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CHARACTERISTICS OF MUNICIPAL WASTEWATER DISCHARGES, 1974

Municipal wastewater discharges into southern California coastal waters represent the principal sources of most pollutants entering these waters as a result of human activity. The 1974 flow of wastewaters into coastal waters was slightly in excess of 1 billion gallons per day (3.78 mil-lion cubic meters, or the volume of a cube with 155-meter sides). The Project receives effluent monitoring data from the five largest municipal dischargers; as shown in Table 1, the combined flow of these five is 94 percent of the total municipal wastewater input. We review the data received each year for major changes in wastewater constituent concentrations or mass emission rates.

The 1974 annual average flows and concentrations for these five major dischargers are listed in Table 2, and Table 3 lists calculated 1974 mass emission rates; irregularities in the data base are explained in the footnotes. It should be noted that the Los Angeles County Sanitation Districts JWPCP effluent is not a typical primary effluent. This one discharge accounts for one-third the flow of waste-water to coastal waters and more than half the total mass emissions of arsenic, chromium, lead, zinc, DDT, and PCB. Improvements to increase treatment efficiencies at the JWPCP and at several other major treatment plants are scheduled to be made within the next couple of years. Major reductions in pollutant discharge to the ocean should result from these improvements.

Table 4 presents the 1971-74 total annual mass emissions for the four largest dischargers, representing 93 percent of the total municipal wastewater flow. All of the general constituents have shown a slight decrease over these 4 years. Trace metals and PCB have remained relatively constant; DDT has decreased by a factor of 10 since 1971, primarily as a result of source control. The numbers for Dieldrin appear to be randomly fluctuating, indicating that there may be problems in the analysis of this material or that inputs fluctuate greatly. The increase since 1971 in municipal wastewater flows has been at an average annual rate of less than 1 percent, reflecting perhaps an end to southern California's period of rapid growth.

Table 1. Municipal wastewater discharges to southern California coastal waters, 1974.

Discharger	Agency	Flow, (mgd)	Nature of Effluent	% of Total Flow
Joint Water Pollution Control Plant (JWPCP)	Los Angeles County Sanitation Districts	344.3	Primary	33.2
		1.7	Digested Sludge Centrate	0.16
Hyperion Plant	City of Los Angeles, Bureau of Sanitation	243.7	Primary	23.5
		100.	Secondary	9.6
		2.3	Plant Sludges	0.22
Orange County Plants	Orange County Sanitation Districts	161	Primary	15.5
		10	Secondary	1.0
Pt. Loma Plant	City of San Diego	104	Primary	10.0
Oxnard Plant	City of Oxnard	10	Primary	1.0
Other (about 20)	Various	40	Primary	3.9
		20	Secondary	1.9
Total		1,037		100

Table 2. Average concentrations of general constituents, trace metals, and chlorinated hydrocarbons in the final effluent of municipal waste discharges, 1974.

	JWPCP	Hyperion 5 mile	Hyperion 7 mile	Orange[a] County	Point Loma	Oxnard
Flow (mgd)	346	341	4.72	171	104	10.1
General Constituents (mg/l)						
Total Suspended Solids	276	83	7,300	107	138	168
Volatile Suspended Solids	182	66	4,700	75	106	–
5-day BOD	213	121	1,900[b]	150	190	251
Chemical Oxygen Demand	613	250	7,700[b]	–	–	–
Oil and Grease	55.1	18	900	34.8	41.1	39.2
Nitrate Nitrogen	0.15	0.3	–	–	–	
Ammonia Nitrogen	38.5	13.8	300[b]	34.8	26.5	–
Organic Nitrogen	15.7	6.3	250[b]	–	–	–
Total Nitrogen	54.4	20.4	550[b]	–	38.0	–
Total Phosphate	47.5	24.3	663[b]	–	–	–
Detergent (MBAS)	6.85	5.1	–	–	7.96	1.25
Cyanide (CN)	0.43	0.2	0.53	–	0	0.005
Phenols	3.31	0.06	–	–	0.23	0.16
Trace Metals (mg/l)[c]						
Silver	0.012	0.02	0.40	0.012	0.008	0.008
Arsenic	0.025	0.01	0.18	–	<0.026	0.001
Cadmium	0.041	0.02	1.27	0.061	0.026	0.012
Chromium	0.86	0.21	15.1	0.28	0.11	0.020
Copper	0.60	0.19	13.9	0.40	0.10	0.074
Iron	8.17	0.64	78.7	–	6.40	1.00
Mercury	0.0011	0.0032	0.15	–	0.0005	–
Manganese	0.11	0.02	0.19	–	0.40	0.10
Nickel	0.31	0.18	3.1	0.23	0.049	–
Lead	0.26	0.04	1.13	0.17	0.059	0.13
Selenium	0.012	0.02	0.40	–	–	0.014
Zinc	1.79	0.24	23.9	0.54	0.50	0.28
Chlorinated Hydrocarbons (µg/l)						
Total DDT	3.01	0.72	2.59	–	2.32	<0.25
Total PCB	10.8[d]	0.36	3.30	17.1	–	–
Dieldrin	0.01	0.01	0.17	–	–	<0.10

[a]All Orange County values based on 10 months of data (no May – June data) except flow, cyanide, and total PCB, which are based on 6 months of data (July – December).

[b]Based upon analysis of 10 weekly composites.

[c]Pt. Loma trace metals based on less than 12 months: Silver, 9 months; copper, 4 months; iron, 2 months; manganese, 5 months.

[d]The average concentration for January to September was 4.72; for October to December, 29.1.

Table 3. Mass emission rates of general constituents, trace metals, and chlorinated hydrocarbons in the final effluent of municipal waste dischargers, 1974.

	JWPCP	Hyperion 5 mile	Hyperion 7 mile	Orange County	Point Loma	Oxnard
Flow (mgd)	346	341	4.72	171	104	10.1
General Constituents (metric tons/yr)						
Total Suspended Solids	132,000	39,100	47,500	25,200	19,800	2,340
Volatile Suspended Solids	86,900	31,100	30,600	17,700	15,200	–
5-day BOD	102,000	56,900	12,400	35,400	27,300	3,500
Chemical Oxygen Demand	293,000	118,000	50,200	–	–	–
Oil and Grease	26,300	8,470	5,860	8,210	5,900	546
Nitrate Nitrogen	71.6	141	–	–	–	–
Ammonia Nitrogen	18,400	6,490	1,950	8,210	3,800	–
Organic Nitrogen	7,500	2,960	1,628	–	–	–
Total Nitrogen	26,000	9,600	3,580	–	5,450	–
Total Phosphate	22,700	11,400	4,320	–	–	–
Detergent (MBAS)	3,270	2,400	–	–	1,140	17.4
Cyanide (CN)	205	94.1	3.45	–	–	0.07
Phenols	1,580	28.2	–	–	33.0	2.23
Trace Metals (metric tons/yr)						
Silver	5.73	9.41	2.61	2.83	1.15	0.11
Arsenic	11.3	4.71	1.17	–	<3.73	0.014
Cadmium	19.6	9.41	8.27	14.4	3.73	0.17
Chromium	411	98.8	98.4	66.1	15.8	0.28
Copper	286	89.4	90.5	94.4	14.4	1.03
Iron	3,900	301	513	–	919	13.9
Mercury	0.53	1.51	0.98	–	0.07	–
Manganese	52.5	9.41	1.24	–	57.4	1.39
Nickel	148	84.7	20.2	54.3	7.03	–
Lead	124	18.8	7.36	40.1	8.47	1.81
Selenium	5.73	9.41	2.61	–	–	0.20
Zinc	855	113	156	127	71.8	3.90
Chlorinated Hydrocarbons (kg/yr)						
Total DDT	1,440	339	16.9	–	333	<3.48
Total PCB	5,160*	169	21.5	4,040	–	–
Dieldrin	4.77	4.71	1.11	–	–	<1.39

*Two-thirds of this amount (3,470 kg) was discharged during the 3-month period, October to December.

Table 4. Combined annual mass emission rates of southern California's four largest municipal wastewater dischargers, 1971 – 1974.

Year	1971	1972	1973	1974
Flow (mgd)*	931	922	955	967
General Constituents (metric tons/yr)				
Total Suspended Solids	288,000	279,000	270,000	264,000
Volatile Suspended Solids	203,000	196,000	186,000	182,000
5 day BOD	283,000	250,000	217,000	222,000
Oil and Grease	62,500	60,600	57,400	54,700
Ammonia Nitrogen	56,600	39,900	45,900	37,000
Trace Metals (metric tons/yr)				
Silver	17.7	21.2	29.0	21.7
Cadmium	57.3	33.8	49.3	55.4
Chromium	676	673	695	690
Copper	559	485	509	575
Nickel	339	273	318	314
Lead	243	226	180	199
Zinc	1,880	1,210	1,360	1,320
Chlorinated Hydrocarbons (kg/yr)**				
Total DDT	21,700	6,600	4,120	2,120
Total PCB	8,730	9,830	4,620	9,390
Dieldrin	18.0	84.4	288	10.6

*1 mgd = 3,780 cu m per day.

**Point Loma Treatment Plant monitored only total DDT in 1974. 1971 Dieldrin values are for Hyperion only; 1974 values are for Hyperion and JWPCP.