METROPOLITAN
WASTE
CONTROL
COMMISSION
Twin Cities Area

350 METRO SQUARE BLDG.
7TH & ROBERT STREETS
SAINT PAUL MN 55101
612/222-8423

1985 ANNUAL WASTEWATER TREAMENT PLANT REPORT VOLUME I

prepared by the

Quality Control & Operations Department
Metropolitan Waste Control Commission
350 Metro Square Building
Saint Paul, Minnesota 55101

Report No. QC 85-111

1.0 INTRODUCTION

The Metropolitan Waste Control Commission was established as the areawide operational water pollution control agency by the Minnesota State Legislature, through the Metropolitan Sewer Act in 1969. This Act gives the Commission formal charge to prevent, abate, and control water pollution in lakes, rivers, and streams of the seven county Metropolitan area around Minneapolis and St. Paul. The accomplishment of these responsibilities required that the Commission acquire, construct, operate, and maintain all interceptor sewers and treatment plants necessary for the collection, treatment, and disposal of wastewater in the area.

Throughout each year, the performance of each plant is monitored, recorded, and reported to regulatory agencies, Commission administrators, and Commission program managers to indicate the degree of compliance with regulatory discharge standards. At the end of each year, the performance of each treatment plant is summarized; this report is a summary of treatment plant performance during 1985.

This report is published in two volumes. Volume I is a summary analysis of plant performance with respect to Permit limitations. Volume II is a detailed data compilation of the performance indicators for each plant, along with descriptive information about each plant's facilities.

Permit regulation of treatment plant discharges covers 1) effluent discharges to receiving waters, and 2) air-borne emissions from incinerators. The following two sections of Volume I deal with each of these areas as they relate to the Commission's facilities.

2.0 EFFLUENT DISCHARGES FROM WASTEWATER TREATMENT PLANTS

2.1 Monitoring Data

During 1985, the Metropolitan Waste Control Commission operated 14 wastewater treatment plants. All Commission plants have been issued discharge Permits by the Minnesota Pollution Control Agency under the regulations of the Federal National Pollutant Discharge Elimination System (NPDES), as established by Public Law 92-500. These Permits set limits for various aspects or parameters of the plant's discharge and require defined monitoring frequencies to determine compliance with these discharge limits.

Table 1 lists most of the parameters with discharge limitations and describes their potential impact on the environment.

TABLE 1

DESCRIPTION OF PARAMETERS

Carbonaceous Biochemical Oxygen Demand (CBOD) - a measure of the dissolved oxygen required by organisms for the aerobic decomposition of organic matter present in water. A low CBOD in the plant discharge is desirable; the least amount of oxygen depletion in the receiving water would result. The CBOD does not include oxygen demand due to oxidation of nitrogenous species.

Total Suspended Solids (TSS) - a measure of the amount of particulate matter found suspended in a given volume of water. Suspended solids adversely affect receiving water by exerting an oxygen demand during decomposition or filtering out available sunlight need by aquatic organisms for photosynthesis.

pH - a measure of the hydrogen ion concentration in water and an indication of acidity or alkalinity. pH values below 6 or above 9 are usually harmful to aquatic life. A pH of 7 is neutral.

Dissolved Oxygen (DO) - a sufficient DO level in plant effluents is important because it is required for the life processes of aquatic organisms.

Fecal Coliforms - a group of bacteria used as indicators of the presence of disease producing bacteria. Fecal coliforms are monitored to indicate the efficiency of the effluent disinfection process.

Ammonia (NH_3) - excessive discharge of NH_3 can adversely affect receiving waters. Oxidation of ammonia can add to the oxygen depletion occurring through oxidation of carbonaceous compounds. Ammonia can also exhibit toxic effects on aquatic life.

Phosphorus Compounds (Phos) - excessive discharge of phosphorus can contribute to undesirable algal growth in receiving waters.

Heavy Metals and Cyanide - heavy metals included in this report are copper (Cu), chromium (Cr), zinc (Zn), lead (Pb), cadmium (Cd), mercury (Hg), nickel (Ni) and arsenic (As). Heavy metals and cyanide can exert toxic effects on aquatic life.

In addition to limits imposed on the concentration levels at which these effluent constituents can be discharged, for some parameters, mass limitations are imposed: limits on the total pounds that can be discharged over a given time period. There are also limitations on the total flow that can be discharged.

In Table 2, the first column lists all the parameters for which there are discharge limitations, by plant, with the current applicable limit. The remaining columns of this table show the monthly average values attained at each plant for these parameters during 1985. Where no value is listed, no limit was applicable; some limits are only applicable during certain months.

In addition to the limits on average monthly discharge, some parameters have weekly or daily average limits. These are not shown in Table 2.

TABLE 2

SUMMARY OF PLANT PERFORMANCE
1985

Treatment Plant	Permit Limitation		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Avg.
	Flow	2.46	2.44	2.65	2.52	2.45	2.46	2.45	2.33	2.48	2.67	2.57	2.30	2.39	2.47
	CBOD	25	16	21	15	14	16	13	17	12	12	12	14	13	14
	TSS	30	12	24	20	12	12	10	12	13	14	11	11	11	13
	Fecal	200	23	46	12	48	78	23	22	150	127	79	18	25	54
	Turbidity	25	8	13	10	8	8	6	8	6	7	6	6	6	7
Anoka	pH	6.0-9.0	7.1-7.3	7.0-7.3	7.1-7.4	7.2-7.4	7.2-7.5	7.1-7.4	7.0-7.3	7.0-7.3	7.0-7.3	7.0-7.3	7.0-7.3	7.0-7.4	7.0-7.5
	Flow	0.65	0.37	0.39	0.49	0.57	0.61	0.59	0.55	0.54	0.54	0.55	0.56	0.54	0.53
	CBOD	25	7	7	5	7	6	7	5	5	4	5	8	8	6
	TSS	30	7	8	8	11	10	10	8	7	6	8	9	12	9
	Fecal	200	-----	-----	4	3	3	3	3	5	4	2	-----	-----	3
	Turbidity	25	4	4	4	6	5	4	4	3	3	4	3	4	4
	pH	6.0-9.0	6.6-7.1	6.7-7.2	6.6-7.6	6.9-8.0	6.8-7.5	6.9-7.9	6.9-7.8	6.9-7.6	6.9-7.9	7.1-8.2	6.7-7.8	6.9-7.5	6.6-8.2
Bayport	Phos	1.0	0.4	0.4	0.3	0.5	0.5	0.5	0.4	0.4	0.7	0.5	0.4	0.6	0.5
	Flow	20.0	17.88	18.66	22.34	22.59	20.39	20.37	18.15	17.41	18.36	20.09	16.83	18.60	19.31
	CBOD	25	16	11	10	11	12	10	9	9	10	7	11	14	11
	TSS	30	8	7	5	6	5	4	5	6	7	6	5	9	6
	Fecal	200	-----	-----	11	10	22	14	9	53	67	32	-----	-----	27
	Turbidity	25	-----	6	5	6	4	4	6	5	5	5	4	6	5
Blue Lake	pH	6.5-8.5	7.0-7.7	7.0-7.4	6.9-7.3	7.0-8.0	6.9-7.8	6.9-7.3	7.0-7.5	7.0-7.4	7.0-7.3	7.0-7.4	7.0-8.0	7.1-7.4	6.9-8.0
	Flow	1.40	0.83	0.84	1.06	1.04	0.92	0.73	0.69	0.82	0.96	1.19	0.90	0.89	0.91
	CBOD	25	16	18	22	17	13	7	9	10	11	8	11	13	13
	TSS	30	18	28	18	15	8	7	9	11	13	10	12	18	14
	Fecal	200	-----	-----	8	5	4	7	5	5	7	7	-----	-----	6
	Turbidity	25	6	8	10	8	5	4	4	5	6	5	5	6	6
Chaska	pH	6.0-9.0	7.2-7.6	7.2-7.7	7.2-7.7	7.2-7.9	7.4-8.0	6.7-7.9	7.3-7.7	7.1-7.9	7.2-7.7	7.1-7.8	7.0-7.7	6.8-7.5	6.7-8.0
	Flow	1.80	1.32	1.38	1.40	1.46	1.37	1.36	1.29	1.28	1.33	1.35	1.32	1.32	1.35
	CBOD	25	14	9	8	18	11	11	7	7	9	7	13	16	11
	TSS	30	12	7	9	18	15	12	9	11	17	10	13	15	12
	Fecal	200	-----	-----	7	20	122	125	58	60	32	212	-----	-----	79
Cottage	Turbidity	25	6	4	5	10	8	6	5	6	9	5	5	6	6
Grove	pH	6.5-8.5	7.4-7.7	7.3-7.7	7.0-7.6	7.3-7.6	7.3-7.6	7.1-7.4	7.0-7.3	6.9-7.2	6.8-7.4	6.9-7.3	7.0-7.5	7.3-7.5	6.8-7.7
	Flow	6.00	5.11	5.15	6.06	6.31	6.02	5.47	5.11	5.14	5.02	5.58	5.15	5.00	5.43
	CBOD	10	2	4	3	5	4	3	2	2	2	1	3	2	3
	TSS	10	2	2	3	2	2	2	2	1	1	1	2	1	2
	Fecal	200	-----	-----	2	2	2	4	3	7	13	4	-----	-----	5
	Turbidity	25	1	1	1	1	1	1	1	1	1	1	1	1	1
	pH	6.0-9.0	6.7-7.1	6.9-7.2	6.8-7.1	6.8-7.2	6.8-7.3	6.9-7.3	6.9-7.3	6.7-7.3	6.8-7.5	7.0-7.5	7.0-7.4	7.0-7.5	6.7-7.5
	Ammonia	1.0	0.2	0.6	0.1	0.3	0.4	0.3	0.3	0.1	0.1	0.1	1.1	0.2	0.3
Empire	DO	>4.0	10.2-13.4	11.2-12.8	11.2-13.2	11.2-13.1	10.8-12.6	10.4-12.6	9.7-11.6	9.2-10.6	9.3-10.6	9.0-10.8	9.5-12.7	10.3-12.9	9.0-13.4
	Flow	2.34	1.59	1.58	1.58	1.74	1.75	1.71	1.61	1.70	1.71	1.65	1.62	1.65	1.66
	CBOD	25	26	19	38	28	14	23	9	10	7	12	19	16	18
	TSS	30	20	13	32	41	29	26	13	15	10	17	17	14	21
	Fecal	200	-----	-----	134	22	80	150	38	48	57	50	-----	-----	72
	Turbidity	25	8	6	16	18	11	9	5	5	4	6	8	6	9
Hastings	pH	6.0-9.0	7.0-7.5	6.8-7.3	6.8-7.3	6.8-7.5	6.9-7.2	6.9-7.3	6.9-7.2	6.9-7.4	7.0-7.4	6.7-7.3	6.9-7.2	6.8-7.8	6.7-7.8

TABLE 2 Cont.

Treatment Plant	Permit Limitation		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Avg.
	Flow	0.22	0.29	0.32	0.41	0.57	0.40	0.35	0.33	0.46	0.69	0.70	0.31	0.24	0.42
	CBOD	25	6	7	11	10	16	9	10	11	5	16	17	23	12
	TSS	30	7	3	7	16	19	14	9	6	10	22	23	28	14
	Fecal	200	-----	-----	4	4	4	19	14	24	7	4	-----	-----	10
	Turbidity	25	4	4	6	11	11	10	9	5	7	14	12	15	9
Maple Plain	pH	6.5-8.5	7.6-7.8	7.6-7.8	7.5-7.8	7.6-7.9	7.5-7.9	7.5-8.0	7.0-7.8	7.0-7.6	7.2-7.6	7.2-7.8	7.0-7.8	7.2-7.5	7.0-8.0
	Flow	0.10	0.179	0.179	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.179
	CBOD	25	10	10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	10
	TSS	30	15	10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	13
	Turbidity	25	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	14
Medina	pH	6.5-8.5	7.4-7.6	7.4-7.4	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	7.4-7.6
	Flow	250	186	208	241	241	243	229	203	225	243	261	205	184	222
	CBOD	18/24*	17	17	17	13	8	9	8	6	6	9	11	10	11
	TSS	30	21	19	14	13	11	17	17	8	7	12	8	7	13
	Fecal	200	-----	-----	5	4	30	15	51	36	5	49	-----	-----	24
	Turbidity	25	8	8	8	8	6	7	7	4	4	8	5	3	6
	pH	6.5-8.5	7.1-7.6	7.2-7.8	7.2-7.6	7.3-7.8	7.3-7.7	7.1-7.7	7.1-7.5	7.1-7.6	7.1-7.5	6.9-8.0	7.1-7.8	7.2-7.6	6.9-8.0
	NH_3	8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.2
	Cd	0.030	0.003	0.002	0.003	0.003	0.003	0.004	0.004	0.004	0.004	0.005	0.002	0.001	0.003
	Cu	0.140	0.03	0.03	0.04	0.03	0.02	0.04	0.03	0.03	0.02	0.03	0.02	0.02	0.03
	CN	0.193	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Metropolitan	Hg	4.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Flow	0.60	0.37	0.46	0.37	0.37	0.34	0.32	0.36	0.40	0.40	0.39	0.37	0.38	0.38
	CBOD	25	18	21	33	22	27	15	10	11	10	14	23	20	18
	TSS	30	4	2	3	3	3	3	2	1	2	2	2	3	3
	Fecal	200	-----	-----	2	3	2	2	2	2	4	2	-----	-----	2
	Turbidity	25	8	4	6	5	5	4	3	3	3	3	5	5	4
	pH	6.5-8.5	6.7-8.4	6.8-8.4	6.2-8.2	6.6-8.4	6.8-8.1	6.8-8.4	6.8-8.4	6.8-8.4	6.9-8.4	6.7-8.4	7.0-7.9	6.8-8.0	6.2-8.4
Rosemount	Phos	1.0	0.2	0.1	0.4	0.2	0.1	0.3	0.1	0.1	0.2	0.1	0.2	0.2	0.2
	Flow	0.86	0.58	0.57	0.74	0.86	0.69	0.60	0.53	0.58	0.62	0.69	0.61	0.60	0.64
	CBOD	25	7	9	11	9	17	18	6	6	6	9	11	9	9
	TSS	30	3	4	2	3	7	11	4	5	3	3	5	3	4
	Fecal	200	-----	-----	6	7	37	99	73	55	34	20	-----	-----	41
	Turbidity	25	4	4	4	5	10	11	9	4	3	7	3	3	6
Savage	pH	6.0-9.0	7.5-7.8	7.6-7.8	7.4-7.6	7.2-7.6	7.3-7.7	7.3-7.7	7.2-7.6	7.5-7.8	7.4-7.8	7.4-7.8	7.4-7.7	7.5-7.7	7.2-7.8
	Flow	24.0	17.31	16.90	17.14	17.51	17.38	17.08	17.21	18.51	17.85	18.11	17.63	17.29	17.5
	CBOD	25	18	17	19	19	16	13	16	19	10	10	20	20	16
	TSS	30	21	20	15	22	17	16	14	17	13	14	20	15	17
	Fecal	200	-----	-----	57	5	48	8	14	16	34	9	-----	-----	24
	Turbidity	25	8	11	9	11	10	8	8	12	7	7	8	7	9
Seneca	pH	6.5-8.5	6.7-7.2	6.7-7.4	6.8-7.7	7.0-7.4	6.9-7.6	7.0-7.5	6.8-7.4	6.9-7.4	7.0-7.4	6.7-7.5	7.0-7.5	6.8-7.4	6.7-7.7
	Flow	3.02	2.68	2.75	2.93	3.05	2.99	2.87	2.66	2.49	2.56	2.71	2.60	2.57	2.74
	CBOD	25	12	10	11	13	7	9	8	6	7	8	10	13	9
	TSS	30	12	10	14	14	11	10	11	7	9	11	10	12	11
	Fecal	200	-----	-----	5	3	3	4	9	4	14	5	-----	-----	6
	Turbidity	25	5	5	7	8	6	5	5	4	5	5	4	4	5
	pH	6.0-9.0	6.9-7.1	6.9-7.1	7.0-7.1	7.0-7.1	6.9-7.1	6.9-7.1	6.9-7.1	7.0-7.1	6.9-7.2	7.0-7.2	6.8-7.1	6.9-7.1	6.8-7.2
Stillwater	Phos	1.0	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.2	0.4	0.4	0.4	0.5	0.4

*June-September = 18 mg/l. October-May = 24 mg/l.

NOTE: pH and DO are daily limitations--all other parameters are monthly limitations. TSS, CBOD, and Fecal also have weekly limitations which are not listed here. Units: Flow - MGD, CBOD, TSS, Phos, Ammonia, DO, Cd, Cu, CN, Hg - mg/L, Fecal - No./100 mL, Turbidity - NTU.

2.2 Compliance with Permit Limitations

Table 3 identifies all permit violations that occurred during 1985. Table 4 below shows how these violations were distributed over the various monitored parameters in 1985 and previous years.

TABLE 4

DISTRIBUTION OF NPDES PERMIT VIOLATIONS AMONG EFFLUENT PARAMETERS
1980-1985

Effluent Parameter	1980	1981	1982	1983	1984	1985
CBOD	12	15	9	3	6	12
TSS	11	5	11	8	18	4
Fecal Coliform	6	6	5	6	6	6
pH	3	0	2	2	1	1
Ammonia	1	0	0	0	1	1
Cyanide/Heavy Metals	3	7	1	1	0	0
Turbidity	0	0	0	0	1	0
Unauthorized Discharge (Medina)	0	2	0	0	0	0
TOTAL	36	35	30	20	33	24

Table 5 shows how these violations were distributed over the various Commission treatment plants during 1985 and previous years.

TABLE 5

DISTRIBUTION OF NPDES PERMIT VIOLATIONS BY TREATMENT PLANT
1975-1985

Treatment Plant	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Anoka	4	1	32	27	8	3	8	2	2	4	1
Apple Valley	2	4	0	2	7	(To Empire Plant 9/79)					
Bayport	8	2	2	0	0	0	0	0	0	0	0
Blue Lake	0	2	0	1	0	0	0	0	1	0	0
Chaska	10	7	4	15	25	4	3	1	1	5	1
Cottage Grove	7	2	2	3	4	1	4	1	1	0	3
Empire		(Plant start up 9/79)			1	1	0	3	0	1	1
Farmington	8	1	9	1	5	(To Empire Plant 9/79)					
Hastings	6	6	7	2	2	5	8	18	7	16	10
Lakeville	1	3	3	12	11	(To Empire Plant 9/79)					
Long Lake	10	16	5	4	4	7	(To Blue Lake Plant 6/80)				
Maple Plain	1	5	2	2	3	3	1	2	0	0	0
Medina	0	0	0	0	1	0	2	0	4	4	(To Metro Plant 2/85)
Metropolitan	4	15	2	8	15	2	5	0	0	0	0
Newport	1	(To Metropolitan Plant 6/75)									
Orono	2	9	3	9	8	7	(To Blue Lake Plant 6/80)				
Prior Lake	1	9	5	(To Blue Lake Plant 6/80)							
Rosemount	4	3	3	1	1	1	0	1	3	2	5
St. Paul Park	4	(To Metropolitan Plant 6/75)									
Savage	2	0	6	2	6	0	0	1	0	1	2
Seneca	5	5	5	5	8	0	2	1	1	0	1
South St. Paul	4	8	5	(To Metropolitan Plant 6/74)							
Stillwater	0	0	1	0	0	2	2	0	0	0	0
Waconia	1	11	9	(To Blue Lake Plant 1/78)							
Total Violations	85	109	105	94	109	36	35	30	20	33	24
# of Plants In Operation	23	21	21	18	19	16	14	14	14	14	13
Avg. # Violations/Plant	3.70	5.19	5.00	5.22	5.74	2.25	2.50	2.14	1.43	2.36	1.85

NOTE: 1984 Total Violations - 163, # of Plants in Operation - 23, Avg. # Violations/Plant

TABLE 3

SUMMARY OF NPDES PERMIT NON-COMPLIANCE IN 1985

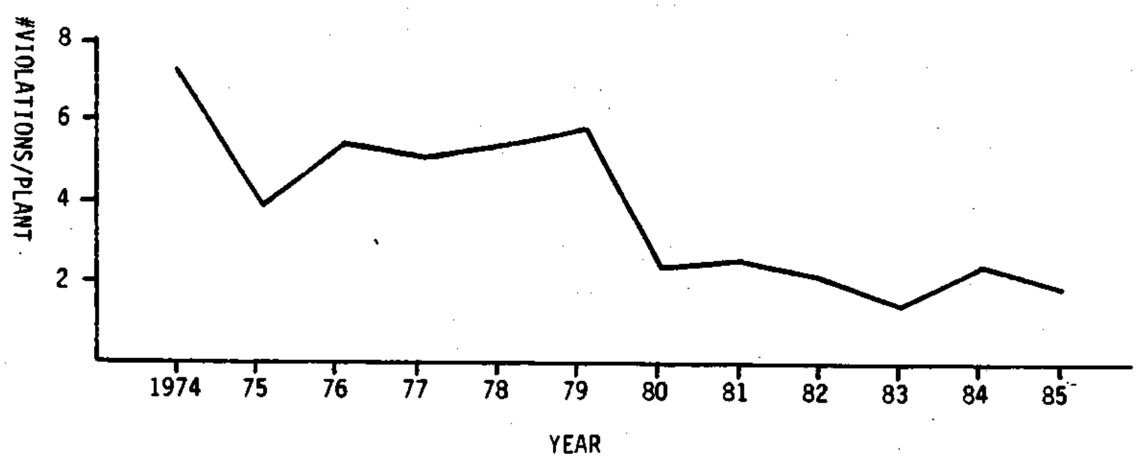
TREATMENT PLANT	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	TOTAL
ANOKA					WFC								1
BAYPORT													0
BLUE LAKE													0
CHASKA		WS											1
COTTAGE GROVE						WFC				WFC WFC			3
EMPIRE											MAm		1
HASTINGS	MB		MB, WB MS, $\overline{WB}$	MB, WB MS, WS							WB		10
MAPLE PLAIN													0
METROPOLITAN													0
ROSEMOUNT			MB, WB pH		MB, WB								5
SAVAGE						WB				WFC			2
SENECA					WFC								1
STILLWATER													0
TOTAL VIOLATIONS	1	1	7	4	4	2	0	0	0	3	2	0	24

Symbols: MB,WB= Monthly and Weekly CBOD Conc; MS,WS= Monthly and Weekly TSS Conc; $\overline{WB}$ = Weekly CBOD Mass Limit; pH = daily pH limit; MFC,WFC = Monthly and Weekly Fecal Coliforn; MAm = Monthly NH_3-N

2.3 Plant Performance

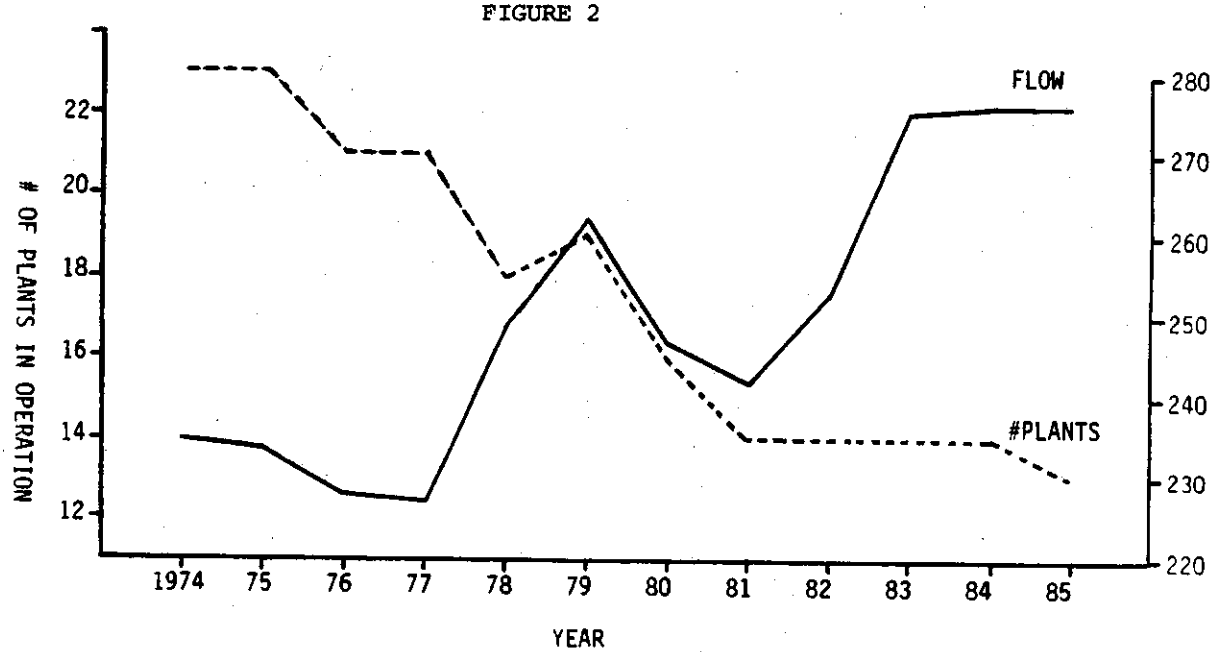
Figure 1 shows graphically how the annual average number of permit violations per plant has steadily decreased over the years. This improvement is all the more dramatic in the light of how the number and stringency of limitations has grown over the same time period.

FIGURE 1



Of the 100 billion gallons of wastewater received during 1985, 81 percent was treated at the Commission's largest facility, the Metropolitan Wastewater Treatment Plant. Approximately 15 percent of the total flow was treated by the other three regional plants: Blue Lake, Empire, and Seneca. The remaining 4 percent of the total flow was treated at the 9 smaller plants. Figure 2, below, shows the total flow treated by the Commission treatment plants and the number of plants in service over the years.

FIGURE 2



During 1985, the Metropolitan Plant effluent quality was similar to the excellent performance during 1982 to 1984. Average effluent CBOD and TSS concentrations during 1985 were 11 mg/L and 13 mg/L, respectively, as compared to 1984 average effluent CBOD and TSS values of 10 mg/L and 11 mg/L. Removal efficiencies for CBOD and TSS were 95 percent and 93 percent, approximately the same removal efficiencies realized in 1984. The Metropolitan Plant effluent quality, as expressed in CBOD and TSS, has reached a level that is difficult to surpass with a conventional secondary treatment facility.

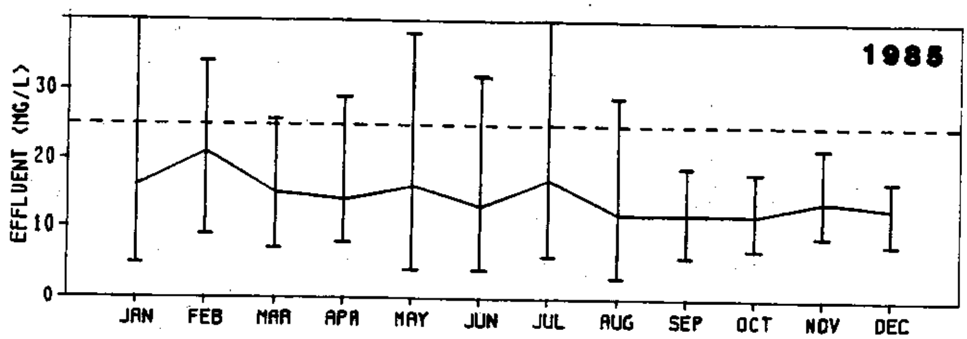
Effluent quality for plants other than the Metropolitan Plant also was similar to 1982-1984 performance. Annual average CBOD and TSS concentrations during 1985 were 12 mg/L and 10 mg/L, as compared with the 11 mg/L and 11 mg/L seen in 1984.

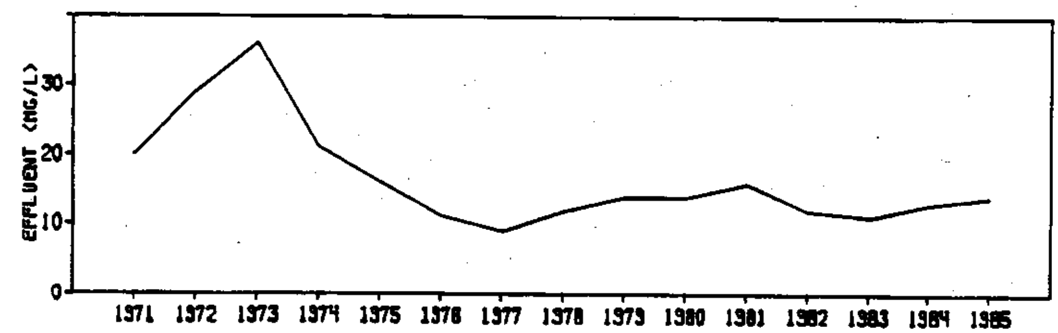
In the following figure 3-16, the performance of each plant with respect to CBOD and TSS is shown graphically, both for 1985 monthly averages and for the 1971-1985 annual averages. Dotted lines on the graphs indicated the permit effluent limitations. The vertical bars on the graphs show the minimum and maximum values monitored during each month.

FIGURE 3.

ANOKA PLANT PERFORMANCE HISTORY

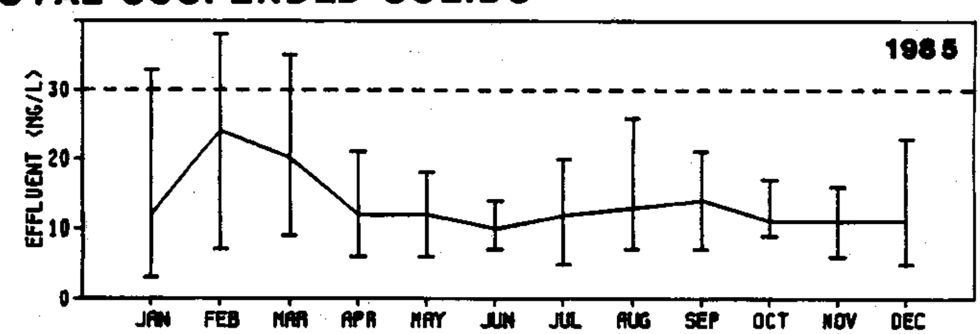
BIOCHEMICAL OXYGEN DEMAND





DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS



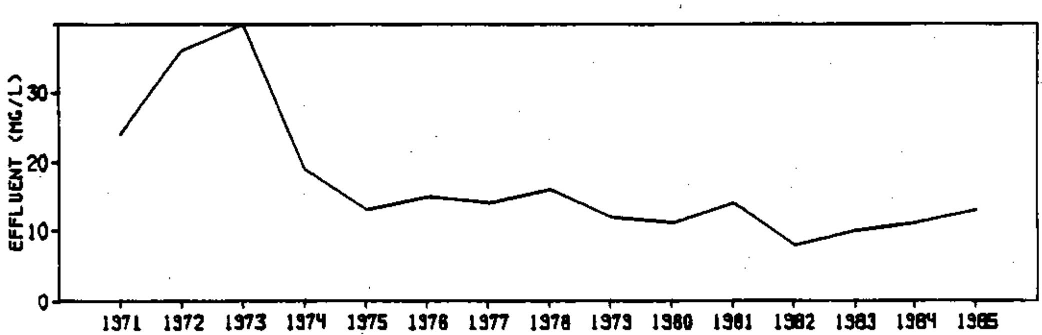
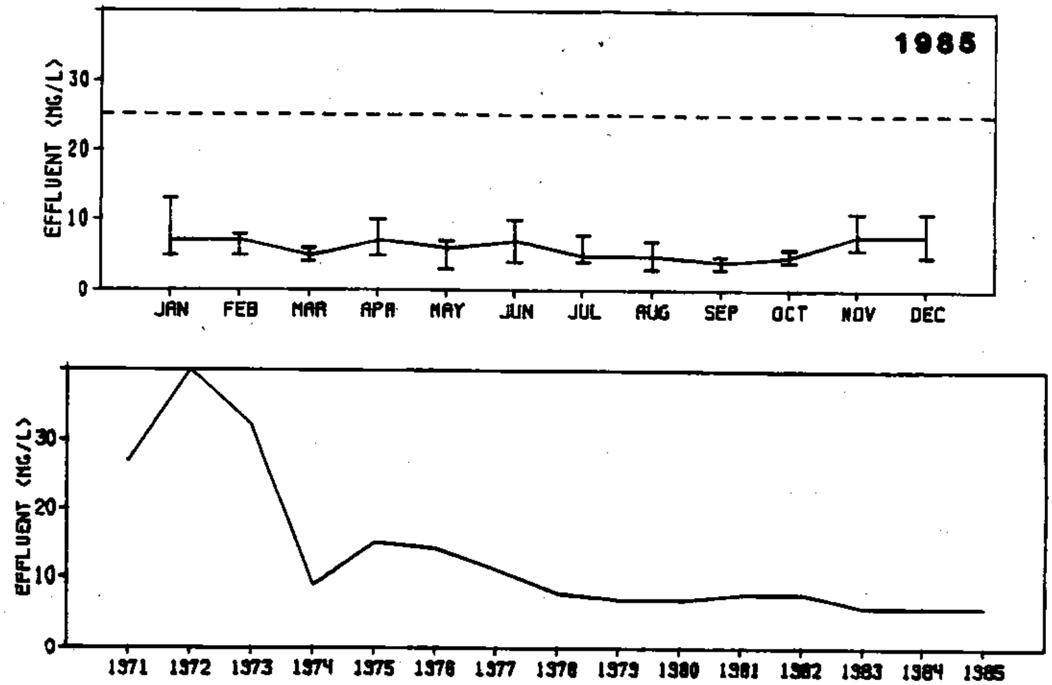


FIGURE 4.

BAYPORT PLANT PERFORMANCE HISTORY

BIOCHEMICAL OXYGEN DEMAND



DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS

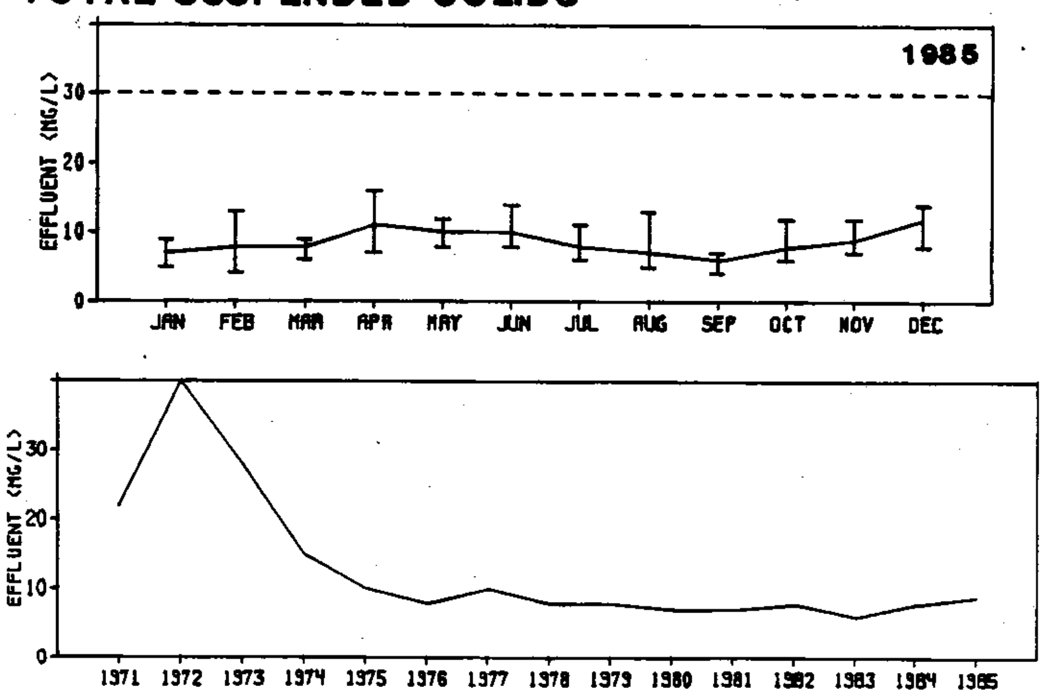
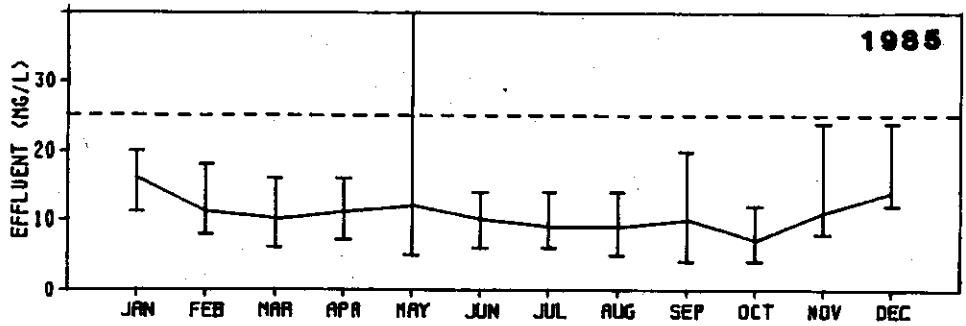
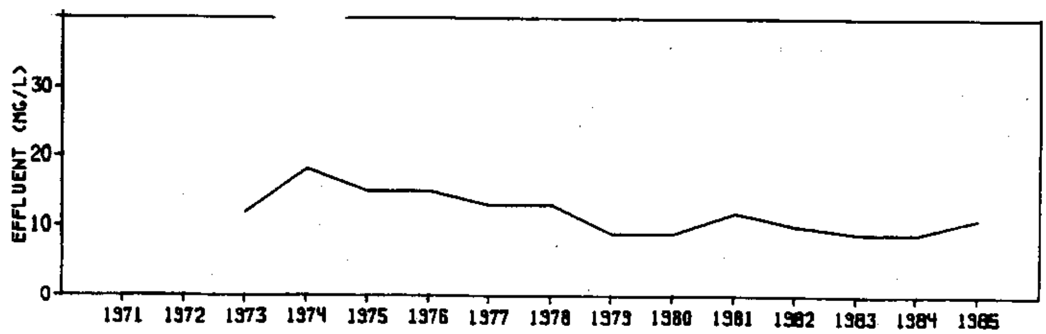


FIGURE 5.

BLUE LAKE PLANT
PERFORMANCE HISTORY

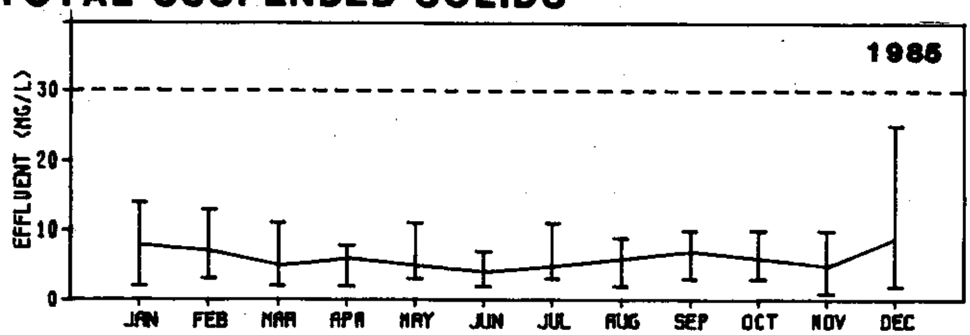
BIOCHEMICAL OXYGEN DEMAND





DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS



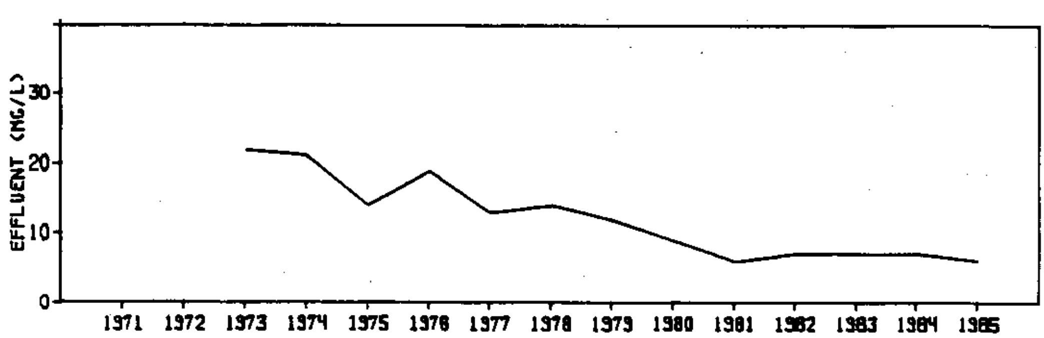
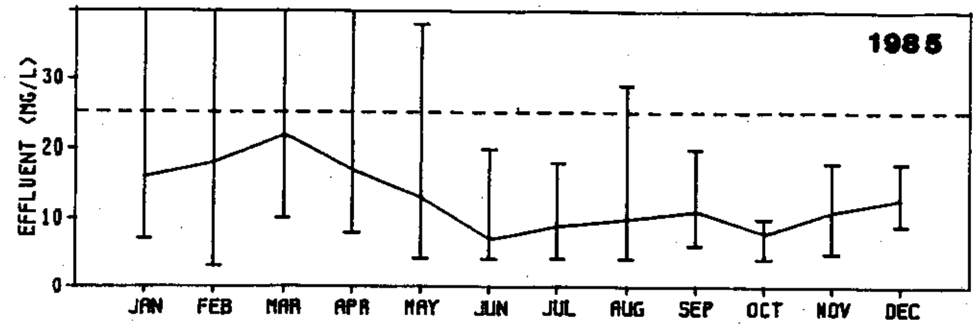
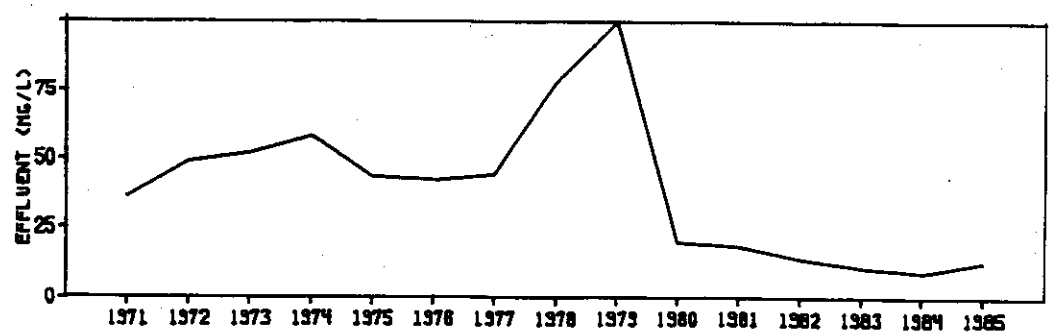


FIGURE 6.

CHASKA PLANT PERFORMANCE HISTORY

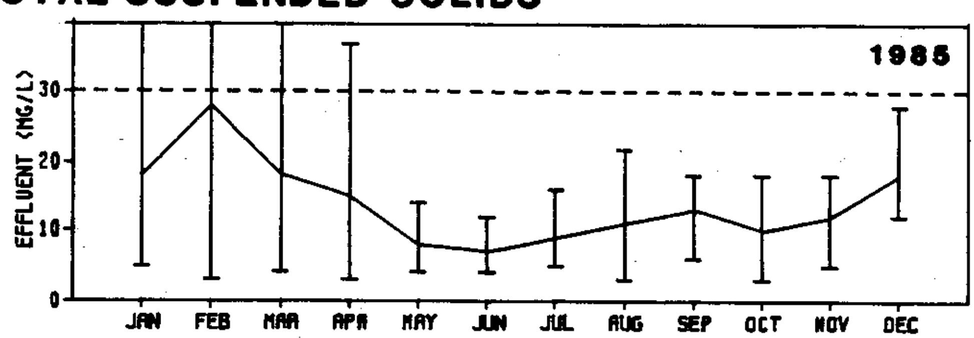
BIOCHEMICAL OXYGEN DEMAND





DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS



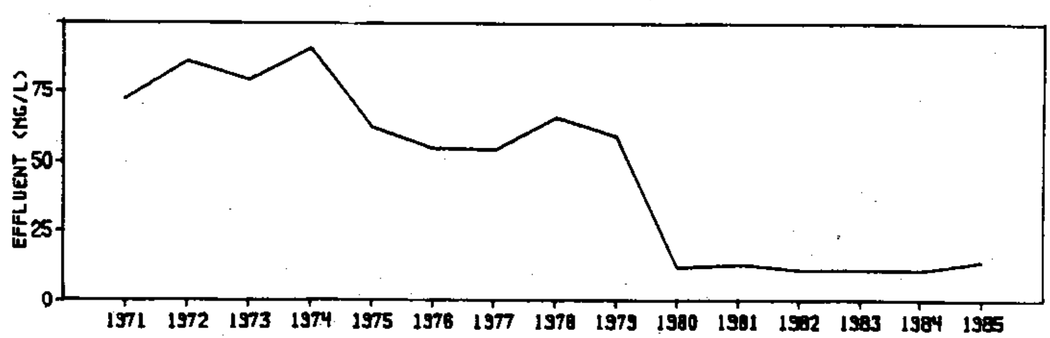
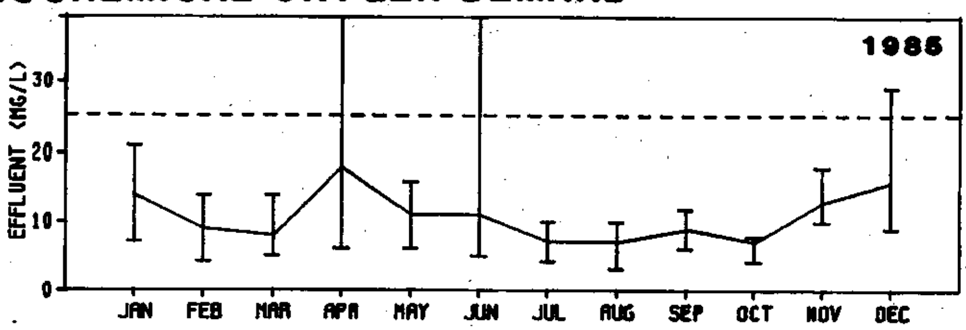
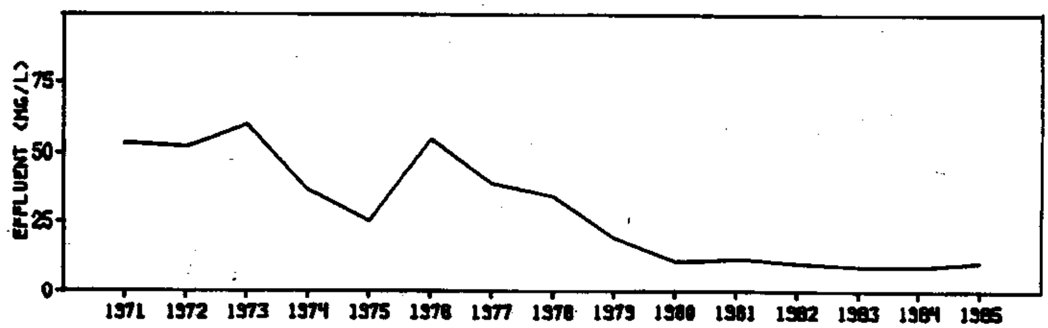


FIGURE 7.

COTTAGE GROVE PLANT PERFORMANCE HISTORY

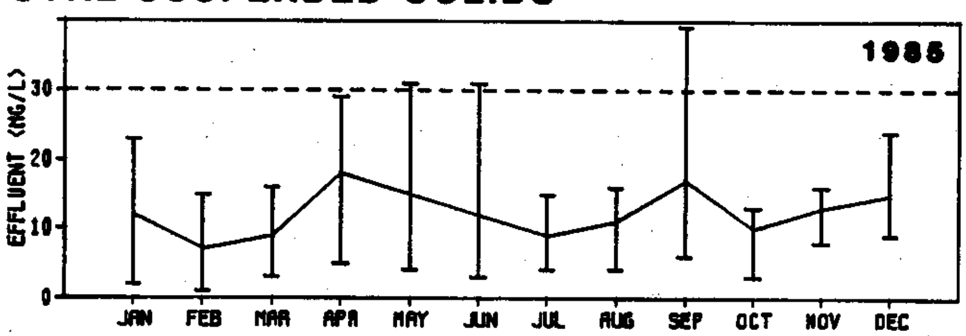
BIOCHEMICAL OXYGEN DEMAND





DATA REPRESENTS CBOD IN 1982 THRU 1986. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS



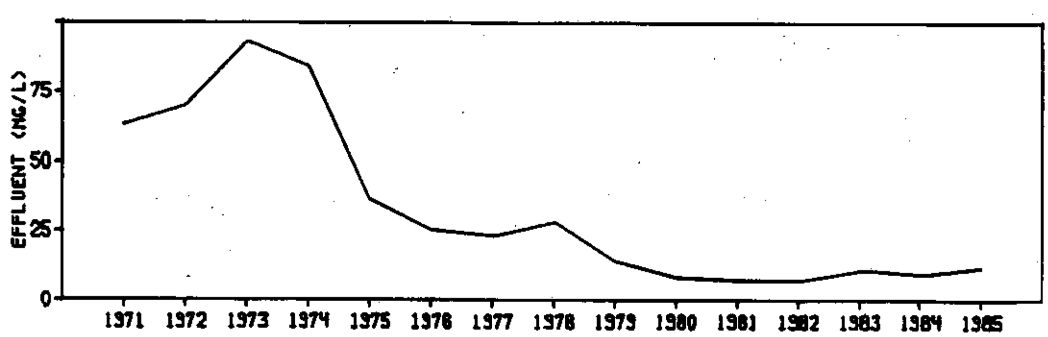
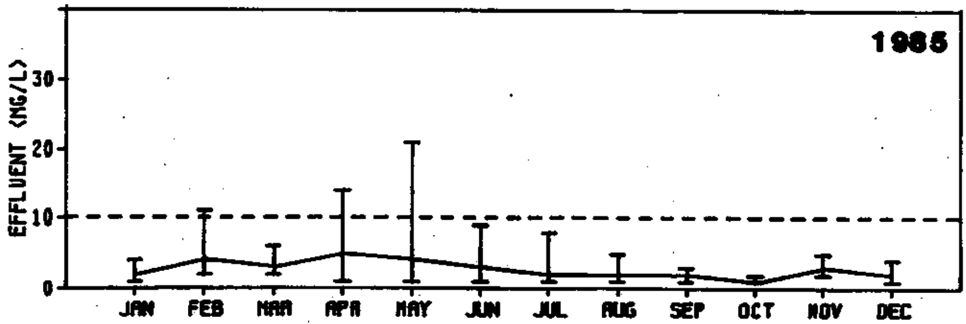
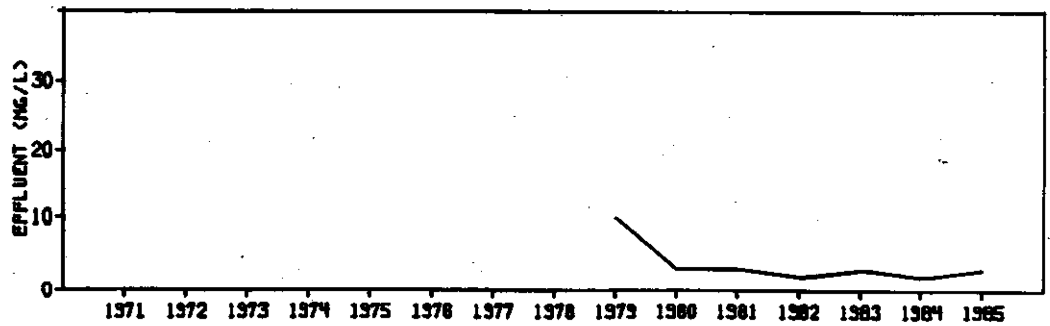


FIGURE 8.

EMPIRE PLANT
PERFORMANCE HISTORY

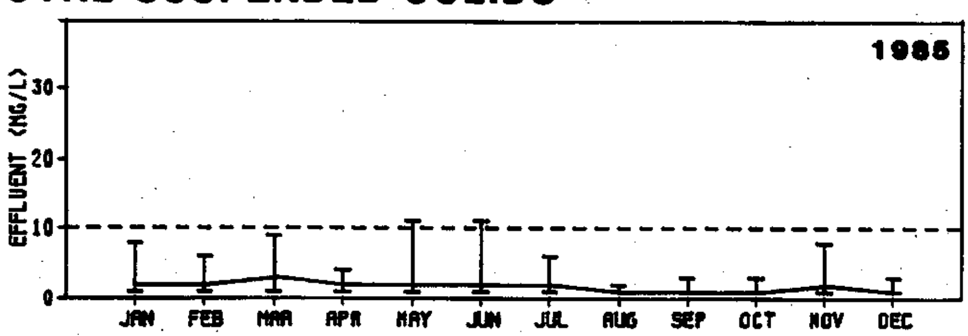
BIOCHEMICAL OXYGEN DEMAND





DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS



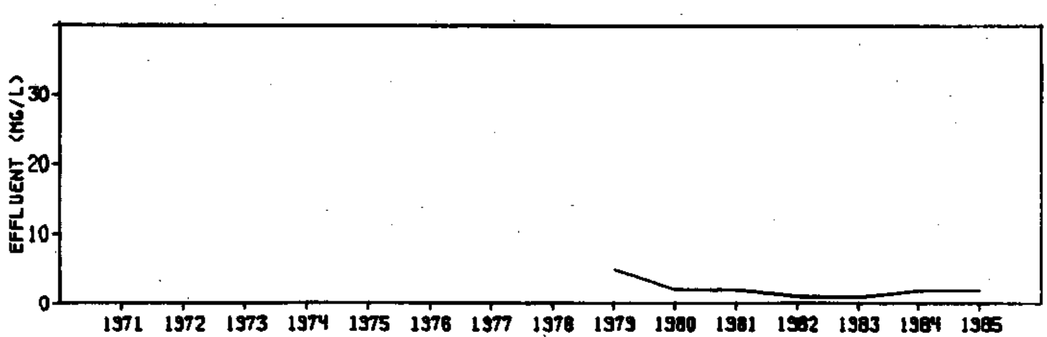
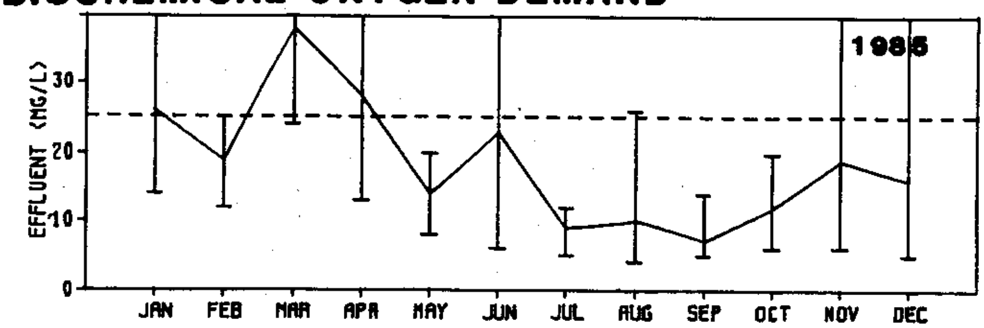
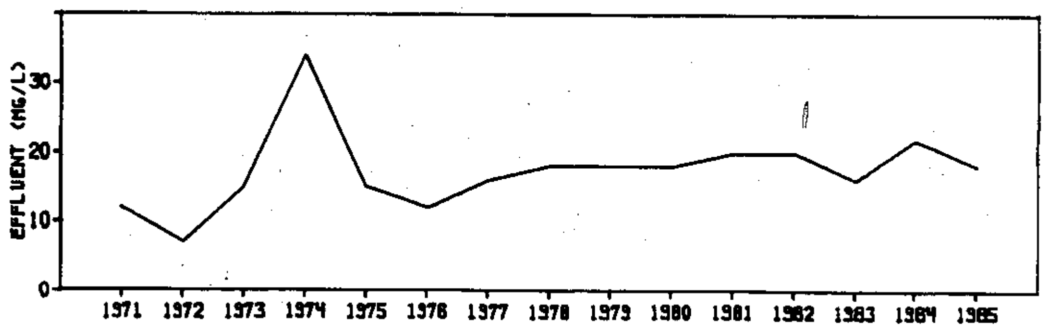


FIGURE 9.

HASTINGS PLANT PERFORMANCE HISTORY

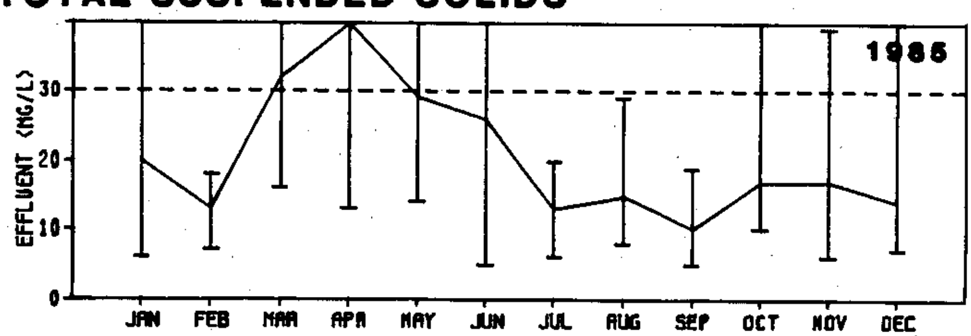
BIOCHEMICAL OXYGEN DEMAND





DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS



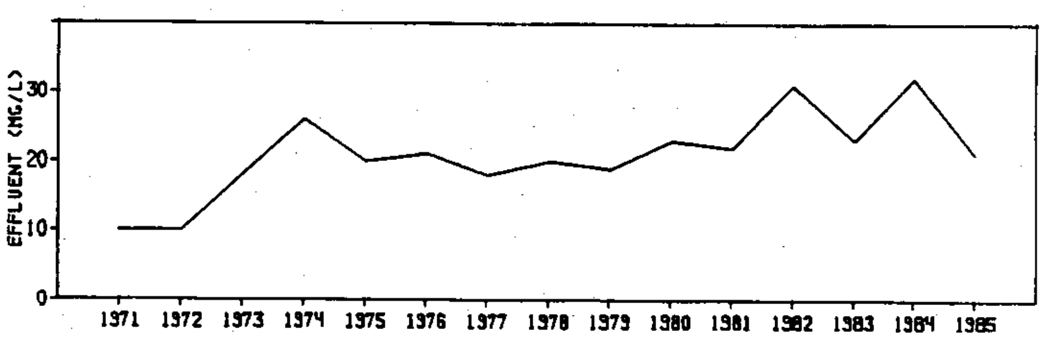
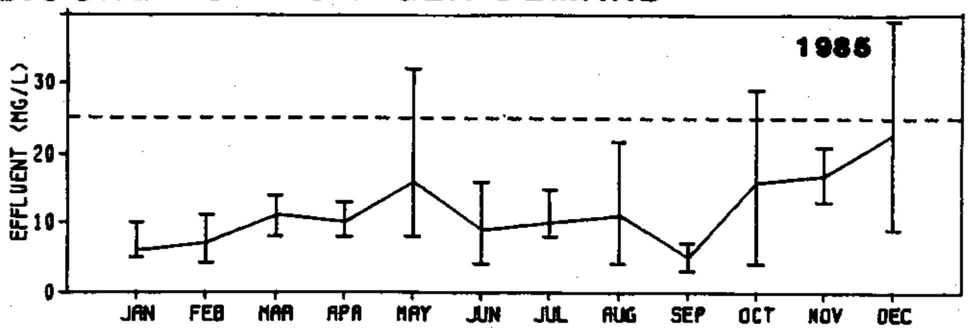
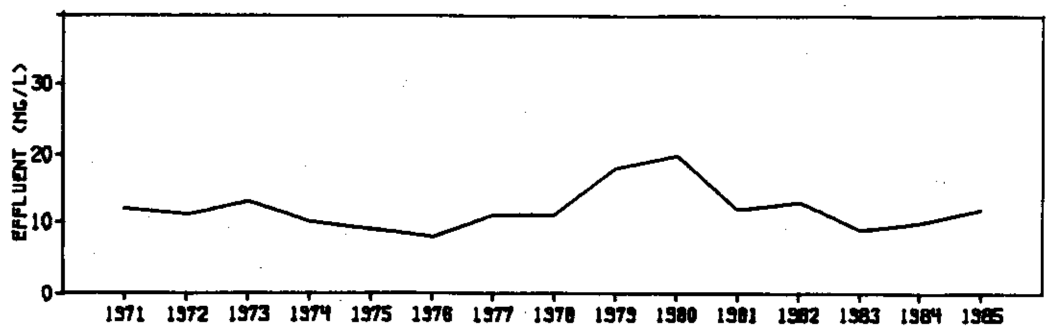


FIGURE 10.

MAPLE PLAIN PLANT PERFORMANCE HISTORY

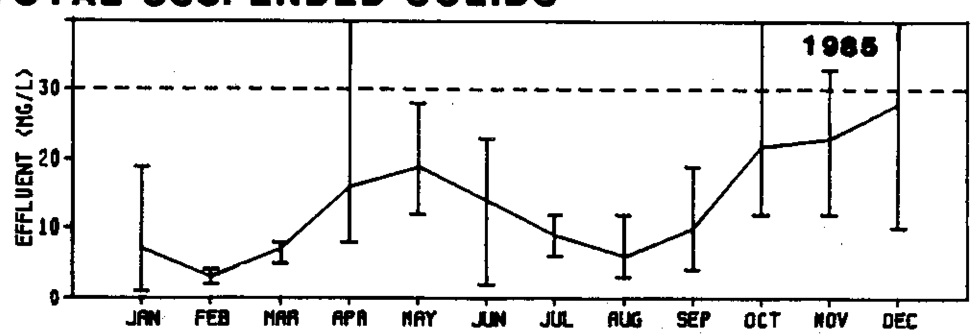
BIOCHEMICAL OXYGEN DEMAND





DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS



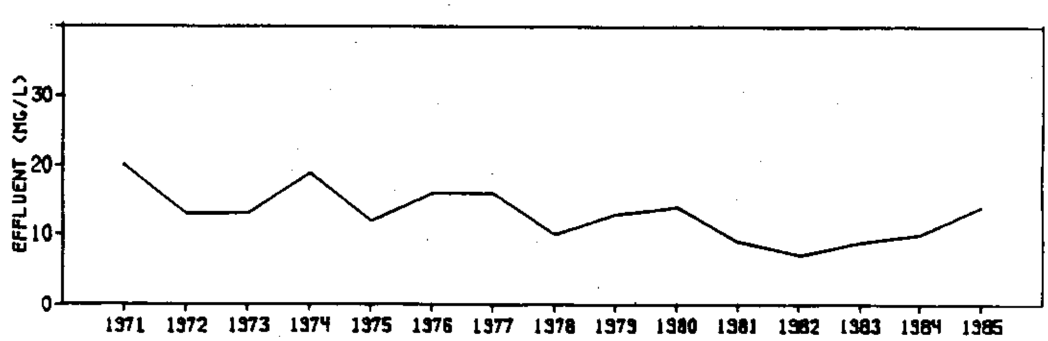
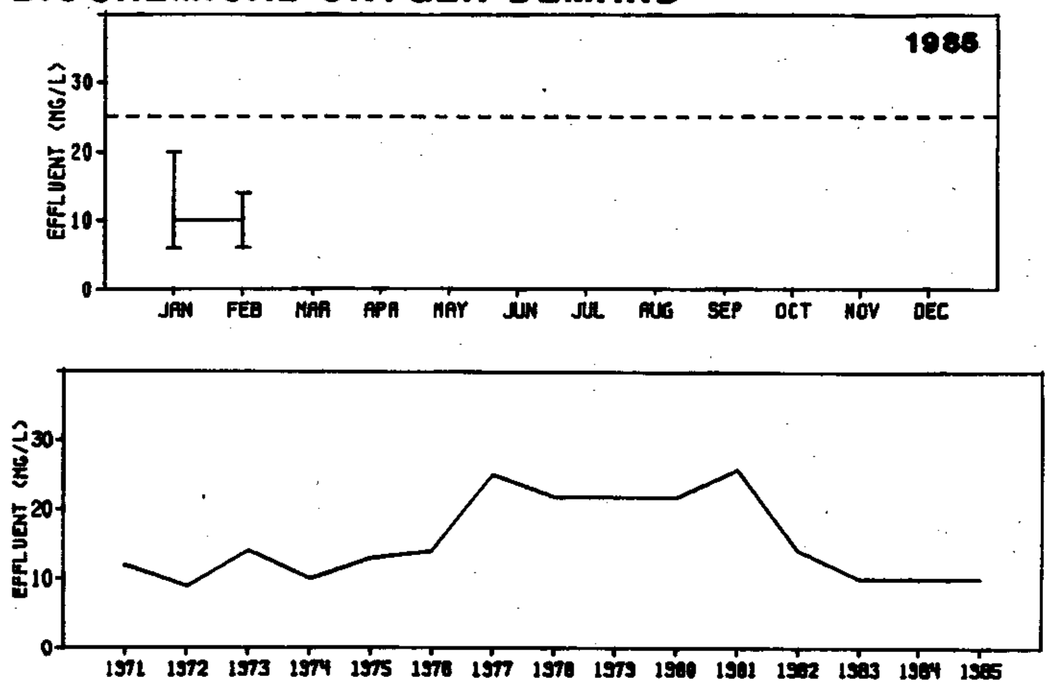


FIGURE 11.

MEDINA PLANT PERFORMANCE HISTORY

BIOCHEMICAL OXYGEN DEMAND



DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS

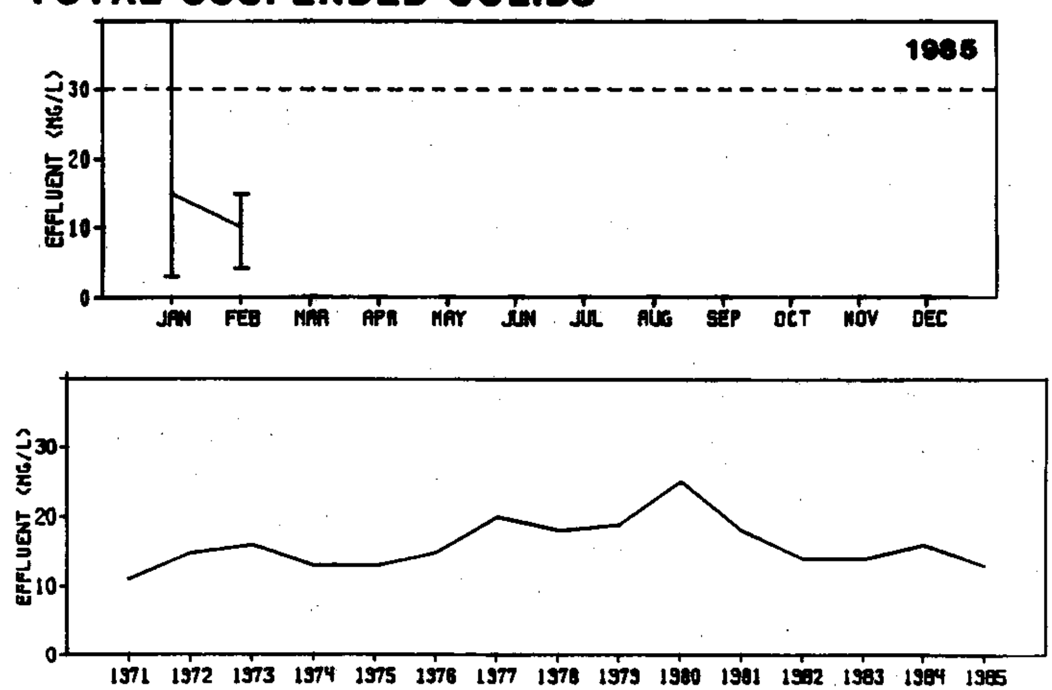
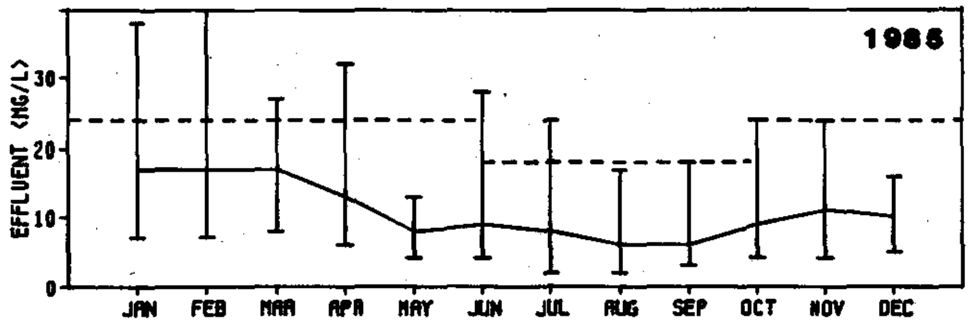
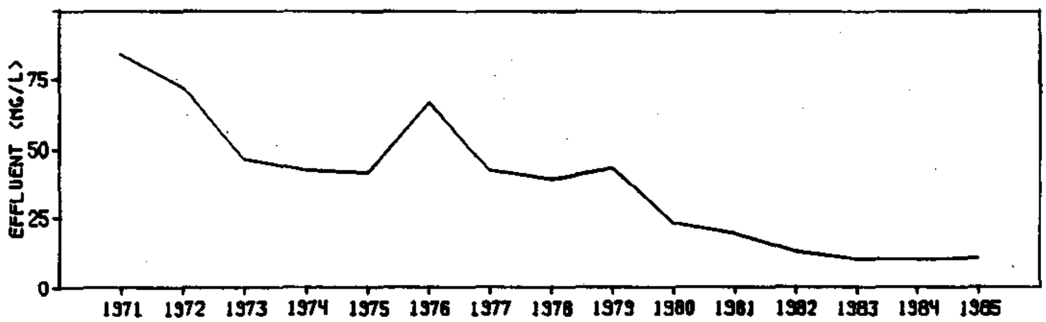


FIGURE 12.

METROPOLITAN PLANT PERFORMANCE HISTORY

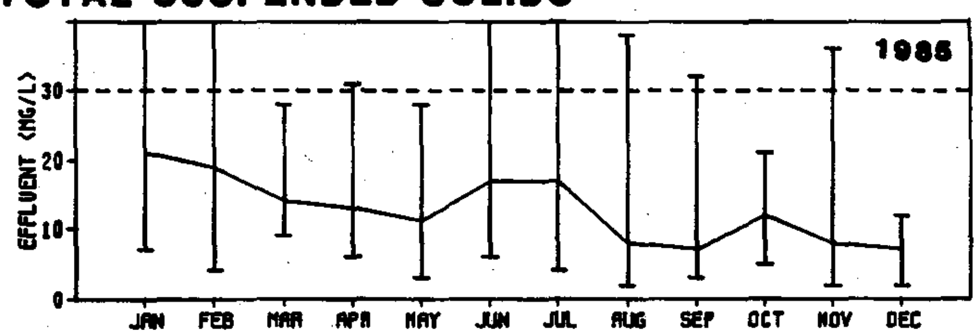
BIOCHEMICAL OXYGEN DEMAND





DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS



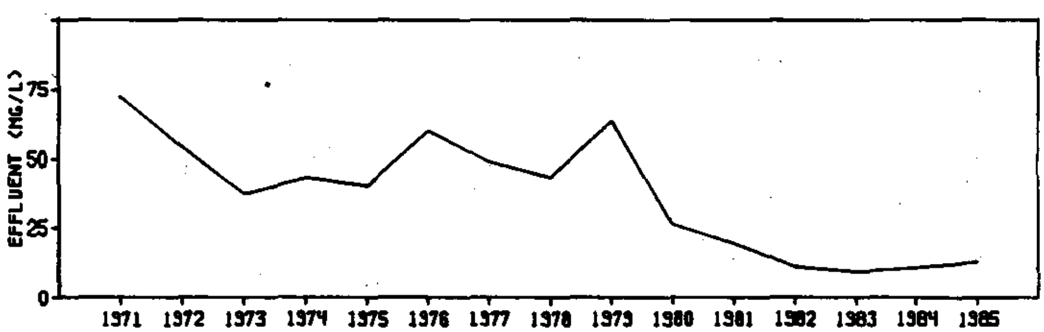
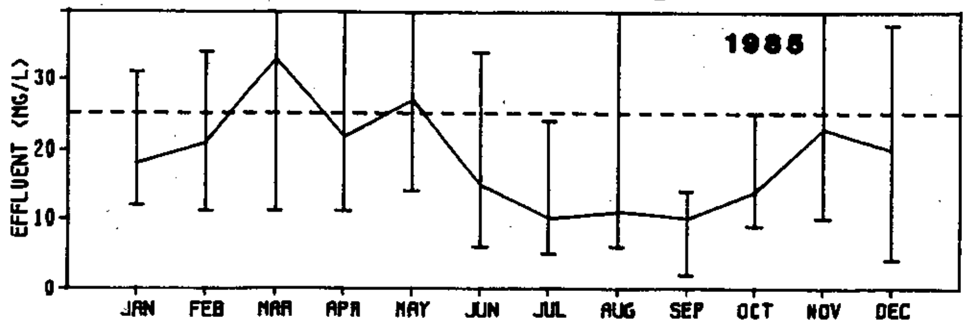
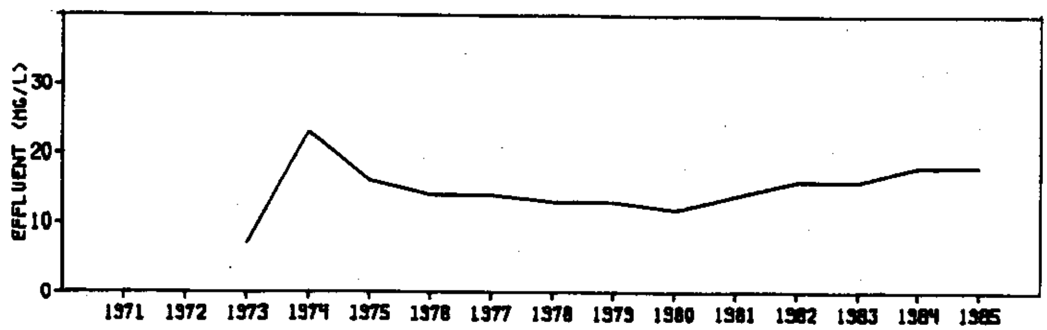


FIGURE 13.

ROSEMOUNT PLANT PERFORMANCE HISTORY

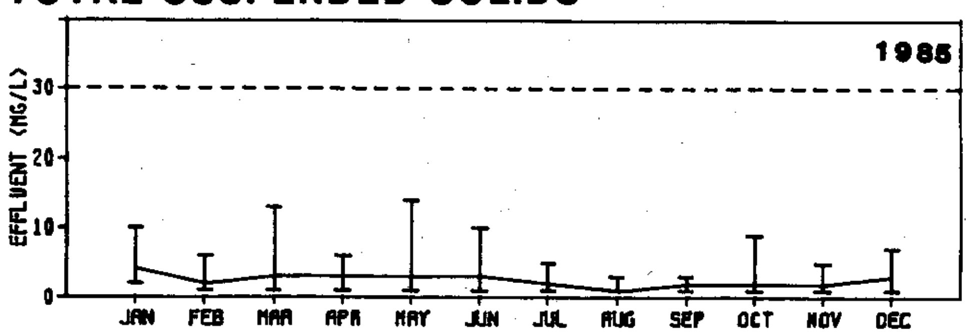
BIOCHEMICAL OXYGEN DEMAND





DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS



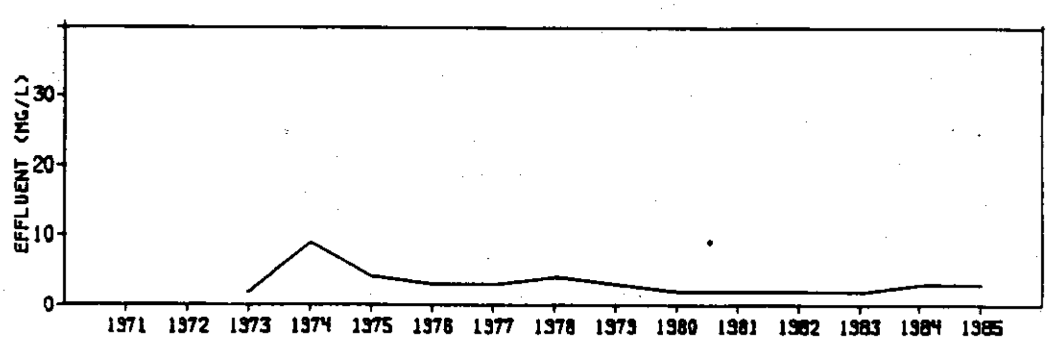
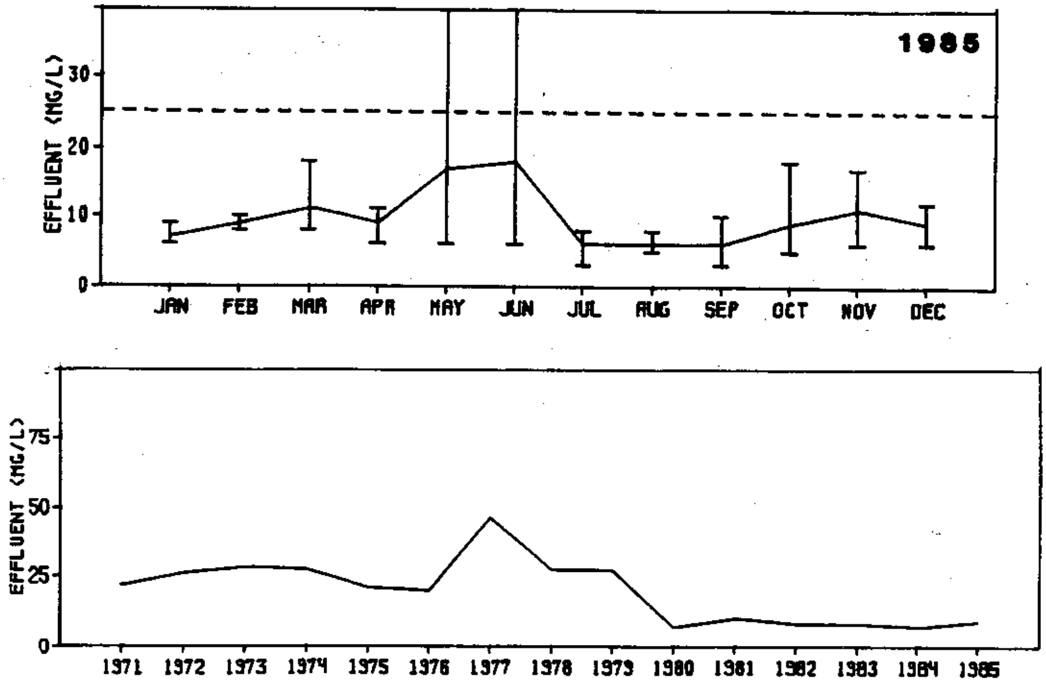


FIGURE 14.

SAVAGE PLANT PERFORMANCE HISTORY

BIOCHEMICAL OXYGEN DEMAND



DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS

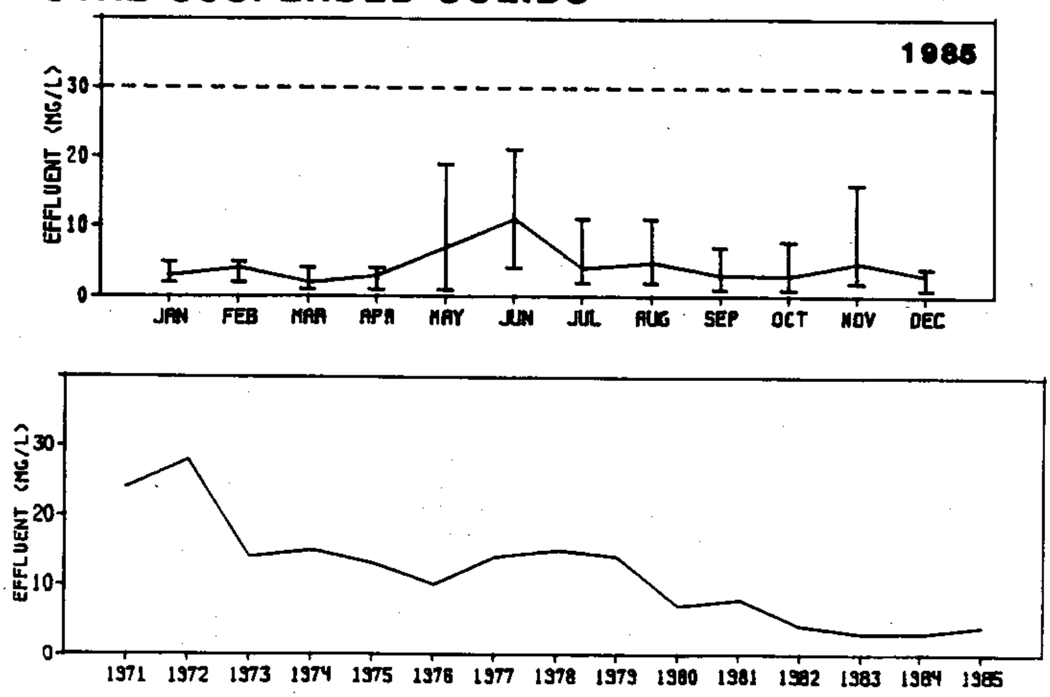
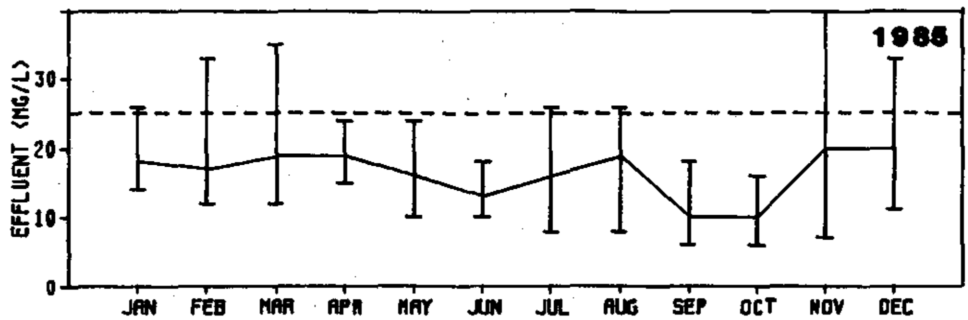
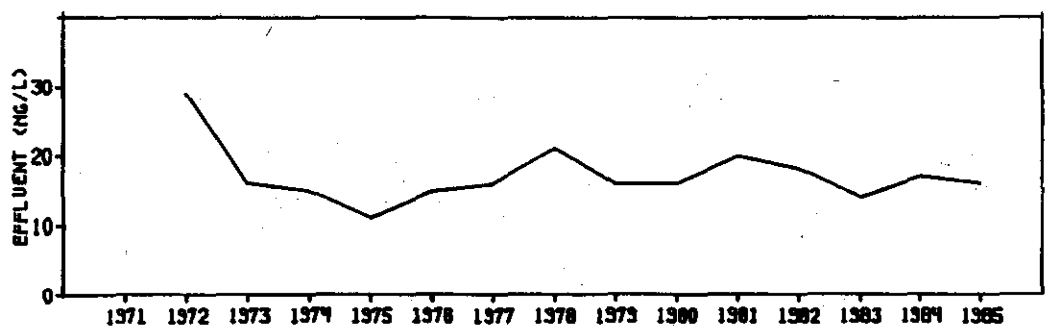


FIGURE 15.

SENECA PLANT PERFORMANCE HISTORY

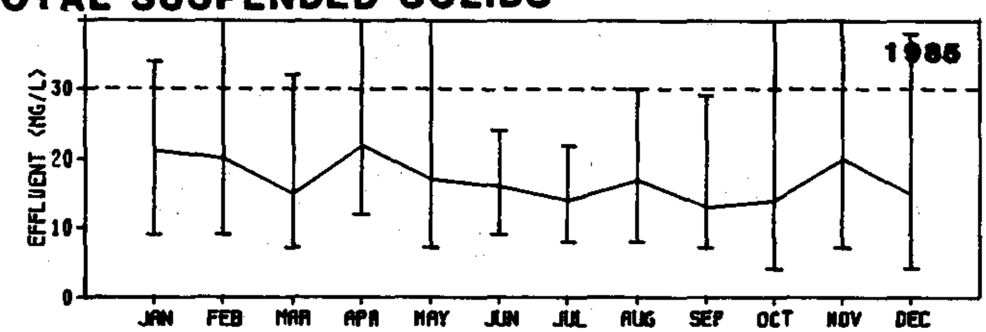
BIOCHEMICAL OXYGEN DEMAND





DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS



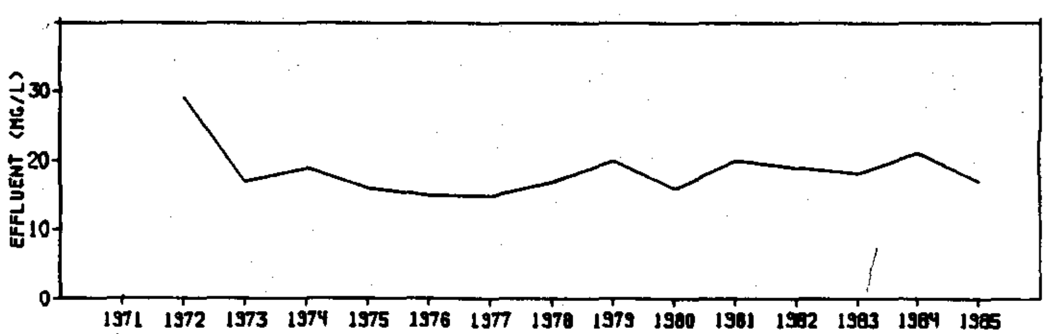
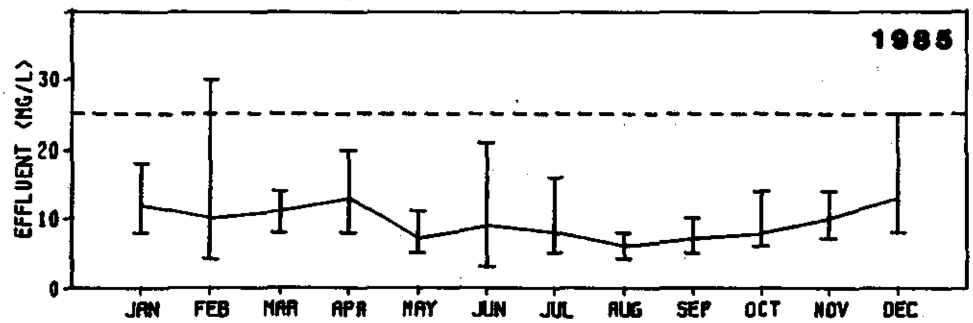
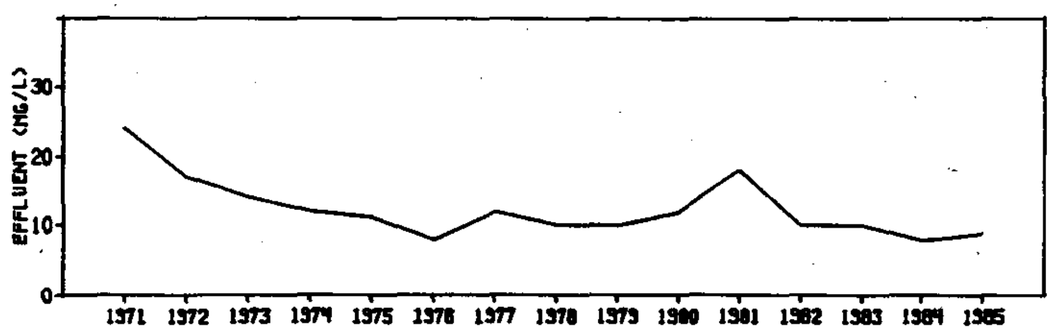


FIGURE 16.

STILLWATER PLANT PERFORMANCE HISTORY

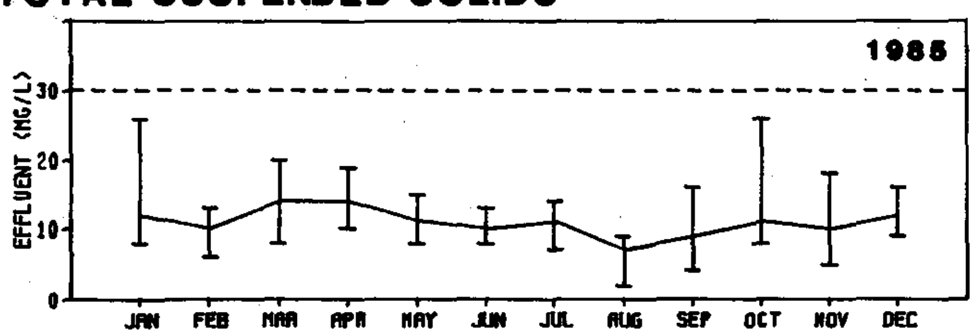
BIOCHEMICAL OXYGEN DEMAND

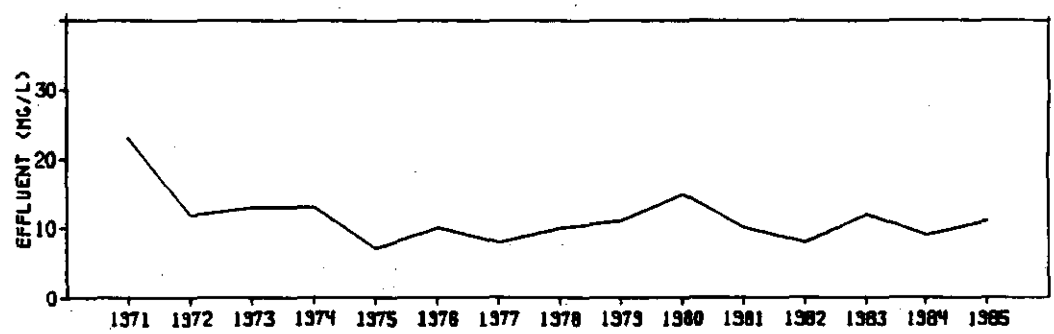




DATA REPRESENTS CBOD IN 1982 THRU 1985. ALL PREVIOUS YEAR'S DATA ARE TBOD.

TOTAL SUSPENDED SOLIDS





3.0 GASEOUS EMISSIONS FROM WATEWATER TREATMENT PLANT INCINERATORS

3.1 Monitoring Data

Sludge generated at Commission treatment plants is handled either by land application or incineration. Most of the sludge generated by Commission Treatment plants receives final processing at the Metropolitan or Seneca Plants. These two plants use incineration for sludge disposal. The incineration process produces exhaust gas which discharges to the atmosphere through stacks and which is subject to air quality emission limitations imposed by the Minnesota Pollution Control Agency through the issuance of permits for incinerator operation.

Emission standards are currently imposed for four measurable parameters: particulate matter, opacity, odor, and mercury. Table 6, below explains the basis for monitoring each of these parameters.

TABLE 6

DESCRIPTION OF AIR QUALITY PARAMETERS

Particulate Emissions - The limit on particulate matter that may be discharged from a stack is based on the average of 3-one hour sampling runs. Under specified conditions, during each run, stack gas is sampled and passed through a filter for one hour and the amount of material collected on the filter is determined. Compliance with particulate limitations demonstrates that an incinerator can be operated to comply with standards. This demonstration is usually required twice per year.

Opacity - Since particulate emission testing can only practically be done on an infrequent basis, ongoing monitoring of particulate discharge and compliance with standards is done through monitoring of the opacity of stack emissions. Opacity is a measurement of the amount of light that will pass through the stack gases. This can be measured either through visual observation or using a beam of light and a sensor. Opcity is measured in percent: 100% opacity being completely opaque, transmitting no light, and 0% opacity being no visible emission from the stack. Opacity limits are based on the average of 24 readings over a 6 minute period.

Odor - Odor concentrations are defined in units of dilution. The amount that a sample must be diluted before no odor can be detected. A sample with high odor units needs a large amount of dilution before becoming undetectable. Odor units are found by averaging the results from a panel of people, each one determining the dilution level at which they can no longer detect any odor. This averaging is done to take into account the varying sensitivities to odors in the general population. In addition to limits on the concentration of odor that can be emitted, there are also limits on the "mass" of odor discharged overtime: odor concentration times the volume of gas discharged per minute.

Mercury - At this time, mercury is the only distinct element for which the Commission has an emission standard.

Compliance with an emission standard can be demonstrated by showing that the total amount of mercury fed to an incinerator is insufficient to cause the standard to be exceeded if all the mercury was to go up the stack.

In the following tables, the results of incinerator stack monitoring during 1985 is tabulated. Table 7 shows the results of the particulate tests - 10 tests were run on the eight incinerators at the Metropolitan and Seneca Treatment Plants. During all particulate tests, compliance with opacity and odor limits is monitored.

Table 7

1985 STACK TESTING SUMMARY

		PARTICULATE[1] EMISSION		OPACITY (%)		ODOR CONCENTRATION[2]		ODOR MASS[3]	
DATE	STACK	LIMIT	RESULT	LIMIT	RESULT	LIMIT	RESULT	LIMIT	RESULT
5/30/85	METRO #8	1.30	0.630	20	-	150	24	1×10^6	0.5×10^6
6/26/85	METRO #9	1.30	1.188	20	7	150	71	1×10^6	1.07×10^6
7/11/85	METRO #8	1.30	1.488	20	5	150	44	1×10^6	0.9×10^6
7/25/85	METRO #8	1.30	0.863	20	7	150	45	1×10^6	0.84×10^6
8/08/85	METRO #8	1.30	0.547	20	7	150	19	1×10^6	0.38×10^6
8/23/85	METRO #7	1.30	0.711	20	7	150	150	1×10^6	3.2×10^6
10/22/85	METRO #9	1.30	0.831	20	13	150	143	1×10^6	2.7×10^6
10/30/85	METRO #9	1.30	0.458	20	12	150	256	1×10^6	3.6×10^6
11/07/85	METRO #9	1.30	0.600	20	11	150	261	1×10^6	4.1×10^6
9/19/85	SENECA #1	0.200	0.038	20	7	150	354	1×10^6	3.4×10^6

[1]Metro Plant Limit: lbs/dry ton of sludge feed
Seneca Plant Limit: grains/dry std. cubic foot of gas corrected to 12% CO_2

[2]Odor units
[3]Odor units/minute

In addition to the visual opacity testing done during stack particulate tests, automatic monitors record the Metropolitan Plant stack opacities continuously. Starting in May of 1985, the Commission's Operations Department began reporting any opacity readings exceeding a 20% limit based on an average of readings over six minutes. Any periods of meter failure (non-operation) were also reported. Table 8, below, summarizes these excursions during the eight months of reporting during 1985.

TABLE 8

CONTINUOUS OPACITY EXCURSION AND OPACITY METER OPERATION DURING 1985

MONTH	# OF EXCURSIONS	TOTAL TIME (MIN)	# OF METER FAILURES	TOTAL TIME (HRS)
May	0	0	4	120.0
June	0	0	4	63.5
July	0	0	4	59.0
August	1	45	7	293.0
Sept.	7	370	8	58.5
Oct.	1	15	8	175.5
Nov.	1	90	6	127.0
Dec.	1	15	19	284.5
TOTAL	17	535	60	1181.0

A third way in which opacity is routinely monitored at the Metropolitan and Seneca Plants, is weekly visual readings. During 1985, 145 readings were taken. The results at the Metropolitan Plant showed 100% compliance with permit limitations; the results at the Seneca Plant were 85% compliance.

In addition to the odor testing required as part of each stack particulate test, the commission is also required to run odor tests on Metropolitan Plant incinerator stacks each week. In April of 1985, this testing was begun. Figure 17 shows graphically the results of these tests. Not all the incinerators were tested at any one time due to specific incinerators not being operational. The dashed lines on the graphs indicate the 150 odor unit permit limitation.

The final parameter for which there are permit limitations for incinerator stack emissions is mercury. In lieu of monitoring the amount of mercury emitted from a stack, the operating permit allows measuring the amount of mercury in the feed sludge to the incinerator and assuming that all the measured mercury is emitted. During 1985, the potential amount of mercury emitted from the incinerator stacks averaged 138 grams/day and 91 grams/day for the Metropolitan and Seneca Plants, respectively. The permit limitation is 3200 grams/day.

3.2 Compliance with Permit Limitations

As indicated in Section 3.1, the emissions from treatment plant incinerator stacks must comply with permit limits for four parameters: particulates, opacity, odors, and mercury.

During 1985, 9 particulate tests were run on the Metropolitan Plant incinerators, one at the Seneca Plant. Only one test, at the Metropolitan Plant, resulted in a permit violation.

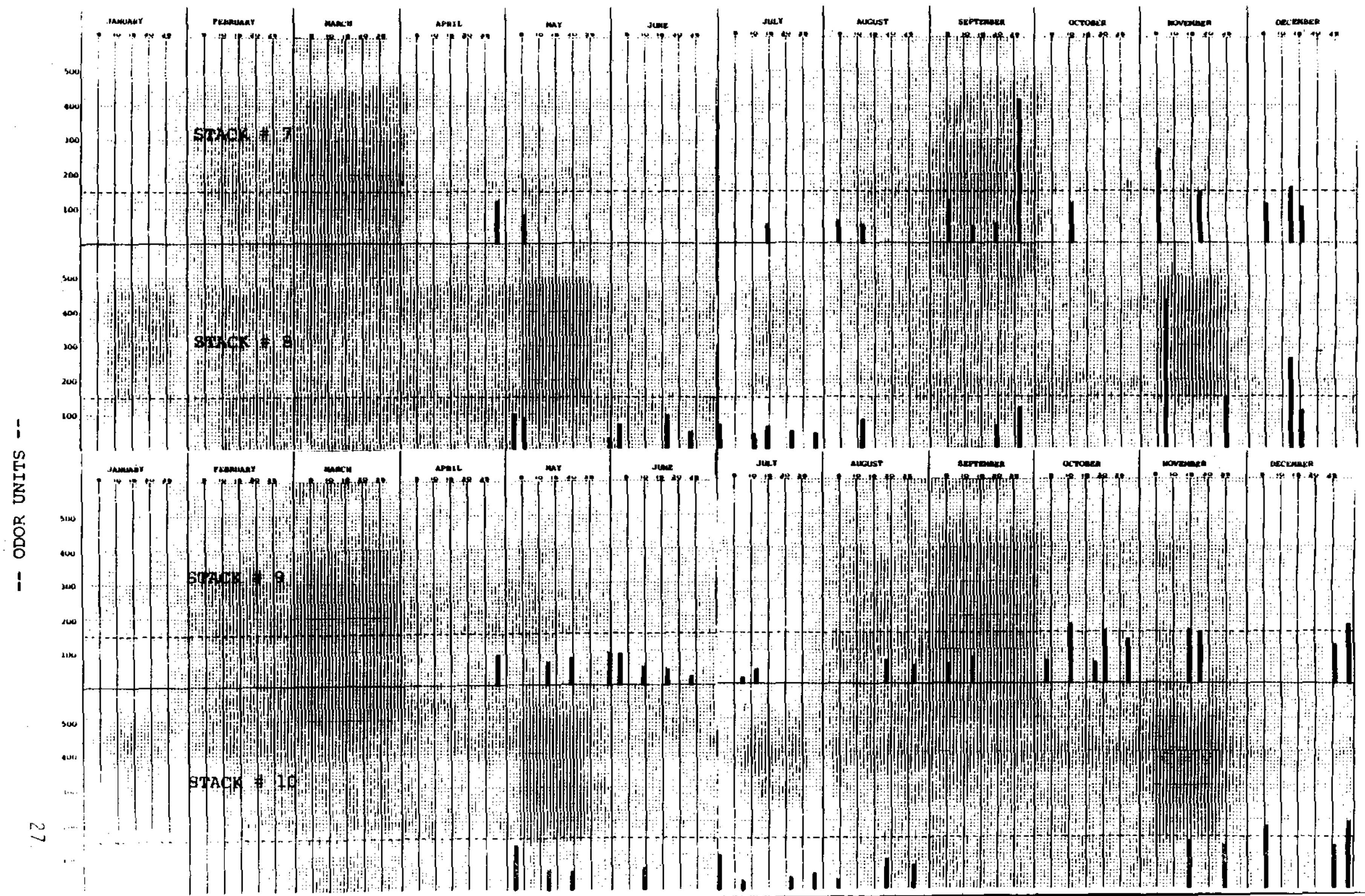
All visual opacity tests indicated compliance with standards with the exception of 5 readings at the Seneca Plant, for an overall compliance record of 97%. The continuous opacity meters on stacks 7-10 at the Metropolitan Plant showed a combined non-compliance total of 9 hours during the 8 months of monitoring during 1985.

Of the 81 odor tests run during 1985 on incinerator stack emissions, 67 or 83% were in compliance. During stack particulate testing, odor mass limits were in compliance only 40% of the time.

Maximum possible mercury discharges from incinerator stacks averaged less than 5% of the permissible limit.

FIGURE 17

ODOR TESTING RESULTS - 1985
METROPOLITAN PLANT INCINERATOR EMISSIONS



TD 525 .T9 M42c 1985 v.1
Metropolitan Waste Control
Commission
Annual wastewater treatment

DATE	ISSUED TO
[redacted]	