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CHARACTERISTICS OF MUNICIPAL WASTEWATERS

Municipal wastewaters are the principle source of most of the pollutants entering southern California coastal waters. During 1980 and 1981 the flow from the five largest ocean dischargers averaged 1,094 million gallons per day (4.1 billion liters per day) and contained 610 metric tons of suspended solids. Following is a summary of the reports on constituents discharged that are compiled by the treatment plants for the State and Regional Water Quality Control Boards.

Tables 1 and 2 list the average annual concentration and calculated mass emissions for 1980; Tables 3 and 4 give the same for 1981. Table 5 lists the combined mass emissions of some constituents from 1971 through 1981. Figure 1 shows the trends of five constituents over the last eleven years.

As a group, the six discharges showed several interesting trends during the last two years:

GENERAL CONSTITUENTS

*The flow is 40 MGD higher than the previous high (1979) with Orange County accounting for more than half the increase.

*The BOD_5 is the highest it has been since 1971, while the suspended solids are the lowest reported in eleven years. In the past, the BOD had been usually less than the suspended solids, but for the last four years BOD has been the greater, reflecting the importance of dissolved BOD or the higher demand of the remaining suspended solids.

METALS

*Seven of the ten measured metals (Cd, Cr, Cu, Hg, Ni, Pb and Zn) were at the lowest level reported since we have been reporting. The metalloids (Arsenic and Selenium) that have been discharged in relatively small amounts show no consistent trend. Silver (Ag) decreased in 1980 and 1981 after increasing during the previous four years.

CHLORINATED HYDROCARBONS

*DDT continues to decrease by 20-30 percent per year and the total output was less than 500 kg. for the first time. JWPCP still accounts for 85-90 percent of this figure.

*PCBs have not dropped much since 1979 and remain at about 1,200 kg. per year. The discharge of PCB is distributed more evenly than DDT with Orange County (35%), Hyperion 5 mile (30%), JWPCP (26%) and Pt. Loma (6%) accounting for 97 percent of the mass discharge.

Table 1

1980 Effluent Characteristics

Concentrations (mg/liter) *

	JWPCP	Hyperion 5 mile	Hyperion 7 mile	Orange County	Point Loma	Oxnard
Flow MGD	374	363	4.84	207	129	18.7
General constituents						
Sus. Sol.	176	77	7100**	120	113	74.6
Sett. Sol. mls/l	0.3	0.9	-	1.5	0.8	0.1
B.O.D.	208	158	-	139	157	195
Oil + Grease	32.2	14	310	23.9	32.2	14.1
NH3-N	39.6	16.5	-	26.8	26.2	20.6
Organic-N	13.4	8.4	289	-	-	10.1
Total-P	9.4	7.1	238	-	-	-
MBAS	6.29	4.5	-	-	5.04	-
CN	0.12	0.09	1.09	< 0.08	0.006	-
Phenols	2.33	0.06	0.41	0.08	.105	0.31
Turbidity	85	55	-	87	55	67.6
Toxicity (T. U.)	3.10	0.32	-	0.001	-	-
Trace Metals						
Ag mg/l	0.010	0.03	0.65	0.013	0.01	0.03
As	0.005	0.01	0.19	0.001	0.0074	0.006
Cd	0.020	0.02	0.77	0.043	0.007	0.02
Cr	0.31	0.09	5.07	0.096	0.04	0.05
Cu	0.19	0.18	9.07	0.234	0.099	0.09
Hg	0.0008	0.001	0.066	0.001	0.001	0.0015
Ni	0.20	0.14	2.98	0.10	0.007	0.04
Pb	0.12	0.09	3.46	0.10	0.09	-
Se	0.01	0.01	0.05	-	-	-
Zn	0.60	0.33	21.1	0.25	0.22	0.13
Chlorinated Hydrocarbons (ug/l)						
DDT ug/l	1.05	0.10	1.05	0.03	0.2	-
PCB	0.65	0.67	6.18	1.33	0.2	1.0
TICH	1.91	0.85	8.06	1.36	0.4	1.0

* except as noted
** Total solids

Table 2

1980 Mass Emission Characteristics

Mass Emission (metric tons/year) *

	JWCP	Hyperion 5 mile	Hyperion 7 mile	Orange County	Point Loma	Oxnard
Flow 10^9 l/yr	516.7	501.5	6.69	286	178.2	25.8
General Constituents						
Sus. Sol.	90,940	38,615	47,500**	34,320	20,140	1,925
B.O.D.	107,500	79,240	-	39,754	27,980	5,030
Oil + Grease	16,640	7,020	2,074	6,835	5,740	364
NH3-N	20,460	8,275	-	7,665	4,670	531
Organic-N	6,920	4,213	1,933	-	-	260
Total-P	4,860	3,561	1,592	-	-	-
MBAS	3,250	2,257	-	-	898	-
CN	62.0	45.1	7.29	< 22.9	1.07	-
Phenols	1,204	30.1	2.74	22.9	18.7	8.0
Trace Metals						
Ag	5.17	15.0	4.35	3.72	1.78	0.77
As	2.58	5.01	1.27	0.286	1.32	0.15
Cd	10.3	10.0	5.15	12.3	1.25	0.52
Cr	160	45.1	33.9	27.5	7.13	1.29
Cu	98.1	90.3	60.7	66.9	17.6	2.32
Hg	0.413	0.501	0.442	0.28	0.178	0.039
Ni	103	70.2	19.9	28.6	1.25	1.03
Pb	62	45.1	23.1	28.6	16.0	-
Se	5.17	< 5.01	0.33	-	-	-
Zn	310	165	141	71.5	39.2	3.35
Chlorinated Hydrocarbons (ug/l)						
DDT	542	50	7	8.6	< 35.6	-
PCB	336	336	41	380	< 35.6	25.8
TICH	987	426	54	390	< 71	25.8

* except as noted
**total solids

Table 3

1981 Mass Emission Characteristics

Concentrations (mg/liters)

	JWPCP	Hyperion 5 mile	Hyperion 7 mile	Orange County	Point Loma	Oxnard
Flow MGD	364	369	4.72	212	130	17.7
General Constituents						
Sus. Sol.	167	77	7,100**	119	114	56.9
Sett. Sol. ml/l	0.3	0.9		1.1	0.95	< 0.1
B.O.D.	202	169		151	161	114
Oil + Grease	23.3	22	353	21.1	29.3	12.2
NH3-N	39.3	16.1		25.7	27.7	17.0
Organic-N	14.0	7.3	266			5.09
Total-P	9.2	6.9	214			
MBAS	5.37	4.12			4.38	
CN	0.08	0.08	0.442	0.04	0.013	0.001
Phenols	2.85	0.06	0.37	0.09	0.073	0.10
Turbidity	79	63		79	53	44
Toxicity (T.U.)	4.2	0.81		1.0	1.3	2.1
Trace metals						
Ag	0.008	0.025	0.739	0.013	0.013	0.003
As	0.005	0.012	0.183	0.003	0.005	0.020
Cd	0.016	0.017	0.892	0.026	0.008	0.003
Cr	0.211	0.054	3.34	0.082	0.043	0.0001
Cu	0.154	0.20	9.32	0.248	0.133	0.093
Hg	0.0018	0.0007	0.036	0.0004	0.0008	0.00005
Ni	0.148	0.108	2.40	0.069	0.0075	0.006
Pb	0.09	0.05	2.0	0.074	0.136	0.011
Se	0.029	0.001	0.044			
Zn	0.500	0.217	11.8	0.22	0.190	0.091
Chlorinated Hydrocarbons (ug/1)						
DDT	0.84	0.050	0.58	0.02	0.084	Not detected
PCB	0.54	0.76	3.05	1.55	0.665	< 0.033
TICH	1.61	0.94	4.68	1.56	0.816	< 0.033

* except as noted
**Total solids

Table 4

1981 Effluent Characteristics

Mass Emissions (metric tons/year) *

	JWPCP	Hyperion 5 mile	Hyperion 7 mile	Orange County	Point Loma	Oxnard
Flow	503	510	6.52	293	179.6	24.5
General Constituents						
Sus. Sol.	84,000	39,270	46,000**	34,870	20,470	1,390
B.O.D.	102,000	86,190		44,240	28,900	2,790
Oil + Grease	11,700	11,220	2,301	6,182	5,260	300
NH3-N	19,800	8,211		7,538	4,979	416
Organic-N	7,040	3,733	1,734			125
Total-P	4,620	3,529	1,295			
MBAS	2,700	2,101			786	
CN	40.2	40.8	2.88	< 11.7	2.33	0.025
Phenols	1,430	30.6	2.43	26.4	13.1	2.50
Trace Metals						
Ag	4.02	12.8	4.82	3.81	2.33	0.074
As	2.62	6.12	1.19	0.879	0.88	0.49
Cd	8.05	8.67	5.82	7.62	1.44	0.074
Cr	106	27.5	21.8	24.0	7.72	0.002
Cu	77.5	102	60.8	72.6	23.9	2.88
Hg	0.91	0.357	0.235	0.117	0.14	0.001
Ni	74.4	55.1	15.6	20.2	1.34	0.147
Pb	45.3	25.5	13.0	21.7	24.4	0.270
Se	14.5	0.51	0.287			
Zn	251	111	77.1	64.5	34.1	2.23
Chlorinated Hydrocarbons (kg/yr)						
DDT	422	26	3.8	6.9	15	
PCB	272	388	20	454	119	0.8
TICH	810	479	30	457	147	0.8

* except as noted
**Total solids

Table 5. Combined annual mass emission rates of southern California's five largest municipal wastewater dischargers, 1971 - 1981

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Flow											
MDG	931	922	955	967	985	1,027	966	1,015	1,054	1,097	
Liters/day 10^6	3,524	3,490	3,615	3,360	3,728	3,889	3,658	3,840	4,000	4,160	4,160
General Constituents (metric tons/yr)											
Total Sus. Sol.	288,000	279,000	270,000	264,000	287,000	288,000	244,000	256,000	243,000	233,000	226,000
5-Day B.O.D.	283,000	250,000	217,000	222,000	237,000[b]	259,000[b]	244,000	237,000[b]	246,000[b]	260,000[b]	264,000[b]
Oil and Grease	63,500	60,600	57,400	54,700	57,420	59,100	49,000	49,000	45,000	39,000	37,000
NH_3-N	56,600	39,900	45,900	37,000	36,620	37,350[b]	41,200	39,500	41,200	42,000[b]	41,000[b]
Trace Metals (metric tons/yr)											
Silver	17.7	21.1	29.0	21.7	25.7	20.2	34.3	32.3	42.2	30.8	27.9
Arsenic	ND	ND	ND	20.9[c]	11.9[c]	10.5[c]	14.0	14.5	15.4	10.6	12.2
Cadmium	57.3	33.8	49.3	55.4	50.0	45.0	42.4	44.8	42.3	39.5	31.7
Chromium	676	673	695	690	580	593.0	366	280	237	275	187
Copper	559	485	509	575	511	507	412	417	359	336	339
Mercury	ND	ND	ND	3.1[c]	2.2[c]	2.6[c]	2.8	1.9	2.5	1.9	1.8
Nickel	339	273	318	314	234	307[b]	264	320	256	224	167
Lead	243	226	180	199	198	191	152	219	223	175	130
Selenium	ND	ND	ND	17.75[b]	16.8[d]	22.0[d]	23.0[d]	23.0[d]	7.7[d]	10.5[d]	15.3[d]
Zinc	1,880	1,210	1,360	1,320	1,142	1,064	837	905	724	730	540
Chlorinated Hydrocarbons (kg/yr)											
Discharger Values											
Total DDT	21,700	6,600	4,120	2,120	1,989	1,673	920	1,110	760	644	474
Total PCB	8,730	9,830	4,620	9,390	6,011	4,310	2,183	2,510	1,190	1,129	1,250
Project Values[e]											
Total DDT	21,600[f]	6,540	3,830	1,570	1,150	970	780	1,050	728	NM	NM
Total PCB	ND	19,490	3,390	5,420	3,070	2,820	1,560	590	1,466		

a. Oxnard included only in 1975 through 1979 data.
b. Hyperion 7-mile effluent excluded.
c. Orange County data not included.
d. Total for Hyperion and JWPCP only.
e. 1976-1979 data based on analysis of two 7-day composites; 1971-1975 data taken from final report to EPA for Grants R801153 and R803707.
f. JWPCP only.

NM = not measured. ND = not detected.

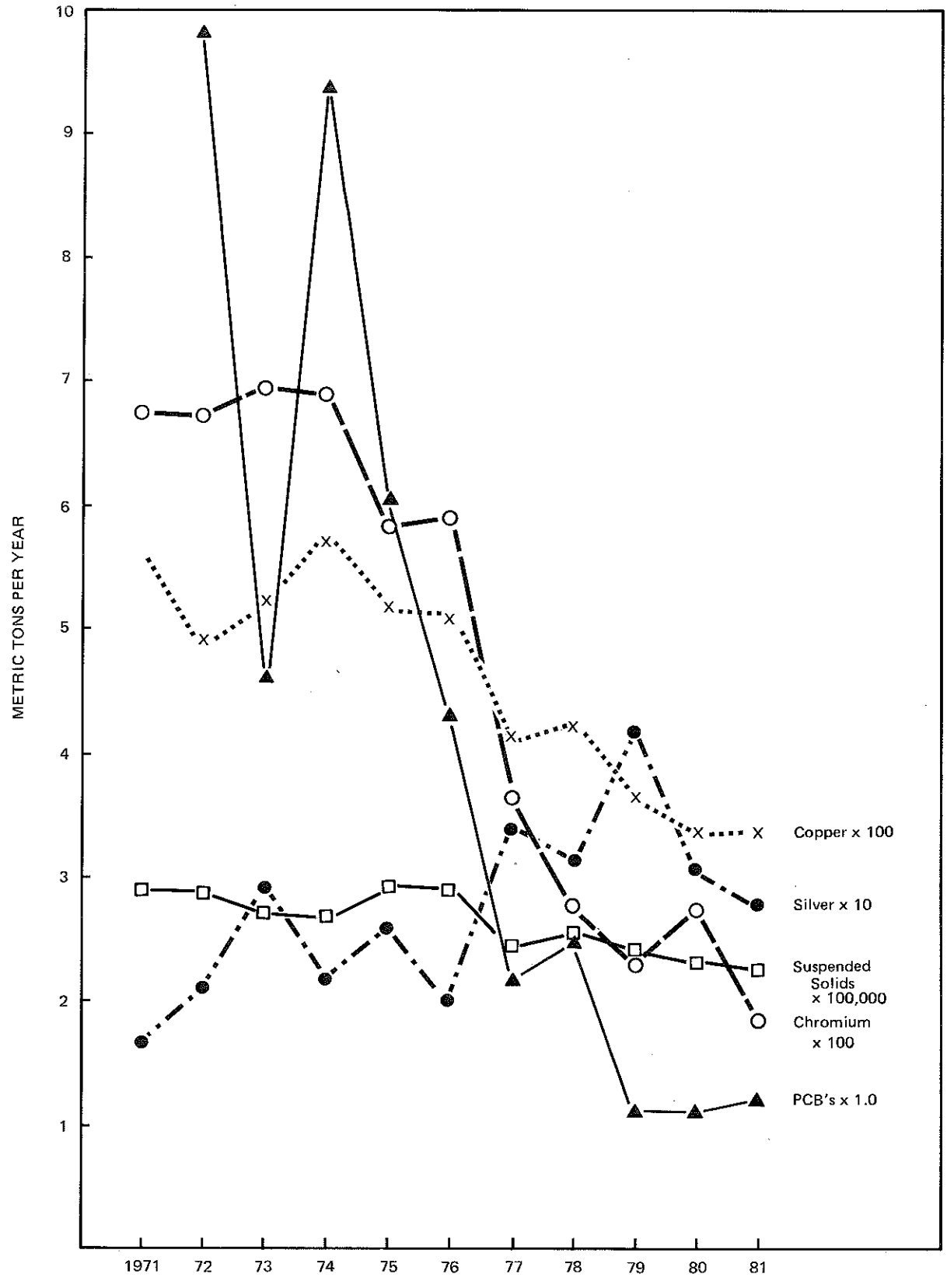

Figure 1. Combined mass emissions per year (1971 - 1981). Trends in 5 constituents.