

CHARACTERISTICS OF MUNICIPAL WASTEWATER DISCHARGES, 1977

Municipal wastewater discharges are the principal source of most pollutants entering southern California waters as a result of human activity. The 1977 flow from the five major discharges averaged 966 million gallons per day (3,660 million liters/day) and contained an average of 650 metric tons of solids per day. In this annual tabulation of the kind and quantity of material discharged, the Project uses the monitoring data that each discharger submits to the State of California. Except for a yearly analysis of chlorinated hydrocarbons in the effluents that the Project performs as part of a laboratory intercalibration effort, we do not attempt to check the discharger's data. In the main, we believe that these data fairly reflect the concentrations and mass emissions of materials discharged.

The data for 1977 are summarized in three tables. The flow of various kinds of effluent is itemized in Table 1. Table 2 gives 1977 annual average concentrations of important waste constituents; the calculated 1977 mass emission rates for the same constituents are listed in Table 3.

Finally, in Table 4, total mass emissions of constituents of particular interest in the years 1971 through 1977 are given.

There were several differences between the 1976 and 1977 values:

- As a group, the five major dischargers showed a 60 million gallon/day (mgd) reduction in the amount of effluent discharged. This reduction may reflect water conservation efforts in a year of drought.
- The combined suspended solids emission of the five dischargers was 18 percent lower in 1977 than in 1976. Los Angeles County Sanitation Districts, which installed new sludge dewatering centrifuges in late 1976, had the largest reduction: Suspended solids emissions for this discharger were 27 percent lower in 1977 than in 1976. Emissions of many of the particulate-associated constituents were reduced by 10 to 30 percent in 1977. •Reductions included the following: Oil and grease, 31 percent; cadmium, 6 percent; chromium, 38 percent; copper, 20 percent; nickel, 14 percent; lead, 0 percent; and zinc, 11 percent.
- The Project's analyses for the chlorinated hydrocarbons revealed a 28 percent reduction in total DDT emissions between 1976 and 1977 and a 34 percent reduction in emissions of total PCB over the same period.
- Emissions of only one of the constituents measured increased dramatically between 1976 and 1977: The 1977 value for silver was 170 percent of the 1976 value. The mass emission rates for silver have fluctuated for several years, but the 34-metric-ton value for 1977 was 5 metric tons greater than the values for any of the past 7 years.

Discharger	Agency	Flow (mgd)	Nature of Effluent	% of Total Flow
Joint Water Pollution Control Plant (JWPCP)	Los Angeles County Sanitation Districts	335	Primary	33.3
		1.9	Digested Sludge	0.2
			Centrate	
Hyperion Plant	City of Los Angeles Bureau of Sanitation	219	Primary	21.8
		100	Secondary	9.9
		1.4	Digested Sludge	0.1
Orange County Plants	Orange County Sanitation Districts	160	Primary	16.0
		20	Secondary	1.9
Point Loma Plant	City of San Diego	116	Primary	11.5
Oxnard Plant	City of Oxnard	11.2	Primary	1.1
Other (about 20)	Various	20	Primary	1.9
		20	Secondary	1.9
Total		1,005		100

Table 1. Municipal waste-water discharged to southern California coastal waters, 1977.

Table 2. Average concentrations of general constituents, trace metals, and chlorinated hydrocarbons in the final effluent of municipal waste dischargers, 1977 (ND means "no data").

	JWPCP	Hyperion 5-mile	7-mile	Orange County	Point Loma	Oxnard
Flow						
mgd	335	319	4.6	180	116	11.2
liters/day x 10 ⁶	1,268	1,207	17.4	681	439	42.39
General constituents (mg/liter)						
Total suspended solids	220	62	8,100 ^a	132	128	98.0
5-day BOD	220	145	ND	197	167	258
Oil and grease	46.1	19	584	42	33.4	23.3
Ammonia nitrogen	39.0	17.2	259	36	23.8	20.5
Total phosphate—P	13.0	7.6	189	ND	ND	ND
Detergent (MBAS)	6.3	4.2	ND	ND	4.0	ND
Cyanide (CN)	0.24	0.14	0.70	0.11	0.05	0.03
Phenols	3.3	0.06	0.56	0.12	0.19	0.15
Trace metals (mg/liter)						
Silver	0.008	0.03	1.89	0.01	0.017	0.009
Arsenic	0.009	0.01	0.20	0.06	0.013	0.006
Cadmium	0.025	0.02	1.30	0.04	0.017	0.009
Chromium	0.38	0.13	12.8	0.18	0.055	0.025
Copper	0.25	0.20	15.5	0.32	0.125	0.125
Mercury	0.001	0.021	0.132	0.0005	0.001	0.0015
Nickel	0.24	0.18	4.1	0.13	0.08	0.210
Lead	0.19	0.03	2.15	0.09	0.06	0.050
Selenium	0.016	0.01	1.68	ND	ND	ND
Zinc	0.84	0.32	28.0	0.40	0.17	0.18
Chlorinated hydrocarbons (ug/liter)						
Discharger values ^b						
Total DDT	1.58	0.20	3.65	0.05	ND	ND
Total PCB	1.81	2.13	35.4	0.73	ND	ND
Total identifiable chlorinated hydrocarbons					2.3	
Project values ^c						
Total DDT	1.58	0.02	1.1	0.02	0.13	0.05
Total PCB	0.68	0.15	16	4.0	0.52	0.06

a. Total solids, suspended and dissolved.

b. Based on analysis of one grab sample per month, except for JWPCP total DDT value, which was based on analysis of 52 weekly composite sample.

c. Based on analysis of two 1-week composite samples.

Table 3. Mass emission rates of general constituents, trace metals, and chlorinated hydrocarbons in final effluent of municipal wastewater dischargers, 1977 (ND means "no data").

	JWPCP	Hyperion		Orange County	Point Loma	Oxnard
		5-mile	7-mile			
Flow						
gallons/yr $\times 10^9$	335	319	4.6	180	116	11.2
liters/yr $\times 10^9$	462.8	441	6.36	247	160	15.47
General constituents (metric tons/year)						
Total suspended solids	102,000	27,300	51,500 ^a	33,300	20,500	1,500
5-day BOD	102,000	63,900	ND	47,900	26,700	3,900
Oil and grease	21,300	8,380	3,700	10,100	5,340	360
Ammonia nitrogen	18,000	7,590	1,650	9,830	3,810	317
Total phosphate-P	5,500	3,350	1,200	ND	ND	ND
Detergent (MBAS)	2,900	1,850	ND	ND	640	ND
Cyanide (CN)	111	61.7	4.4	29	<8	0.5
Phenols	1,530	26.5	3.56	24.7	31.5	2.40
Trace metals (metric tons/year)						
Silver	3.70	13.25	12.0	2.47	2.7	0.14
Arsenic	4.16	4.41	1.27	ND	2.1	0.09
Cadmium	11.6	8.82	8.27	10.9	2.7	0.14
Chromium	176	57.3	81.4	42.0	8.8	0.39
Copper	116	88	98.6	81.5	20	1.95
Mercury	0.462	0.926	0.84	0.37	0.16	0.023
Nickel	111	79.4	26.1	32.1	12.8	3.25
Lead	87.8	13.2	13.7	23.4	12.8	0.77
Selenium	7.39	4.4	10.7	ND	ND	ND
Zinc	388	141	178	101	27	1.7
Chlorinated hydrocarbons (kg/yr)						
Discharger values ^b						
Total DDT	730	88	23	14.1		ND
Total PCB	838	939	226	180		ND
Total identifiable chlorinated hydrocarbons					364	
Project values ^c						
Total DDT	730	8.8	7	6	21	0.8
Total PCB	314	67	108	986	83	0.8

a. Total solids, suspended and dissolved.

b. Based on analysis of one grab sample per month, except for JWPCP total DDT value, which was based on analysis of 52 weekly composite samples.

c. Based on analysis of two 1-week composite samples.

Table 4. Combined annual mass emission rates of southern California's five largest municipal wastewater dischargers, 1971-77 (ND means "no data").^a

	1971	1972	1973	1974	1975	1976	1977
Flow							
mgd	931	922	955	967	985	1,027	966
liters/day x 10 ⁶	3,524	3,490	3,615	3,380	3,728	3,889	3,658
General constituents (metric tons/yr)							
Total suspended solids	288,000	279,000	270,000	264,000	287,000	288,000	236,000
5-day BOD	283,000	250,000	217,000	222,000	237,000 ^b	259,000 ^b	244,000
Oil and grease	62,500	60,600	57,400	54,700	57,420	59,100	41,000
Ammonia nitrogen	56,600	39,900	45,900	37,000	38,620	37,350 ^b	41,200
Trace metals (metric tons/year)							
Silver	17.7	21.1	29.0	21.7	25.7	20.2	34.3
Arsenic	ND	ND	ND	20.9 ^c	11.9 ^c	10.5 ^c	12.0
Cadmium	57.3	33.8	49.3	55.4	50.0	45.0	42.4
Chromium	676	673	695	690	580	593.0	366
Copper	559	485	509	575	511	507	407
Mercury	ND	ND	ND	3.09 ^c	2.24 ^c	2.55 ^c	2.78
Nickel	339	273	318	314	234	307 ^b	264
Lead	243	226	180	199	198	191	152
Selenium	ND	ND	ND	17.75 ^d	16.9 ^d	22.0 ^d	23.0 ^d
Zinc	1,880	1,210	1,360	1,320	1,142	1,064	937
Chlorinated hydrocarbons (kg/yr)							
Discharger values							
Total DDT	21,700	6,600	4,120	2,120	1,989	1,673	1,219
Total PCB	8,730	9,830	4,620	9,390	6,011	4,310	2,183
Project values ^e							
Total DDT	21,600 ^f	6,540	3,830	1,570	1,150	970	770
Total PCB	ND	>19,490	>3,390	5,420	3,070	2,820	1,560

a. Oxnard included only in 1975 through 1977 data.

b. Hyperion 7-mile effluent excluded.

c. Orange County data not included.

d. Total for Hyperion and JWPCP only.

e. 1976 and 1977 data based on analysis of 1-week composites; 1971-75 data taken from Final report to EPA for Grants R801153 and R803707.

f. JWPCP only.