

Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***RESEARCH AND DEVELOPMENT
DEPARTMENT***

REPORT NO. 03-24

ODOR MONITORING PROGRAM AT DISTRICT FACILITIES

DURING 2002

December 2003

Metropolitan Water Reclamation District of Greater Chicago
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**ODOR MONITORING PROGRAM AT DISTRICT FACILITIES
DURING 2002**

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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 13 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 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 addition to the subjective odor measurements, an analysis of the ambient air for hydrogen sulfide 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 2002. 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 2002.

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TABLE 1

ODOR MONITORING PROGRAM FOR 2002

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 2	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	1	0
Kirie WRP	17	1996	12	1 7*	R&D M&O	Yes	0	--
North Side WRP	13	1992	12	1 7**	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	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 = 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 odor monitoring surveys depending upon conditions, but the data are not included in this report for 2002.

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 2002 with regard to the various facilities were generally infrequent, ranging from none to three at each facility during the year.

RESULTS AT DISTRICT FACILITIES IN 2002

The results of the various odor monitoring programs at each of the District facilities for 2002 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 93 percent of the time by M&O Department personnel, respectively. The strong odors that are observed occurred around the sludge concentration building and

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TABLE 2

ODOR MONITORING RESULTS FOR 2002

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	1,743	0	3	482	1,258	72
	M&O	1,045	0	7	61	977	93
Calumet SDS	R&D	1,303	0	3	300	1,000	77
	M&O	720	0	2	24	694	96
o Egan WRP	R&D	344	0	0	56	288	84
Kirie WRP	R&D	850	0	0	124	726	85
	M&O	8,585	0	0	42	8,543	99
North Side WRP	R&D	659	0	0	170	489	74
	M&O**						
Stickney WRP	R&D	2,908	0	13	937	950	67
	M&O	2,380	0	1	764	765	68
HASMA, LASMA, Marathon, and Vulcan SPS	R&D	2,250	0	19	679	1,552	69
Ridgeland SDS	R&D	316	0	0	74	242	77
Stony Island SDS	R&D	224	0	3	97	124	55

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 also carries out odor monitoring at these facilities, but the data are not included in this Table.

preliminary tanks, with 3.1 and 1.3 percent, respectively, of the observations registered as strong. Other areas which had easily noticeable odors were in the vicinity of the preliminary tanks, 63 percent of observations, sludge digester tanks, 27 percent of observations, lagoons 7 and 8, 25 percent of observations, and aeration Battery A, 19 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 39.6 ppbv. The next highest values were observed around the preliminary tanks, with average of 28.8 ppbv. The rest of the locations averaged between 6.5 and 11 ppbv, with a number of nondetectable observations.

Figure 1 summarizes all the monthly observations of easily noticeable, strong, and very strong odors made during 2002 in terms of frequency of occurrence. The frequency of easily noticeable observations showed no seasonal trend, ranging between 12 and 15 percent each month.

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TABLE 3

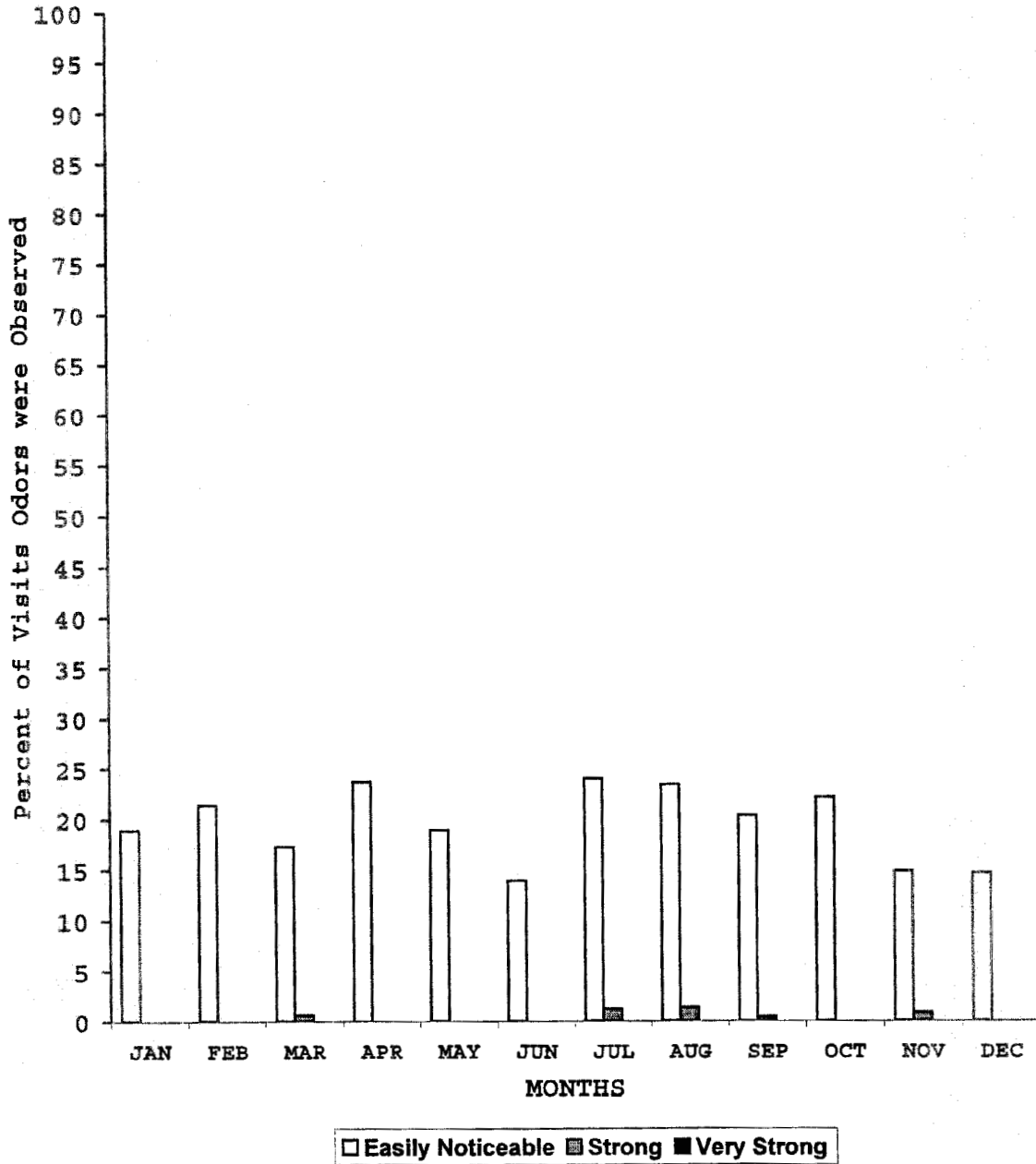
HYDROGEN SULFIDE READINGS AT
CALUMET WRP - 2002

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Plant Entrance	11.0	1	230
Lagoon #16 SW Corner	6.5	3	12
Sludge Conc. Bldg.	39.6	1	370
Lagoon #16 NE Corner	6.6	0	15
Sludge Digester Tanks	8.2	0	61
Aeration Battery A - West	6.7	0	16
TARP Pump Station	7.1	0	20
Preliminary Tanks	28.8	1	370
Gate Near Lagoon #9	7.1	1	23
Between Lagoon #7 & #8	9.3	1	38
Lagoon #1 & #2	7.1	0	21
Lagoon #3 & #4	6.7	0	22
Ellis Ave. & 130th St.	6.7	0	24

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FIGURE 1

ODOR OBSERVANCES AT CALUMET WRP - 2002



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, 77 percent by the R&D Department and 96 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 1.3 percent of the time. Overall there were 13 strong odor observations out of 2,390 observations (0.5 percent). Easily noticeable odors occurred between 9 and 32 percent of the time around the drying areas.

The hydrogen sulfide levels averaged between 5.9 and 9.9 ppbv. The highest value observed was 140 ppbv, with the majority of the values less than 31 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 2002.

John E. Egan WRP

At the John E. Egan WRP the easily noticeable and stronger odor observations occurred 56 out of 344 times, or 16

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TABLE 4

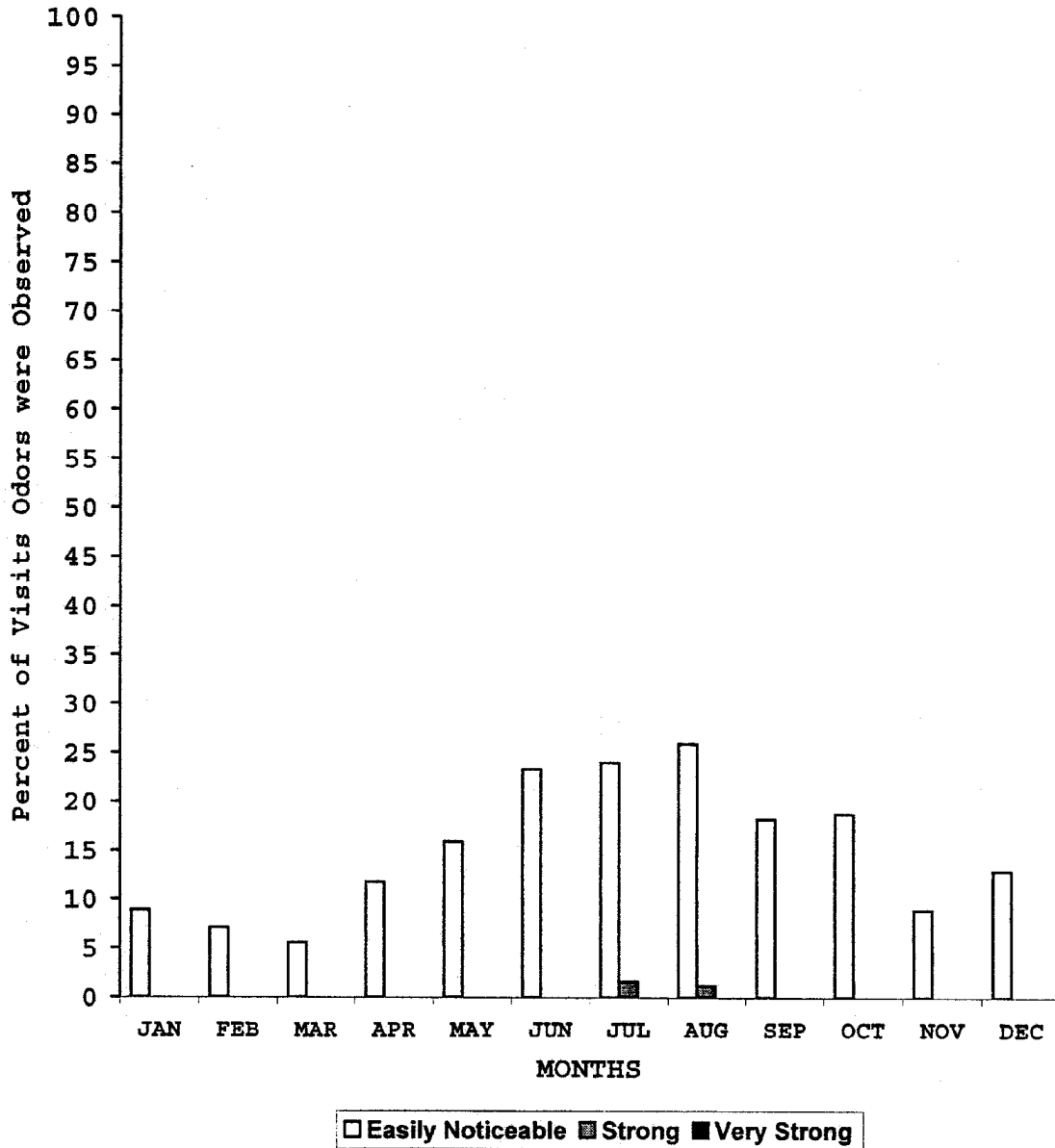
HYDROGEN SULFIDE READINGS AT
CALUMET SOLIDS DRYING AREAS - 2002

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
East Drying Cell #1 SW	6.3	0	14
Hopper Building	6.3	0	24
East Drying Cell #8 NW	6.2	0	16
East Drying Cell #8 NE	6.9	1	23
Truck Scale/Centrifuge	7.1	1	22
East Drying Cell #1 SE	9.9	0	140
West Drying Cell #1 @ Gate	6.4	0	19
West Drying Cell #4	6.5	0	31
Bituminous Road @ Gate	5.9	1	20

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FIGURE 2

ODOR OBSERVANCES AT CALUMET SOLIDS DRYING
AREAS - 2002



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. There were no strong or very strong odor observations at these locations in 2002. At the West and East Gates the odors were generally faint to no odor, 96 percent and 100 percent of the time, respectively. The easily noticeable odors were highest in the vicinity of the primary tanks.

The percentage of observations at which easily noticeable, strong, and very strong odors were observed during 2002 are plotted by month in Figure 3. Except for July, the frequency of observance was higher in the summer months.

The average hydrogen sulfide measurements ranged from 5.7 to 7.9 ppbv, as shown in Table 5. The highest levels were observed in the vicinity of the primary tanks.

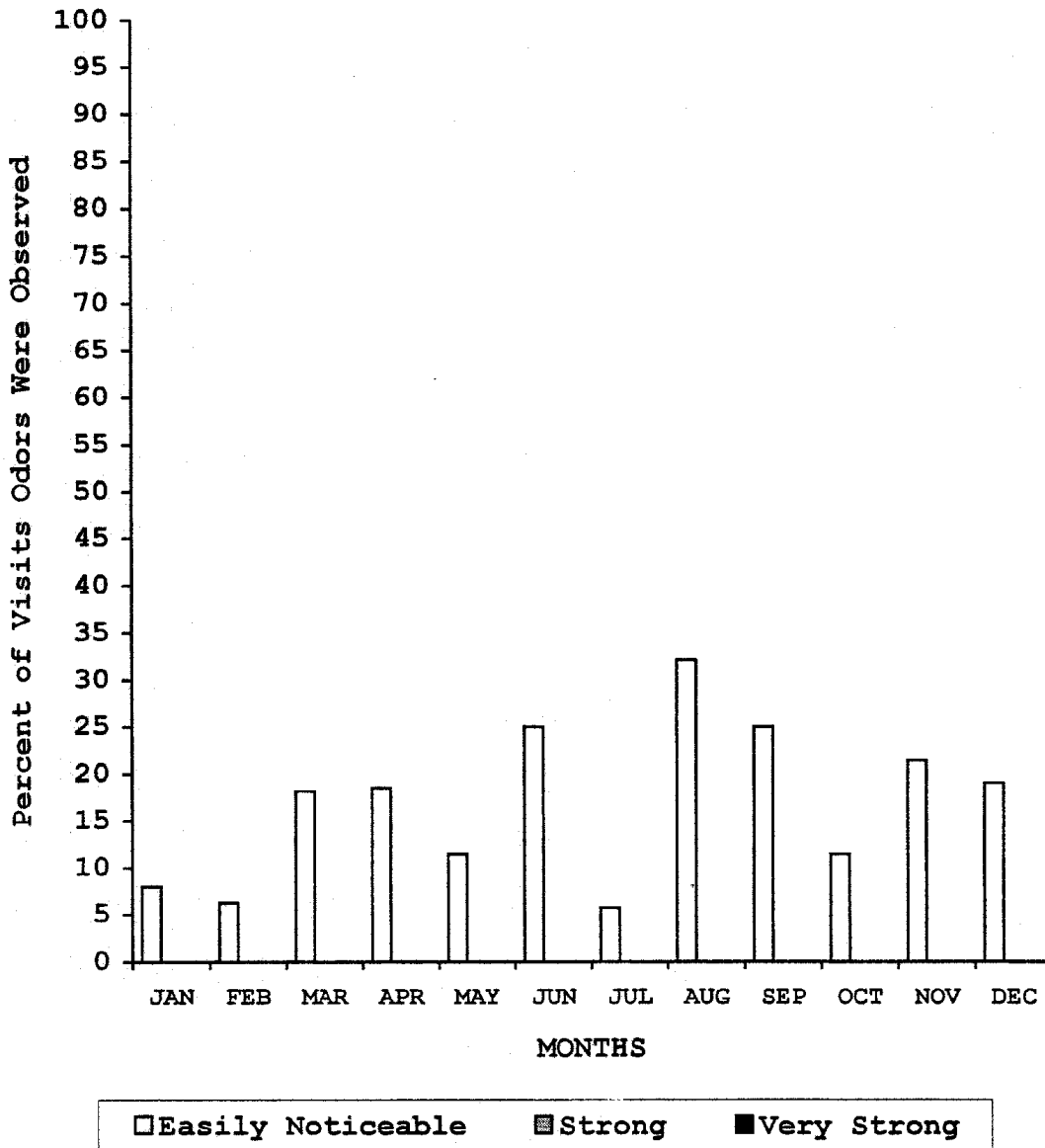
James C. Kirie WRP

There were no very strong or strong odor observations at the James C. Kirie WRP during 2002. Approximately 85 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

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FIGURE 3

ODOR OBSERVANCES AT JOHN E. EGAN WRP - 2002



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TABLE 5

HYDROGEN SULFIDE READINGS AT
JOHN E. EGAN WRP - 2002

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
West Entrance Gate	5.7	0	14
Near Waste Gas Burner	6.3	0	12
Primary Tanks	7.9	0	44
South End "A" Drive	5.9	0	11
Final Tanks	6.3	0	14
East Entrance Gates	5.8	0	11
West of Storage Building	6.4	1	17

vicinity of the return aeration channel and air lift stations A1 and A2, ranging between 12 and 20 percent.

Figure 4 summarizes the observations of odor monitoring personnel during 2002 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.

The measured hydrogen sulfide levels are summarized in Table 6. The highest levels of hydrogen sulfide were measured in the vicinity of the return aeration channel, with an average of 7.4 ppbv and maximum of 49 ppbv. All the other locations had averages ranging from 5.8 to 6.5 ppbv.

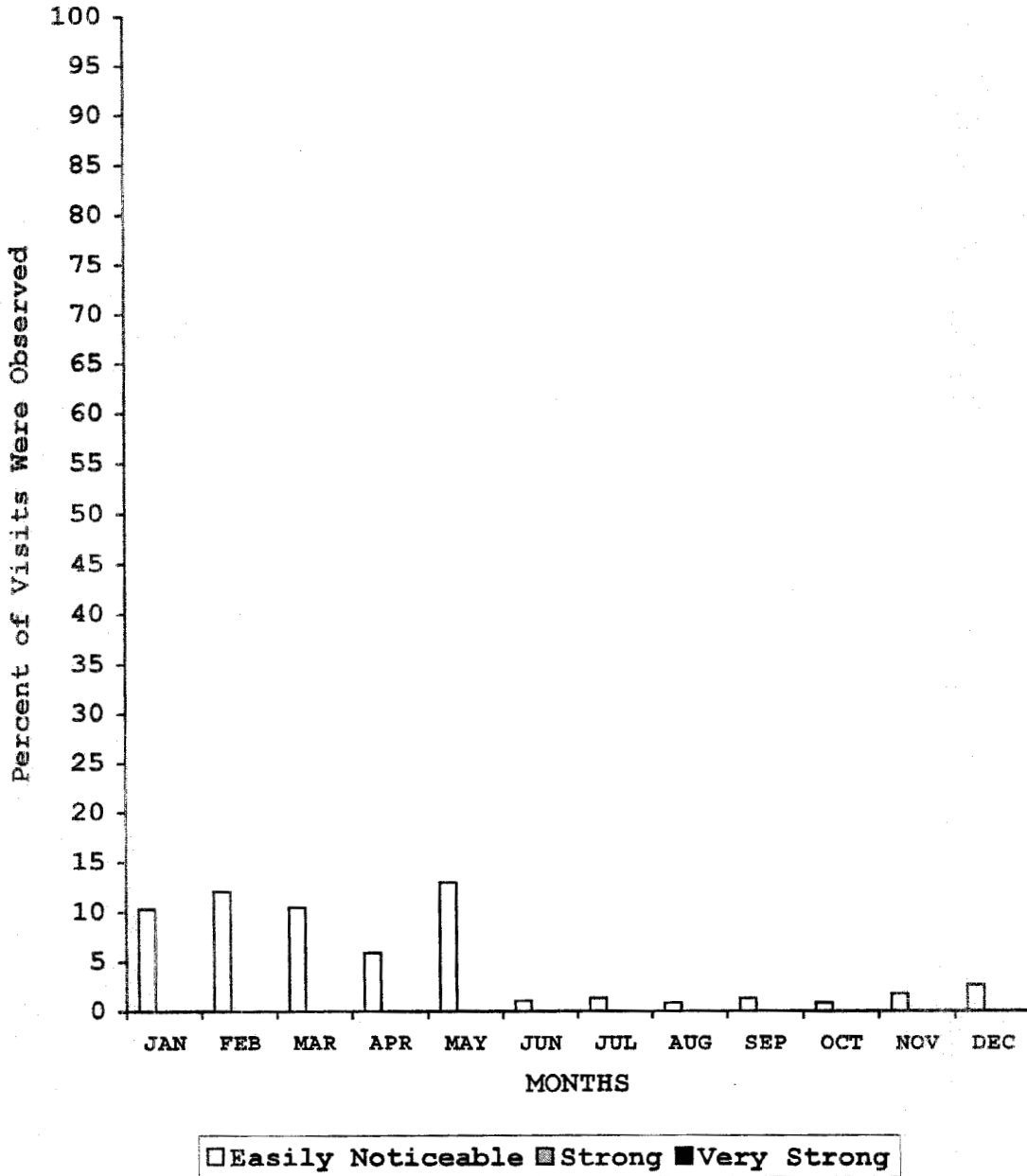
North Side WRP

The majority of the observations at the North Side WRP were faint to no odor, 74 percent of the time. There were no strong odor observations during 2002. The easily noticeable odors occurred with greatest frequency around the Preliminary Tank #3, 55 percent, the gallery building of Battery D mix channel, 37 percent, and the covered sludge concentration tanks, 51 percent.

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FIGURE 4

ODOR OBSERVANCES AT JAMES C. KIRIE WRP - 2002



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TABLE 6

HYDROGEN SULFIDE READINGS AT
KIRIE WRP - 2002

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Plant Entrance	5.9	1	10
Pump Station	6.3	0	24
Air Lift B1	6.1	0	12
Road C-1	6.1	1	12
Return Channel	7.4	0	49
East Gallery - North	6.0	1	12
Road C-2	6.5	2	17
Road C-3	6.0	1	11
Road C-4	6.0	2	14
Air Lift A-1	6.3	1	11
Air Lift A-2	6.3	0	25
Road C-5	6.1	2	11
Road C-6	6.1	2	10
Road C-7	6.1	0	17
Air Lift B2	5.8	1	10
Ridge Lane - Point #1	5.8	0	12
Marshall and Pleasant Lane - Point #2	5.9	1	10

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.

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 25.2 ppbv. There was one high value on July 31, 2002, east of McCormick Road along the Howard Street Interceptor. This was quickly reduced by chlorination of the raw sewage.

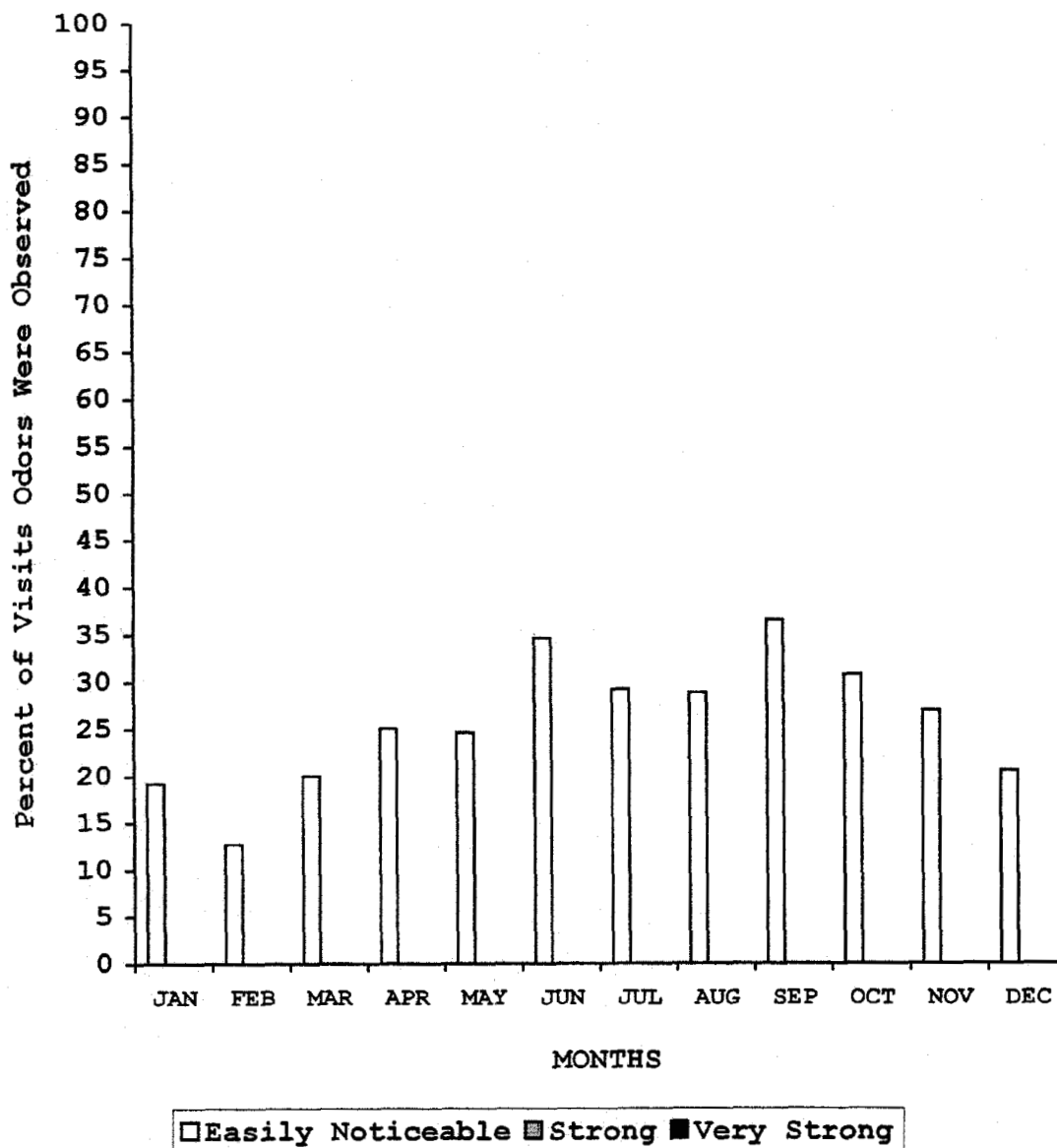
Stickney WRP

Overall, the majority of the observations were faint to no odor, with 67 percent of R&D Department and 68 percent of M&O Department observations, respectively. Overall, there were 14 strong odor observations, or 0.2 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 79 percent of the observations were easily noticeable odors.

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FIGURE 5

ODOR OBSERVANCES AT NORTH SIDE WRP - 2002



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TABLE 7

HYDROGEN SULFIDE READINGS AT
NORTH SIDE WRP - 2002

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Howard Street West End	6.5	0	12
Howard Street East of McCormick Road	11.2	2	150
McCormick Road	7.6	1	23
P&B Building	6.5	0	18
North Ave. Rect. Tank A6	6.4	0	14
North Ave. Rect. Tank B6	6.6	1	14
North Ave. Rect. Tank C6	6.6	0	15
Final Tank Batt. D3	7.3	0	21
Gallery Bldg. of Batt. D. Mix Channel	9.2	1	130
Main Street and Avenue E	6.0	1	13
Covered Weir Prel. Tank 10	9.3	0	60
Weir Rect. Prel. Tank 3	9.7	2	38
Main St. Covered Sludge Conc. Tanks	25.2	0	370

The Imhoff tanks (at Third Avenue and Fourth Avenue), the concentration tanks at G Street North, the preliminary tanks at Twelfth Avenue, the sludge concentration tanks, and the post-digestion centrifuges had easily noticeable odors 47, 44, 38, 49, 49, and 40 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 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 44.5, 120, and 73.1 ppbv, respectively, as shown in Table 8. The pre-digestion centrifuges and the concentration tanks at D Street had average hydrogen sulfide concentrations of 83.5 and 33.6 ppbv, respectively. In general, the hydrogen sulfide levels are slightly higher than observed at the other District WRPs.

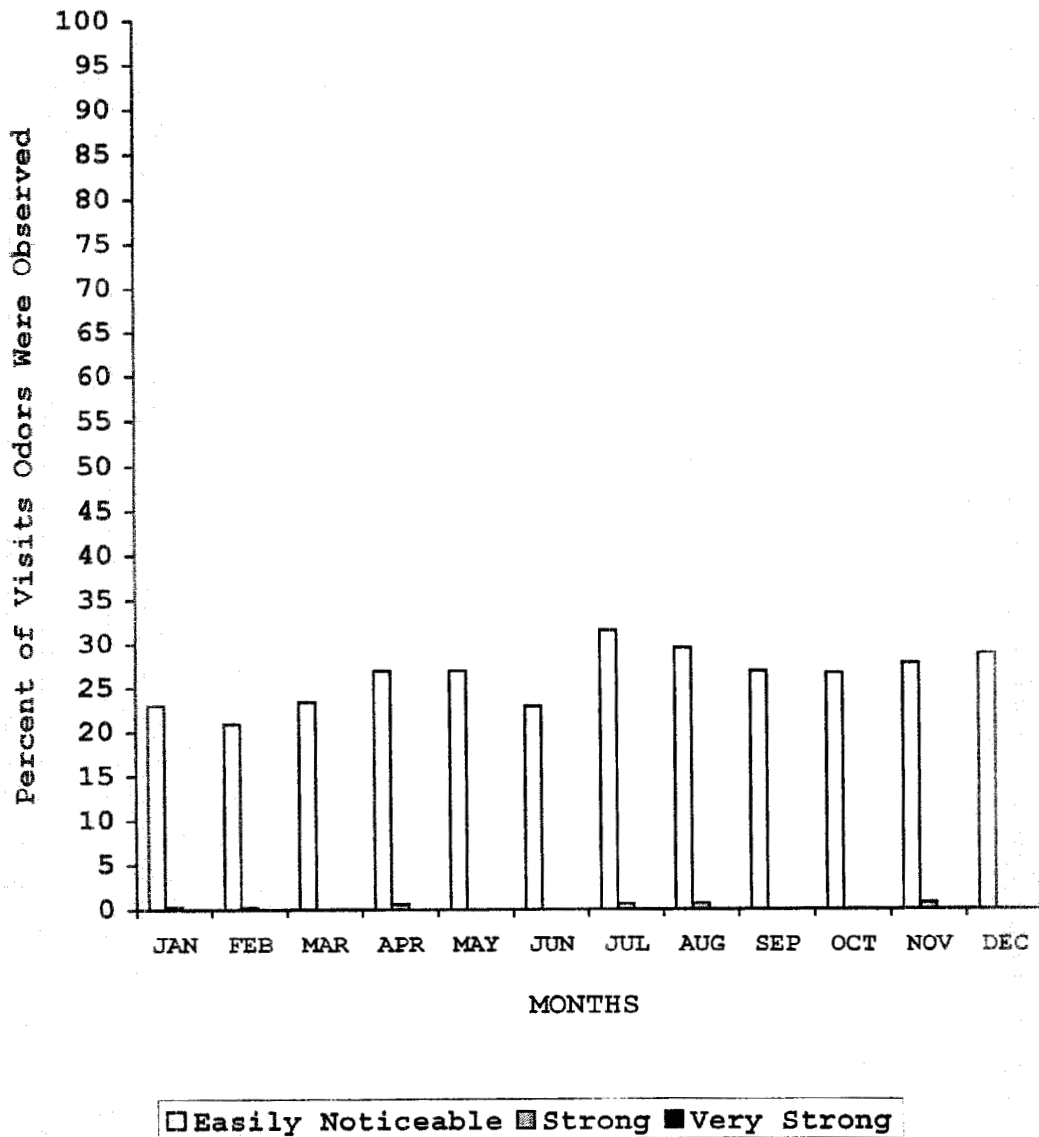
Stickney Solids Drying and Management Areas

The Stickney Solids Drying and Management Areas, consisting of HASMA, LASMA, Marathon, and Vulcan, had 69 percent of

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FIGURE 6

ODOR OBSERVANCES AT STICKNEY WRP - 2002



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TABLE 8

HYDROGEN SULFIDE READINGS AT
STICKNEY WRP - 2002

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
Imhoff B St./3rd Ave.	19.2	0	168
Imhoff B St./4th Ave.	23.7	0	360
Imhoff B St./5th Ave.	14.2	2	95
Digester 6th Ave. @ B St.	11.8	1	160
West Digester Cont. Bldg.	10.4	1	67
Centrifuges 6th Ave. @ Pre.	83.5	5	810
Centrifuges 6th Ave. @ Post	13.2	0	110
Concentration G St. North	44.5	0	310
Concentration D St. South	33.6	3	300
Preliminary 12th Ave.	73.1	0	1,500
Preliminary 10th Ave.	120	0	2,900
39th St./Central Ave.	8.5	0	36
39th St./Morton College Ent.	8.8	0	42
39th St./Dig. @ 57th Ave.	7.8	0	21
39th St./Between Austin and Lombard	7.2	1	16
Battery D, B St/13th Ave.	7.6	0	38
Lombard Ave. @ Gate/39th St.	8.2	1	92
Laramie and 40th St.	32.7	0	1,310
Laramie and 39th St.	11.3	0	53

the observations in 2002 characterized as faint to no odor. There were only 19 strong odor observations out of 2,250 total observations. The strong odor observations were most prominent in the vicinity of the TARP shaft at the Vulcan Site, with a frequency of 6.6 percent. The other strong odor observations were equally divided among the various areas depending upon the activity at the time. Easily noticeable odors were generally observed at the Marathon site, 46 percent of the observations, and at HASMA, 48 percent of the observations. The LASMA lagoon area ranged between 6 and 16 percent easily noticeable odors depending upon the location. The LASMA Drying Cell areas ranged between 8.6 and 18.5 percent of the observations.

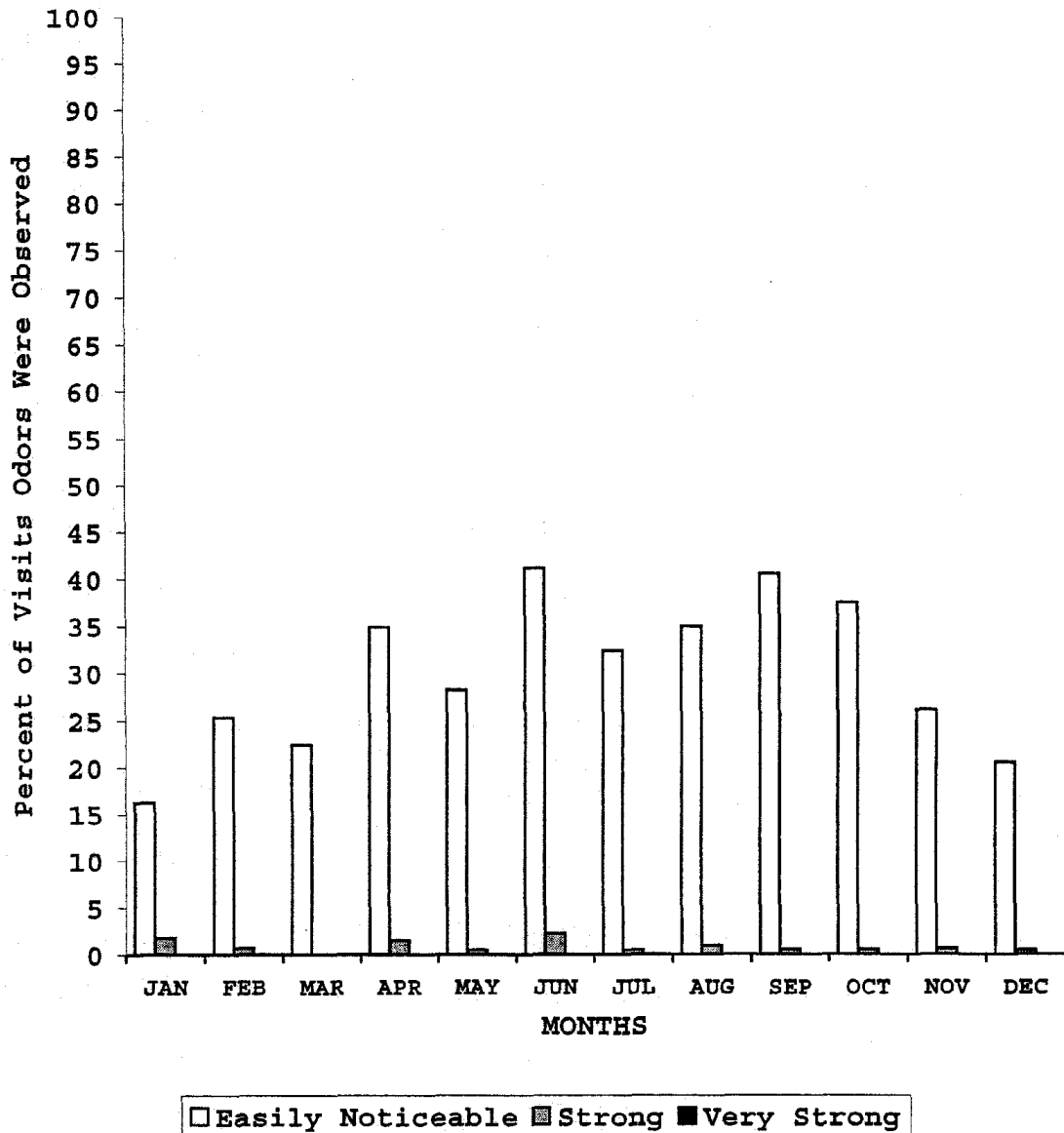
The percentage of observations at which easily noticeable, strong, and very strong odors were observed was plotted by month and are presented in Figure 7. As expected, the frequency of observed odors is generally highest during the late spring through early fall months when solids processing and drying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

The highest average hydrogen sulfide concentrations were observed by the TARP Drop Shaft, 46.5 ppbv. The other

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FIGURE 7

ODOR OBSERVANCES AT HASMA, LASMA, VULCAN, AND MARATHON SITES - 2002



locations had average hydrogen sulfide levels from 8.0 to 10.2 ppbv, as shown in Table 9.

Ridgeland and Stony Island Drying Areas

The Ridgeland Drying Area had 77 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 odor observations during 2002. The easily noticeable odors were 23.4 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 2002 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 5.1 to 6.1 ppbv, as shown in Table 10.

The Stony Island Drying Areas had 55 percent of the observations characterized as faint to no odor, with three strong odor observations in 2002. The easily noticeable odors account for approximately 43 percent of the total observations.

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TABLE 9

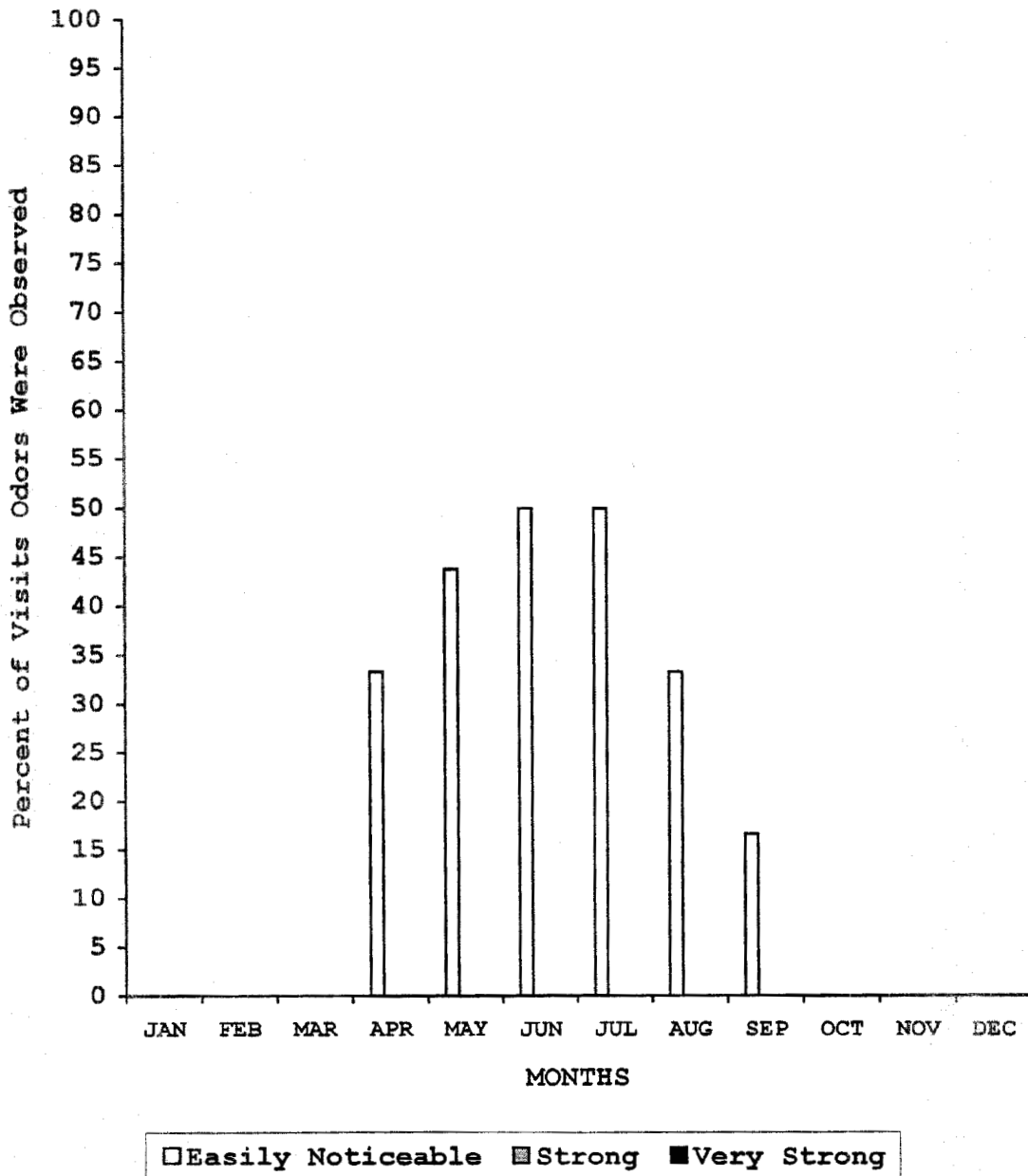
HYDROGEN SULFIDE READINGS AT
STICKNEY SOLIDS DRYING AREAS - 2002

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
HASMA	8.4	0	28
Vulcan South	8.5	0	40
Vulcan North	10.2	0	53
Vulcan TARP Drop Shaft	46.5	0	840
Vulcan TARP Well	8.8	0	40
LASMA Lagoon 1	8.0	0	20
LASMA Lagoon 16	8.2	0	23
LASMA Lagoon 24	8.8	2	31
LASMA Lagoon 30	8.9	2	23
LASMA Cell 1E-1W	9.5	1	41
LASMA Cell 2E-2W	9.6	2	60
LASMA Cell 3E-3W	9.9	2	60
LASMA Cell 4E-4W	8.7	0	30
LASMA Cell 5E-5W	8.5	1	32
Marathon	9.4	0	64

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FIGURE 8

ODOR OBSERVANCES AT RIDGELAND - 2002



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TABLE 10

HYDROGEN SULFIDE READINGS AT
RIDGELAND AND STONY ISLAND DRYING AREAS - 2002

Location	Hydrogen Sulfide, ppbv		
	Mean	Minimum	Maximum
<u>Ridgeland</u>			
SW Parking Area	5.4	0	14
North of Cell 2W	6.0	0	15
NE Corner Cell 5E	6.1	0	14
South of Cell 5	5.1	0	10
<u>Stony Island</u>			
Entrance 122nd St.	6.4	1	17
NE Corner Cell 5	8.6	0	59
South End Cells 4 & 7	7.6	0	23
West Side of Cell 3	10.7	1	52

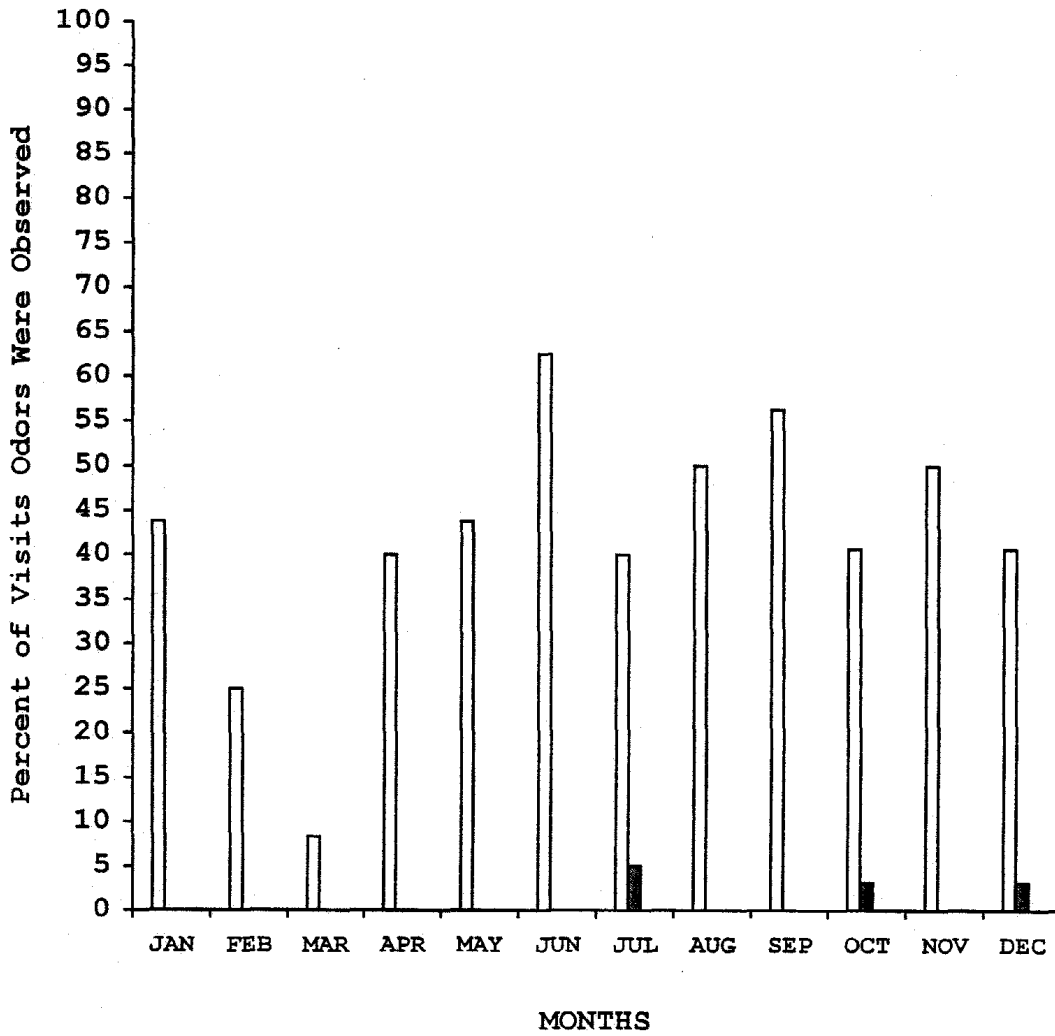
A monthly summary of the observations at the Stony Island Drying Area of easily noticeable, strong, and very strong odors during 2002 is presented in Figure 9 expressed as frequency of occurrence.

The average hydrogen sulfide levels around the Stony Island Drying Area, as shown in Table 10, varied from 6.4 to 10.7 ppbv.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE 9

ODOR OBSERVANCES AT STONY ISLAND - 2002



□ Easily Noticeable ■ Strong ■ Very Strong

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 2002 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 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 2002 the various facilities received from none to three calls each. None of the complaints could be confirmed as resulting from odors emanating from District facilities.

During 2002 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 55 to 77 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 seven ppbv at the WRPs. At the Stickney WRP the average hydrogen sulfide levels along the periphery of the plant were seven to nine ppbv and 10 to 120 ppbv within the WRP.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TABLE 11

STRONG ODOR OBSERVATIONS - 2002

Facility	Number of Strong Observations	Total Number of Observations
Calumet WRP		
Sludge Concentration Building	7	
Preliminary Tanks	<u>3</u>	
Total	10	2,801
Calumet SDS		
West Drying Cell #1	3	
Hopper Building	1	
West Drying Cell #4	<u>1</u>	
Total	5	2,023
Egan WRP	Total 0	344
Kirie WRP	Total 0	9,870
North Side WRP	Total 0	659
Stickney WRP		
Imhoff Tanks	1	
Centrifuges (Pre and Post)	2	
Sludge Concentration Tanks	2	
Preliminary Tanks	<u>9</u>	
Total	14	5,288
HASMA, LASMA, Vulcan SDS		
HASMA	2	
Vulcan TARP Shaft	10	
LASMA Lagoons	1	
LASMA Drying Cells	4	
Marathon	<u>2</u>	
Total	19	2,250
Ridgeland SDS	Total 0	316
Stony Island SDS	Total 3	224

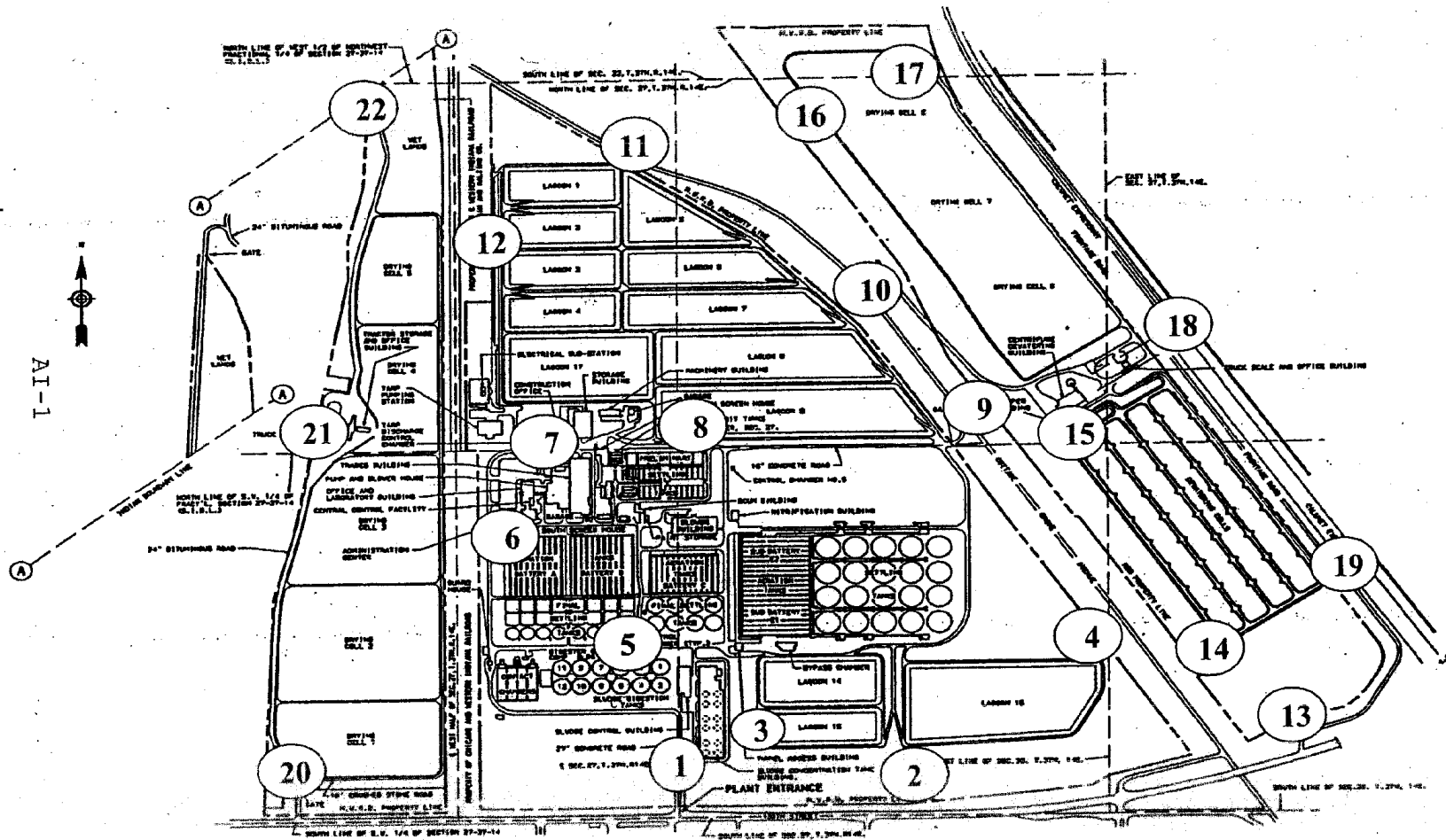
APPENDIX AI

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 DRYING AREAS
 NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



AI-1

METROPOLITAN WATER RECLAMATION DISTRICT
 OF GREATER CHICAGO

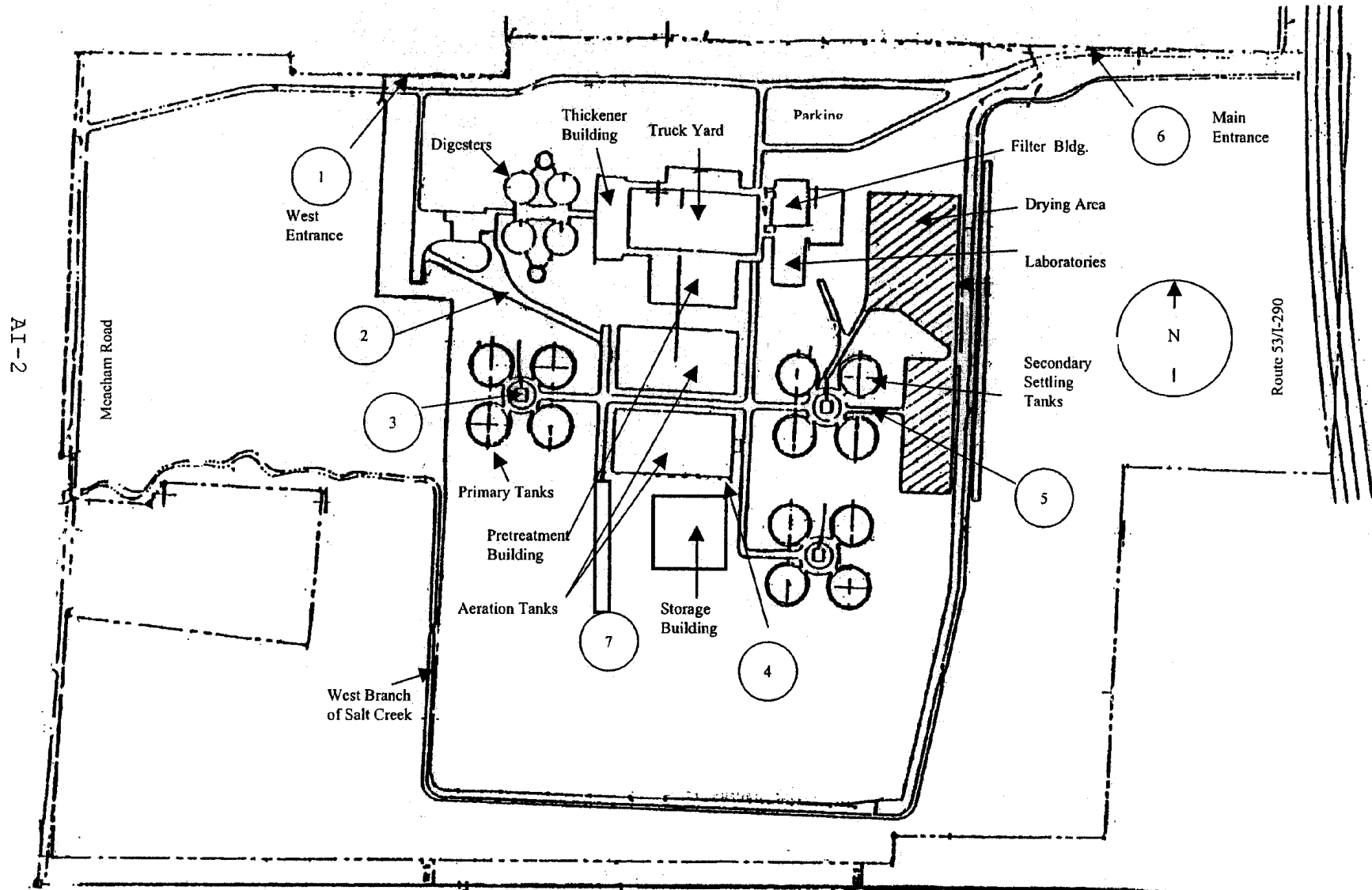
LOCATION PLAN
 CALUMET WRP

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

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE AI-2

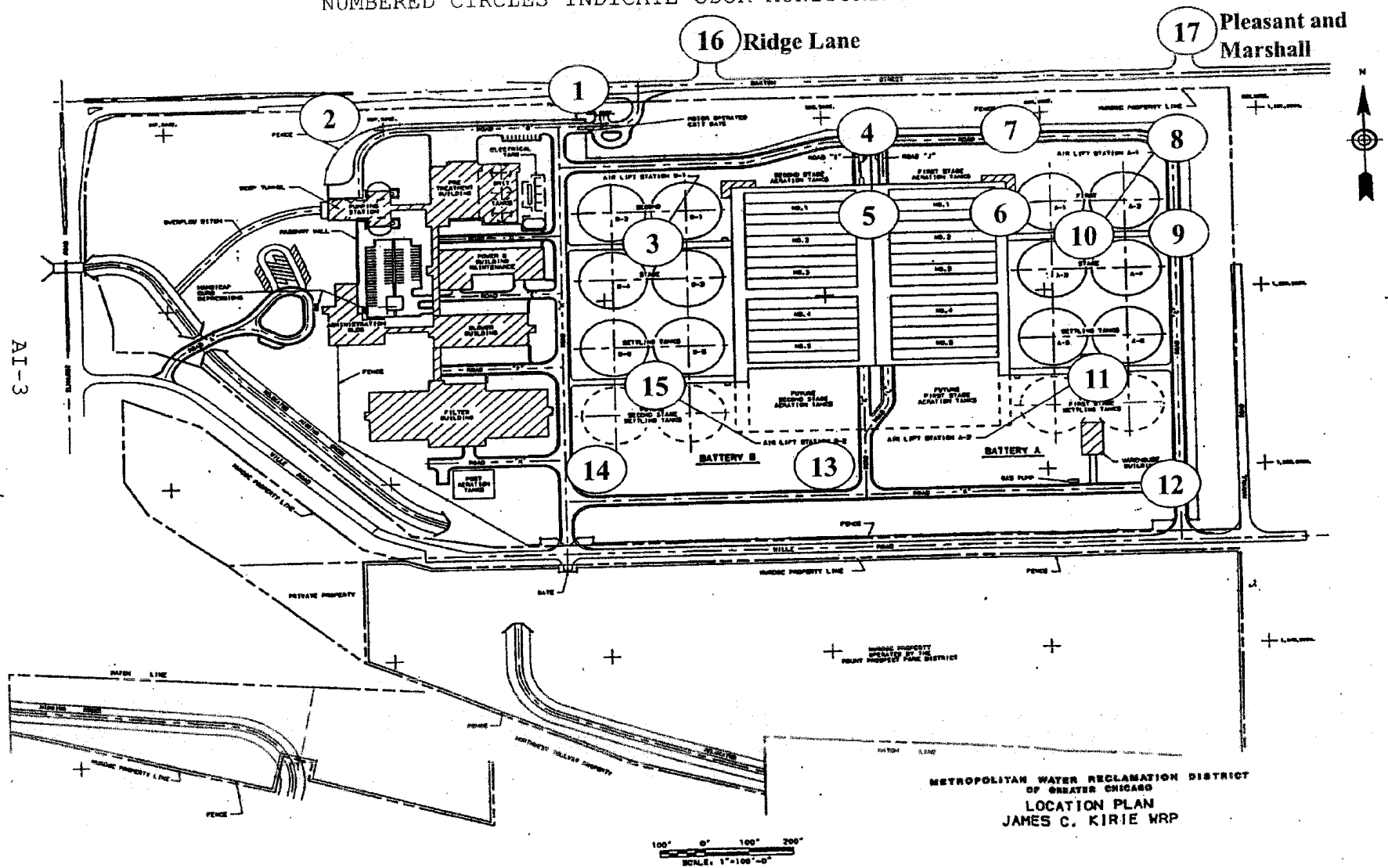
JOHN E. EGAN WRP AND DRYING AREA
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE AI-3

JAMES C. KIRIE WRP
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



AI-3

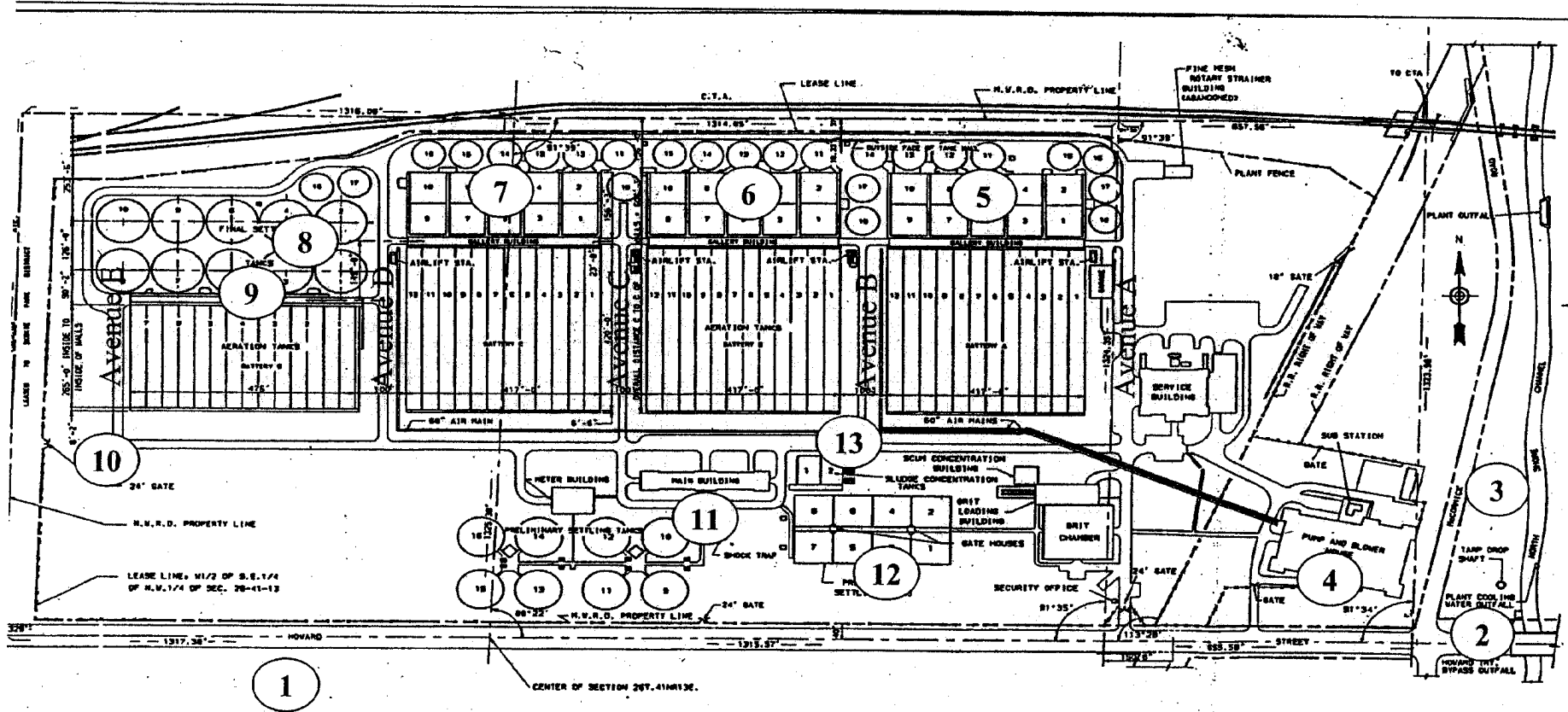
METROPOLITAN WATER RECLAMATION DISTRICT
OF GREATER CHICAGO
LOCATION PLAN
JAMES C. KIRIE WRP

SCALE: 1"=100'-0"

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

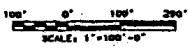
FIGURE AI-4

NORTH SIDE WRP
 NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



AI-4

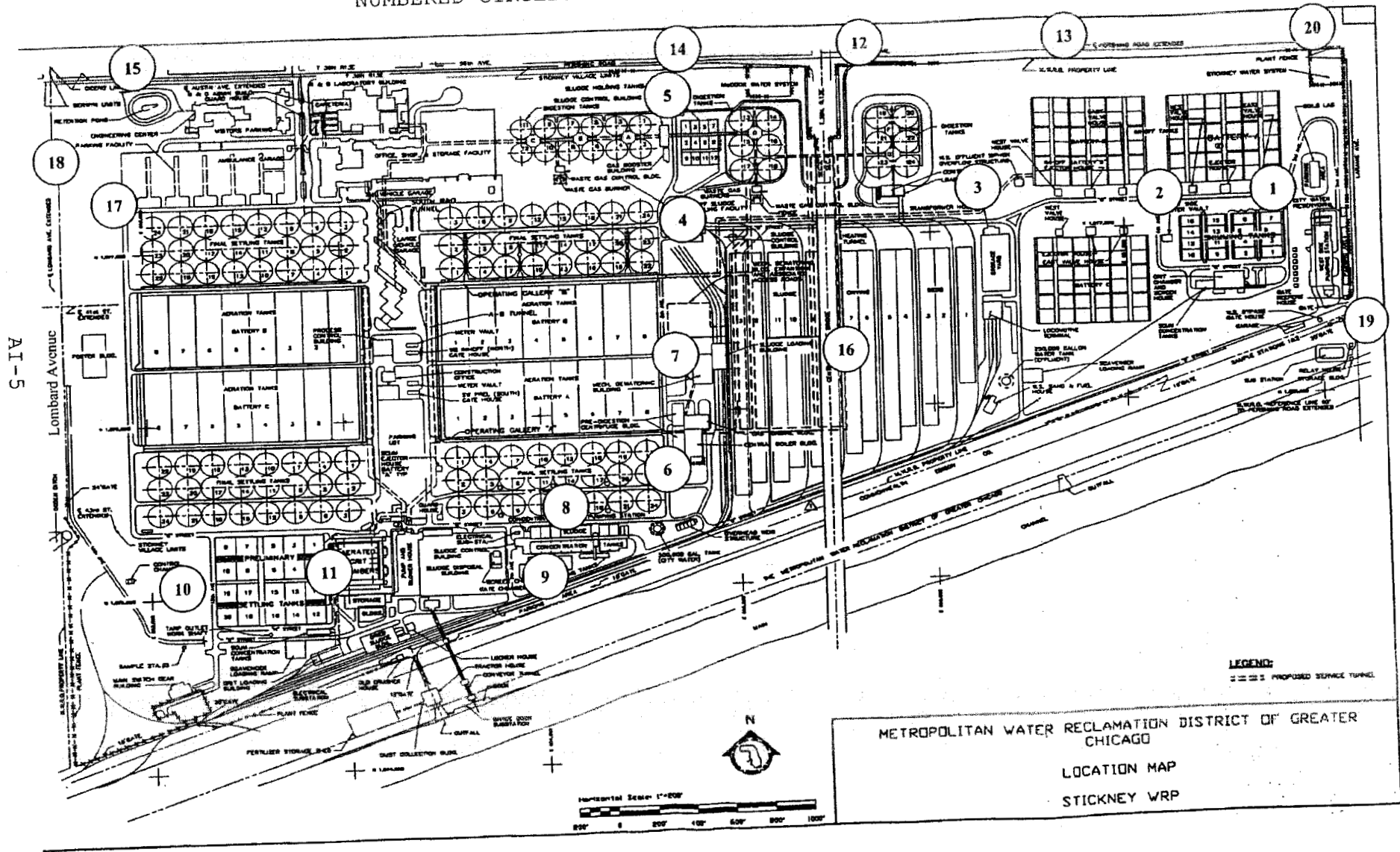
METROPOLITAN WATER RECLAMATION DISTRICT
 OF GREATER CHICAGO
 LOCATION PLAN
 NORTH SIDE WRP



METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE AI-5

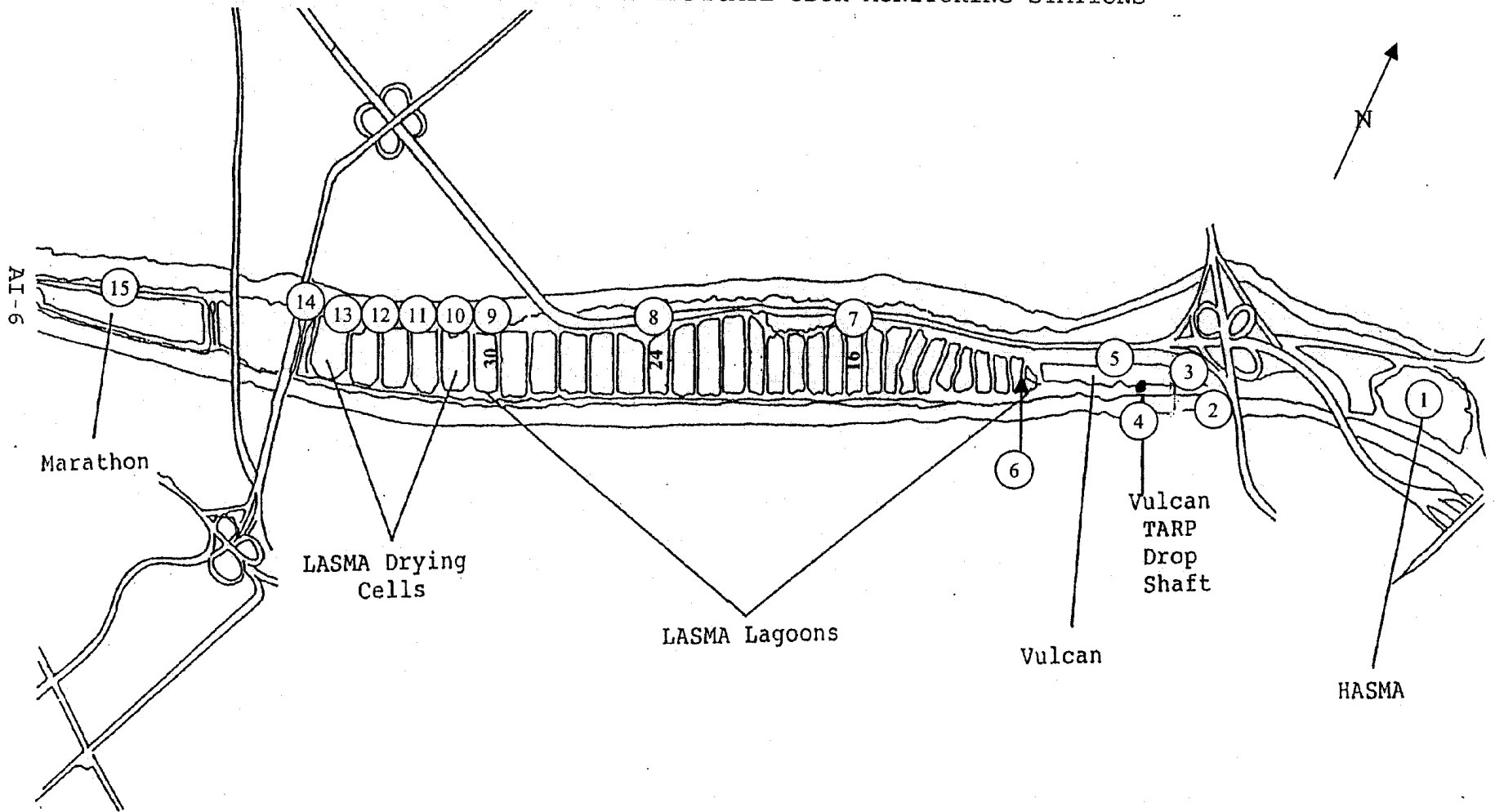
STICKNEY WRP NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

FIGURE AI-6

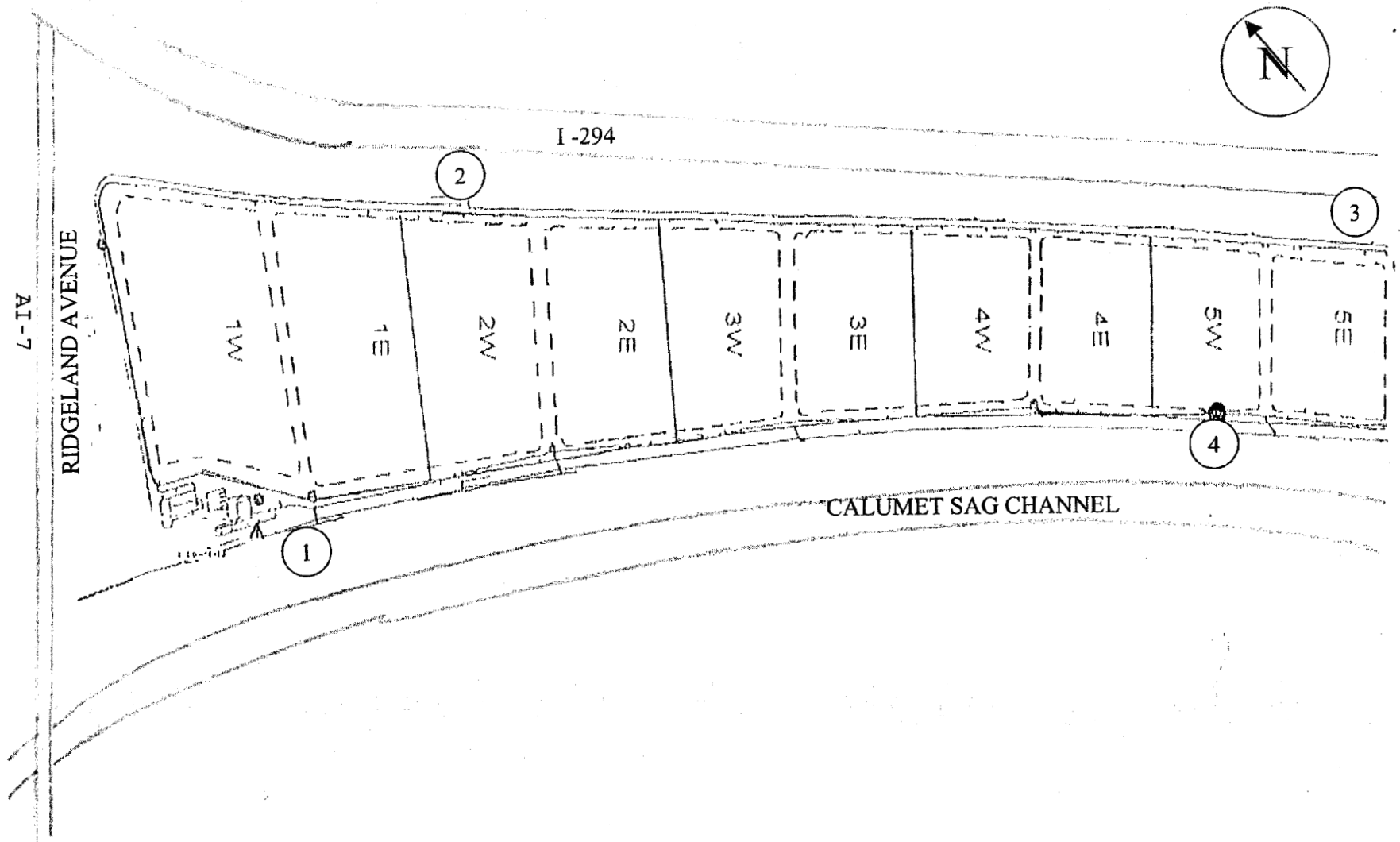
STICKNEY SOLIDS DRYING SITES (HASMA, VULCAN, LASMA AND MARATHON)
NUMBERED CIRCLES INDICATE ODOR MONITORING STATIONS



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

