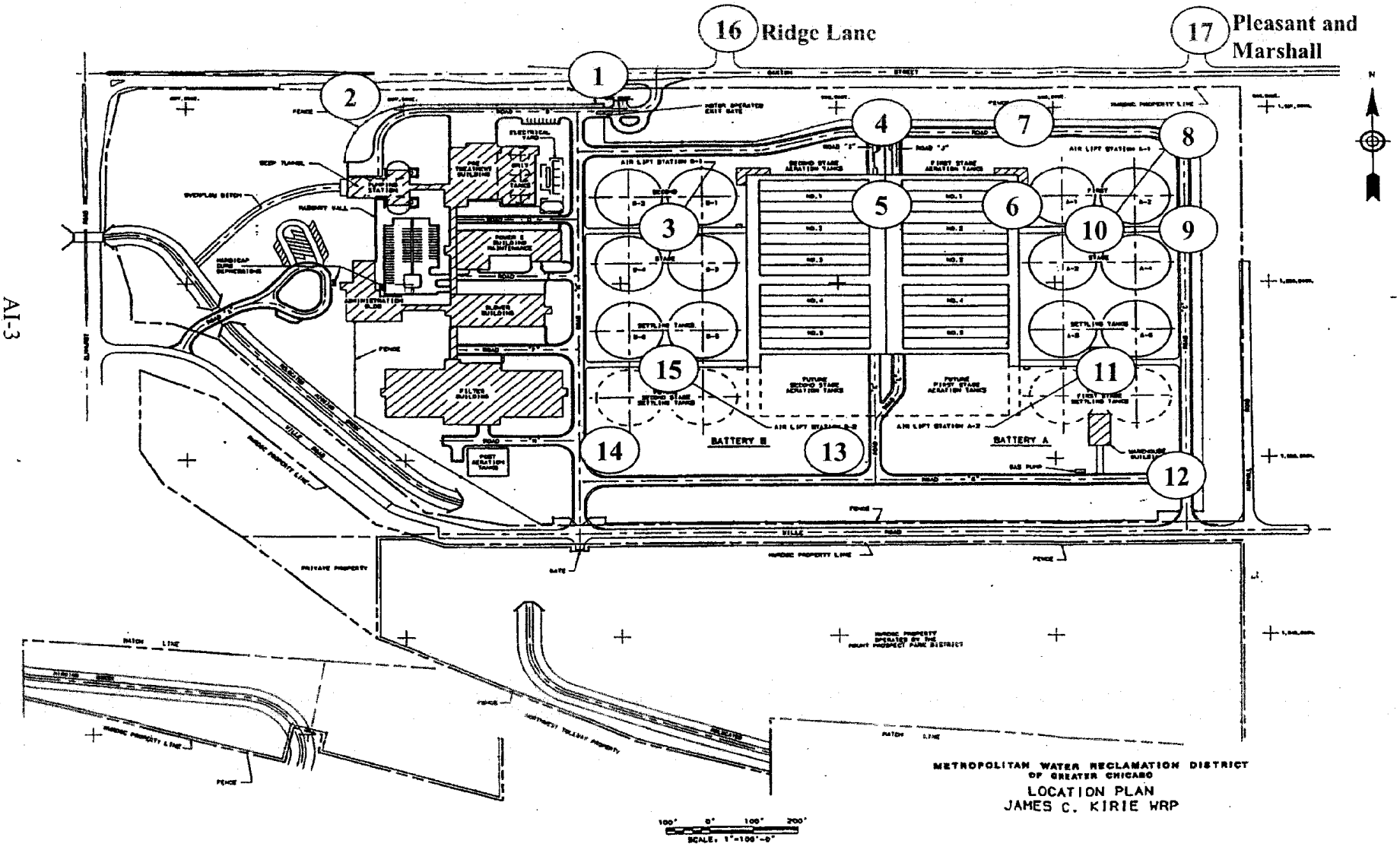
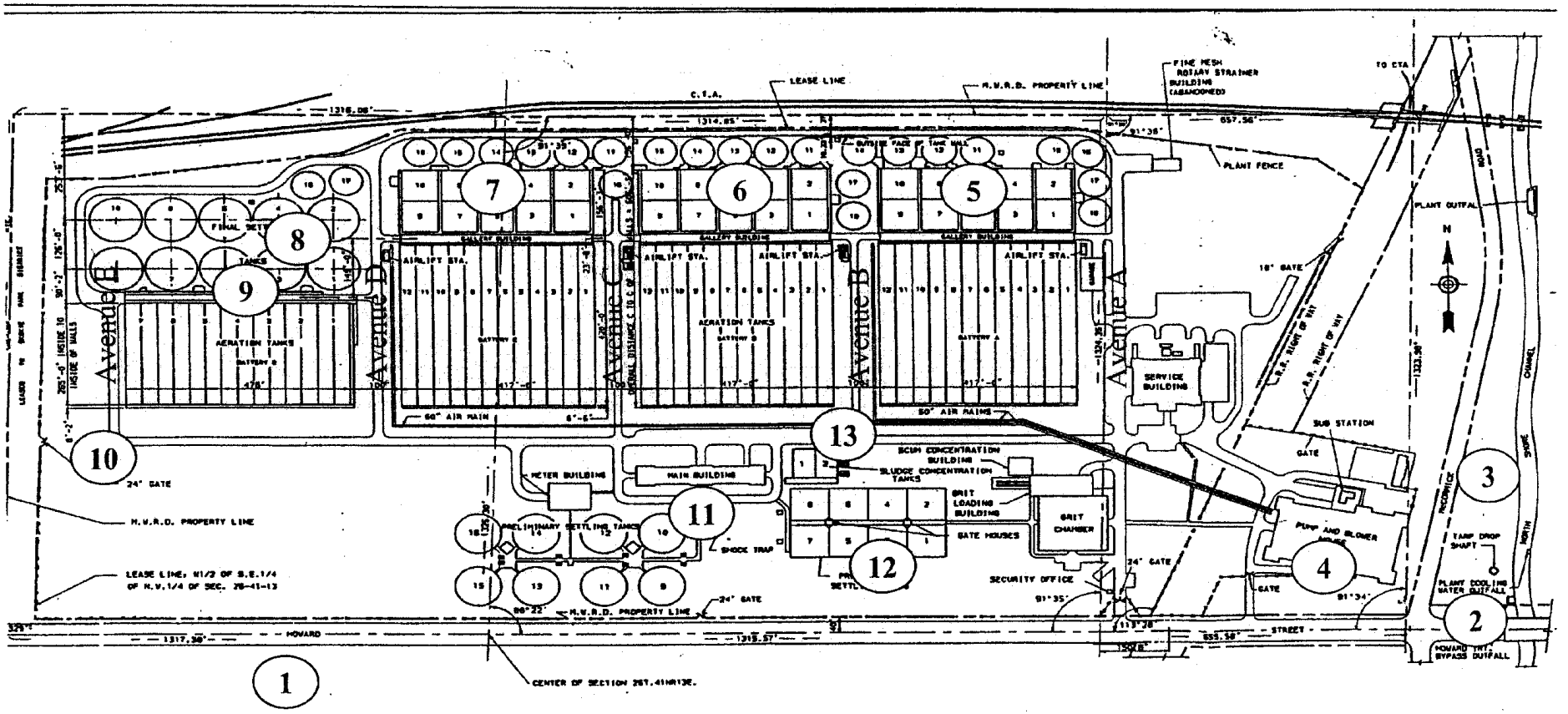


FIGURE AI-4: NORTH SIDE WRP
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



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

FIGURE AI-5: STICKNEY WRP
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS

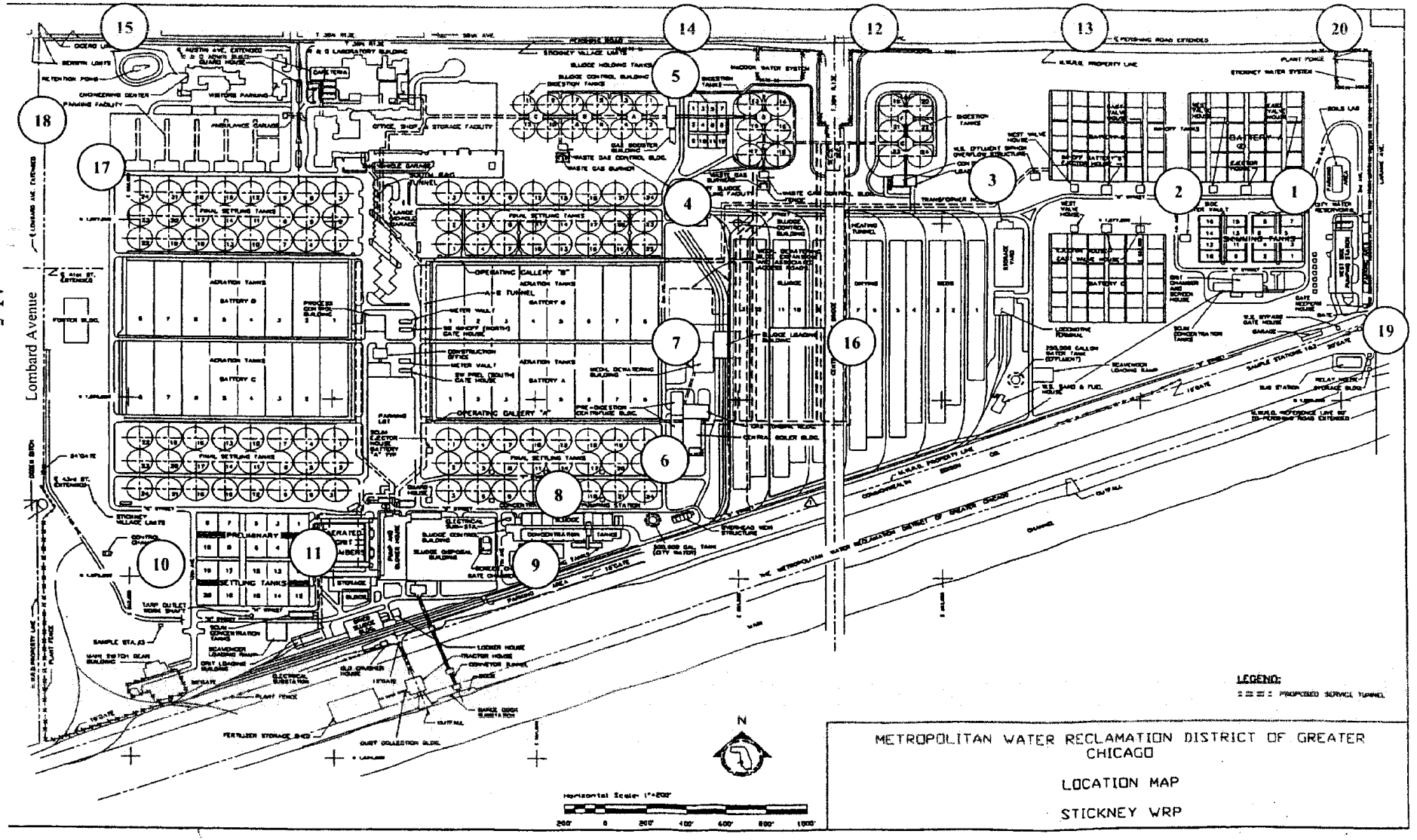


FIGURE AI - 6 : STICKNEY SOLIDS DRYING SITES (HASMA, VULCAN, LASMA AND MARATHON)
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS

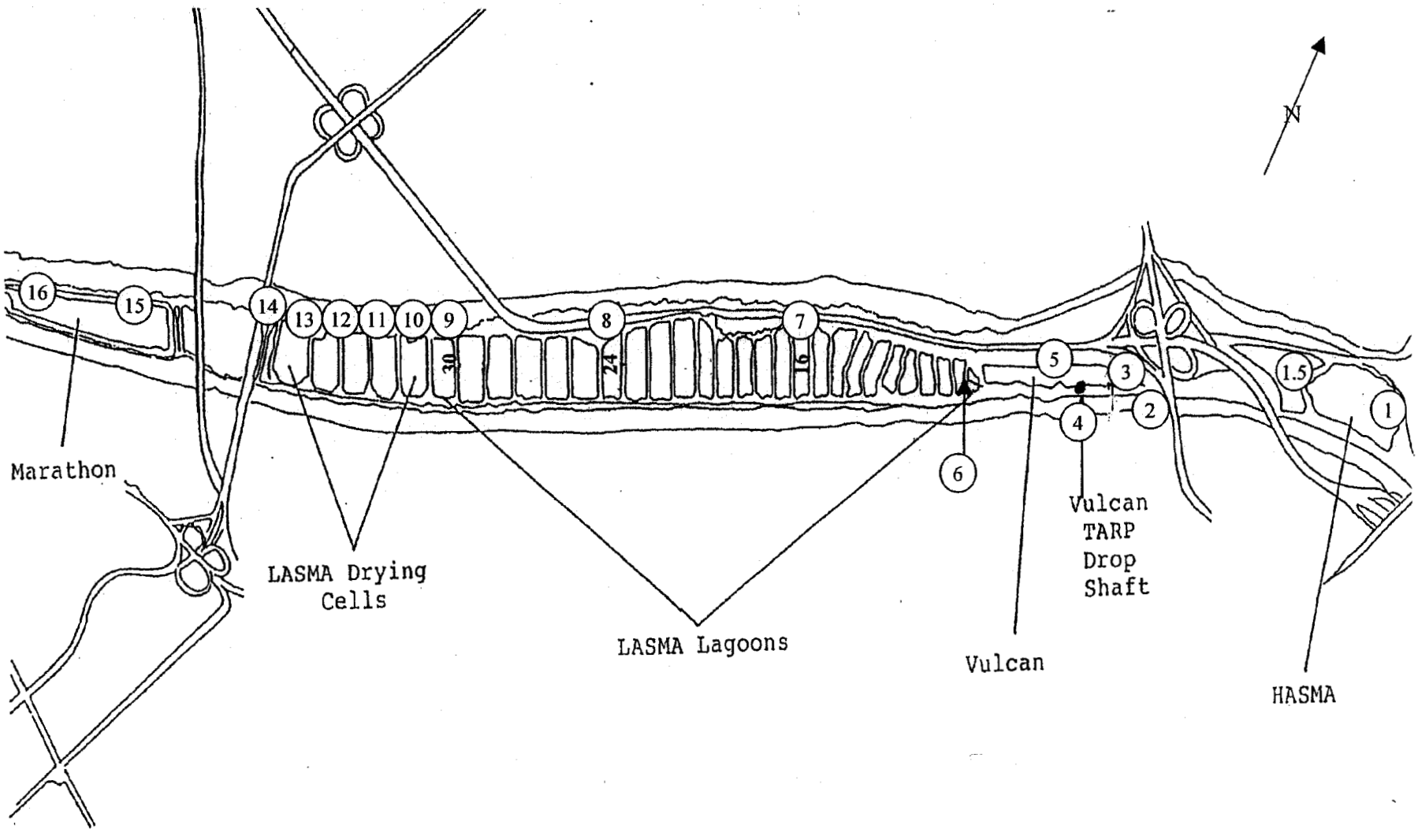


FIGURE AI-7: RIDGELAND AVENUE SOLIDS DRYING AREA (RASMA)
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS

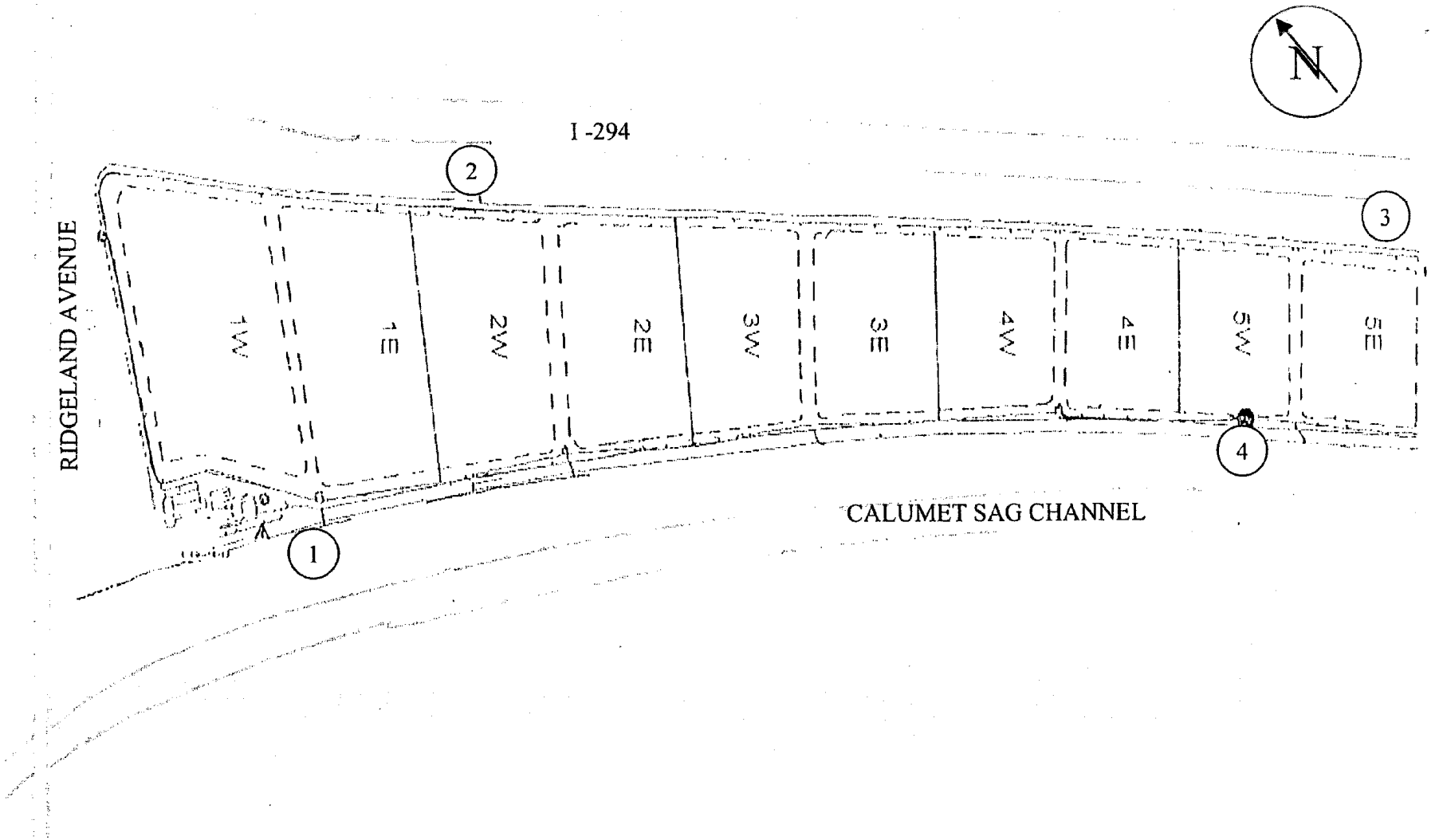


FIGURE AI-8: STONY ISLAND DRYING AREA
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS