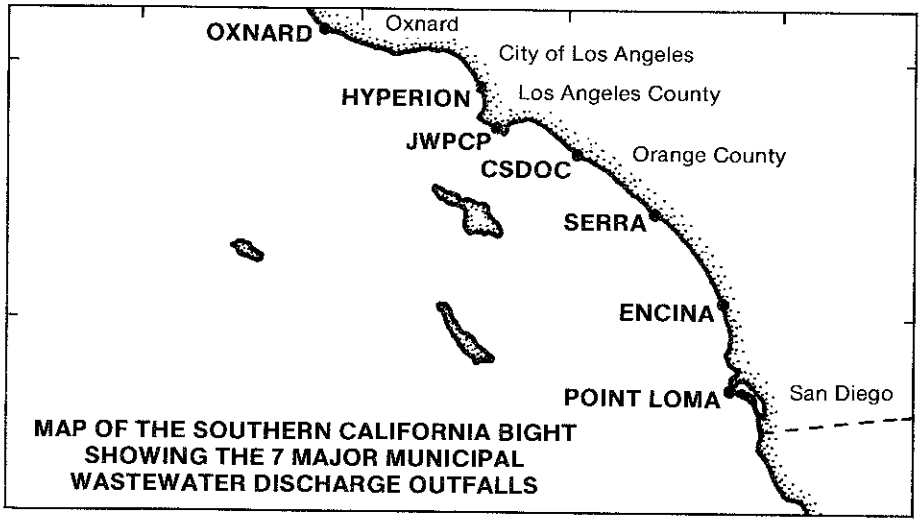
CHARACTERISTICS OF MUNICIPAL WASTEWATER IN 1984 AND 1985

This report summarizes the monitoring data for 1984 and 1985 reported to the State of California's Regional Water Quality Control Boards by seven of the 13 municipal treatment plants that discharge into southern California coastal waters. The seven plants are operated by the municipalities and sanitation districts that provide funding for the Southern California Coastal Water Research Project (SCCWRP).

Four of the seven dischargers represent the largest facilities in southern California: Hyperion, 393 million gallons per day (mgd); the Joint Water Pollution Control Plant (JWPCP), 362 mgd; Orange County Sanitation Plant #2, 232 mgd; and the Point Loma Treatment Plant, 156 mgd. These flows constitute approximately 85 percent of the total municipal effluent discharged in southern California coastal waters. The remaining three dischargers are Oxnard, 18 mgd; Encina, 14 mgd, and the South East Regional Reclamation Authority (SERRA), 10 mgd. The locations of the discharge outfalls and the names of the sponsoring municipalities are provided in Figure 1. The flows and degree of treatment provided by the plants are shown in Table 1.



OUTFALL NAME	SPONSOR	LENGTH OF DISCHARGE PIPE(S) (m)	AVERAGE DISCHARGE DEPTH
•OXNARD	Ventura County Sanitation Districts	1,585 m	15 m
•HYPERION	Los Angeles City Bureau of Sanitation	11,200 m "7-mile pipe" 9,600 m "5-mile pipe"	100 m 57 m
•JWPCP	Los Angeles County Sanitation Districts	2,800 m 90-in 365 m 120-in	60 m 60 m
•CSDOC	Orange County Sanitation Districts	8,350 m	55 m
•SERRA	South East Regional Reclamation Authority	2,650 m	50 m
•ENCINA	Encina Water Pollution Control Facility	1,238 m	45 m
•POINT LOMA	City of San Diego	4,000 m	60 m

Figure 1. Locations of the seven dischargers summarized in this report.

	HYP	JWP	OCS	PTL
Primary	292	183	94	156
Secondary	97	179	138	
Dilute Sludge	4			
	OXN	**ENC**	**SER**	**TOTAL**
Primary		11	12.5	742
Secondary	18	5		443
Dilute Sludge				4
			total flow	1190

Table 1. Treatment & Flows (in millions of gallons/day for seven outfalls)

The 1984 and 1985 average concentrations and mass emissions, calculated by SCCWRP environmental specialist Henry Schafer from the monitoring data, are shown in Tables 2 through 5.

Several significant changes in plant capacity and treatment capability have occurred since the last SCCWRP report in 1984. JWPCP began operation of its new secondary facilities in November of 1983; by 1985, these facilities were treating an average of 179 mgd. The advanced treatment and improved sludge dewatering centrifuges have helped to reduce suspended solids emissions at Palos Verdes by more than 50 percent since 1983.

However, hydraulic overloading, increasing flow, rehabilitation construction and new construction at the Hyperion treatment plant have reduced the quality of effluent discharged to Santa Monica Bay through the five mile outfall, resulting in a 50 percent increase in suspended solids between 1983 and 1985.

The Encina treatment plant began discharging under its 301(h) waiver permit in July 1985 and has since discharged an average of 5 mgd of primary effluent.

Overall, the long term trend in the combined discharges of increasing flow and decreasing contaminant concentrations and mass emissions continued in 1984 and 1985 (Figures 2 through 5 and Table 6). Specific changes since 1983 in the combined discharges include:

1. The combined discharges increased by 25 mgd since 1983. A 20 mgd decrease in flow at the Hyperion five mile outfall was offset by 10 mgd increases at JWPCP and Orange County and a 25 mgd increase at Point Loma.

2. Suspended solids were reduced by 17 percent. The 50 percent increase at the Hyperion five mile outfall was offset by decreases at all other major outfalls.

3. Oil and grease emissions in 1984 were the lowest since before 1971. However, they increased by 10 percent in 1985 because of increased values at the Hyperion five mile outfall.

4. Seven of the 10 trace metal emissions were at their lowest levels since before 1971. Copper and selenium decreased approximately five percent; mercury decreased 17 percent; cadmium, chromium, nickle and zinc decreased approximately 30 percent.

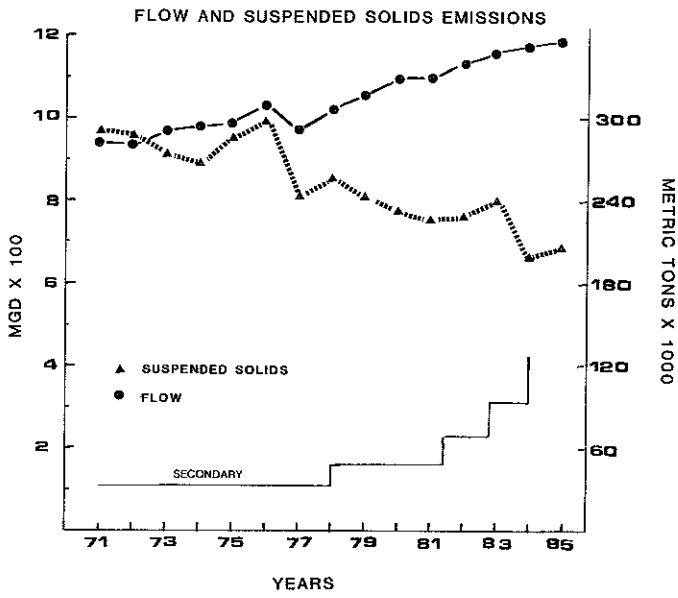
	JWPCP	HYP5	HYP7	CSDOC	POINT LOMA	OXNARD	ENCINA	SERRA
FLOW (MGD)	351	404	4.48	230	140	18.9	14.4	12.7
Sus. Sol.	103	118	7800*	49.1	90.2	32.1	7.41	8.6
Set. S.	0.4	1.5	---	0.5	0.5	0.1	0.1	0.1
B.O.D.	146	183	---	97	133	31	30	19
O&G	16	19	442	13	24	5.3	2.3	1.7
NO3-N	<0.10	<0.5	---	---	---	4.3	---	---
NO2-N	<0.01	0.11	---	---	---	0.69	---	---
NH3-N	37	14	216	25	27	8.3	19	1.6
Org-N	11.4	8.7	344	---	---	5.6	---	---
Tot-N	---	---	---	32.5	---	---	---	---
Tot-P	8.8	6.8	177	---	---	---	---	---
MBAS	4.63	3.49	---	---	1.91	---	---	---
CN^-	0.04	0.02	0.14	0.02	0.006	---	0.04	0.04
Phenols	1.95	0.047	0.39	0.039	0.056	0.015	0.012	0.02
Turb (JTU)	78	78	---	67	73	18	4.6	2.7
C.O.D.	428	---	---	---	---	---	43.8	---
Tox (TU)	2.35	3.86	---	0.74	1.06	0	0.93	---
Ag	0.009	0.015	0.53	0.014	0.018	<0.007	0.003	0.02
As	0.020	0.01	0.12	0.004	0.004	<0.002	0.002	<0.01
Cd	0.008	0.009	0.51	0.007	0.009	0.008	0.001	<0.01
Cr	0.11	0.07	3.99	0.048	0.035	<0.01	0.002	0.02
Cu	0.089	0.14	8.6	0.167	0.116	0.047	0.027	0.04
Hg	0.0006	0.0004	0.034	0.0003	0.0004	<0.002	0.0001	0.0008
Ni	0.11	0.07	1.65	0.06	0.057	0.059	0.007	<0.01
Pb	0.05	0.05	2.12	0.04	0.047	<0.05	0.007	0.32
Se	0.013	<0.005	0.022	---	---	---	---	---
Zn	0.27	0.16	10	0.16	0.18	0.06	0.08	0.06
DDT (µg/l)	0.48	0.03	0.21	0.15	0.03	---	---	---
PCB (µg/l)	0.63	<0.2	1.22	2.81	<0.001	<1.0	---	---
TICH (µg/l)	1.89	0.13	4.29	2.81	0.20	<1.0	<1.0	---

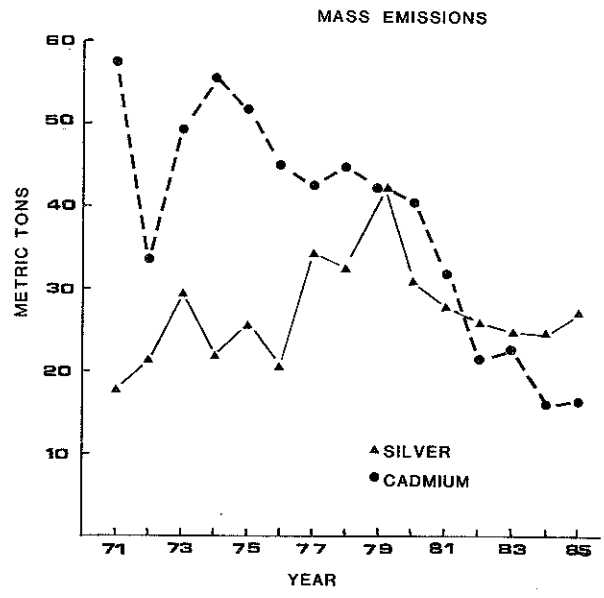
***Total Solids**

Table 2. 1984 effluent concentrations in mg/L, except as noted.

	JWPCP	HYP5	HYP7	CSDOC	POINT LOMA	OXNARD	ENCINA	SERRA
FLOW $(L/Yr \times 10^9)$	485	558	6.19	315	193	26.1	19.9	17.5
Sus. Sol.	50000	65800	48300	15500	17400	838	147	150
B.O.D.	70800	102000	---	30600	25700	822	597	333
O&G	7860	10600	2740	4220	4550	138	45.2	29.8
NO3-N	<48.5	<279	---	---	---	112	---	---
NO2-N	<4.85	61	---	---	---	18	---	---
NH3-N	17900	8020	1340	7840	5170	217	370	28
Org-N	5530	4870	2130	---	---	147	---	---
Tot.-P	4270	3780	110	---	---	---	---	---
MBAS	2250	1950	---	---	369	---	---	---
CN^-	19.4	8.93	0.87	6.93	1.24	---	0.80	0.70
Phenols	946	26.2	2.41	12.2	10.8	0.39	0.23	0.35
Ag	4.46	8.34	3.29	4.41	3.47	<0.18	0.06	0.35
As	9.55	5.58	0.74	1.35	0.73	<0.05	0.04	<0.18
Cd	3.78	5.02	3.16	2.17	1.74	0.21	0.03	<0.18
Cr	53	39	25	15	6.8	<0.26	0.05	0.35
Cu	43.2	78.1	53.3	52.6	22.4	1.23	0.54	0.70
Hg	0.29	0.22	0.21	0.11	0.09	<0.05	<.01	0.01
Ni	53	39	10	19	11	1.5	0.13	<0.18
Pb	24.2	27.9	13.1	12.6	9.1	<1.3	0.14	5.6
Se	6.1	<2.8	0.14	---	---	---	---	---
Zn	131	89	62	52	35	1.5	1.7	1.1
DDT (Kg/Yr)	230	16	1.3	49	6.3	ND	---	ND
PCB (Kg/Yr)	310	<110	7.6	881	<0.2	<26	---	ND
TICH (Kg/Yr)	920	72	27	970	39	<26	<0.02	ND

Table 3. 1984 Mass Emissions (metric tons per year)

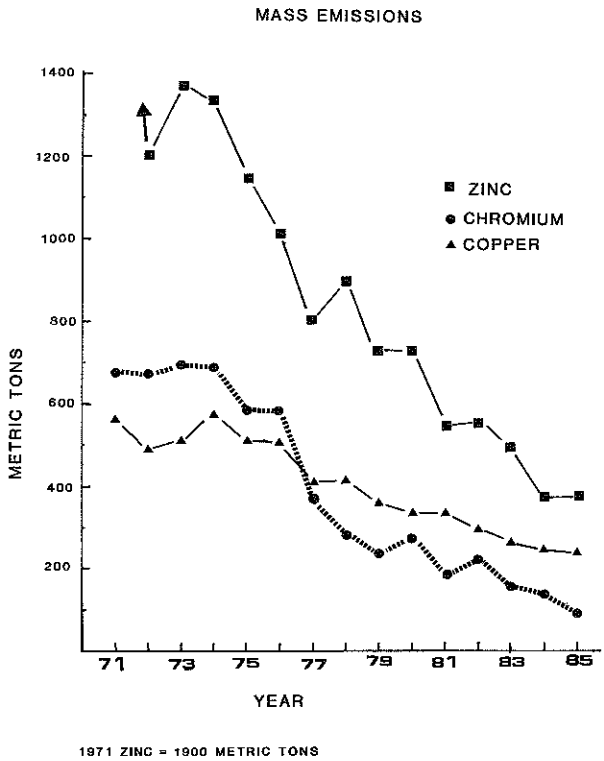


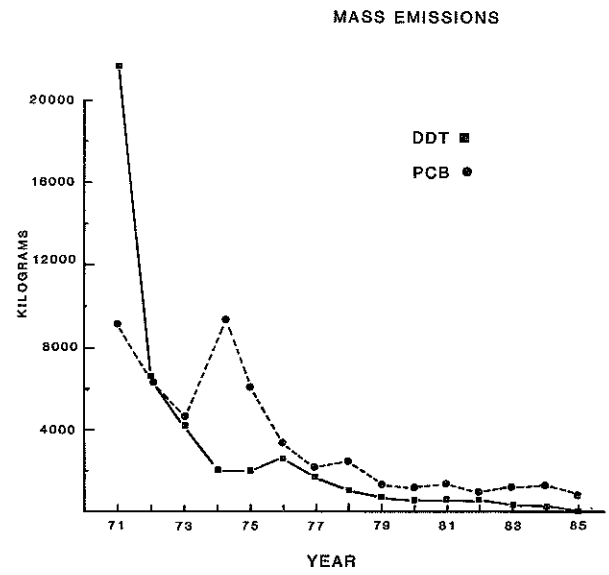


However, three of the trace metals increased in concentration. Silver values decreased slightly in 1984 but rebounded to 1981 values in 1985. Arsenic values in 1984 and 1985 are double the values in 1982-83. This increase was seen at seven of the eight outfalls SCCWRP reviewed. The widespread and consistent increase suggests that it is

	JWPCP	HYP5	HYP7	CSDOC	POINT LOMA	OXNARD	ENCINA	SERRA
FLOW (MGD)	362	389	4.04	232	156	18.5	15.3	13.5
Sus. Sol.	87	162	7900	46	70	32	20	10
Set. S.	0.4	2.5	---	0.5	0.3	0.1	0.2	<0.1
B.O.D.	126	254	---	83	127	32	28	15
O&G	14	29	408	14	23	4.9	5.3	1.8
NO3-N	1.3	<0.5	---	---	---	4.2	---	---
NO2-N	0.30	0.08	---	---	---	0.59	---	---
NH3-N	40.8	16.6	273	24.9	25.1	8.6	17.0	---
Org-N	11.8	11.5	375	---	---	10.1	---	---
Tot-N	---	---	---	33	---	---	---	---
Tot-P	8.2	6.7	148	---	---	---	---	---
MBAS	5.7	4.2	---	<.001	---	---	---	---
CN^-	0.020	0.026	0.12	---	0.006	0.008	<0.035	---
Phenols	1.46	0.045	0.17	0.048	0.044	0.021	<0.002	---
Turb (JTU)	68	80	---	45	64	19	12	4
Tox (TU)	2.25	1.51	---	0.12	---	0	0.98	---
Ag	0.010	0.026	0.3	0.012	0.009	<0.01	.001	---
As	0.013	0.012	0.2	0.002	.004	.007	.004	---
Cd	0.005	0.011	0.54	.009	0.009	0.013	<.001	---
Cr	0.080	0.060	3.7	0.035	0.027	<0.01	.002	---
Cu	0.067	0.20	8.7	0.099	0.080	0.058	.031	---
Hg	0.0004	0.0005	0.039	0.0004	0.0004	<0.002	0.0004	
Ni	0.080	0.080	1.73	0.046	0.050	0.051	.006	---
Pb	0.05	0.09	2.61	.04	0.08	0.03	<.01	---
Se	0.011	<0.005	0.046	<0.015	---	---	---	---
Zn	0.19	0.28	10.5	0.16	0.09	.07	.06	---
DDT (µg/l)	0.1	0.2	0.2	0.03	<0.01	---	---	---
PCB (µg/l)	0.2	0.1	3.6	2.1	<0.1	<1	<1	---
TICH (µg/l)	0.41	.13	6.7	---	.26	<1	<1	---

Table 4. 1985 Effluent (concentrations in mg/L, except as noted)





	JWPCP	HYP5	HYP7	CSDOC	POINT LOMA	OXNARD	ENCINA	SERRA
FLOW (L/year x 10^9)	500	537	5.58	320	216	25.6	21.1	18.6
Sus. Sol.	43500	87000	44100	14600	15100	828	425	196
SET. S.	---	---	---	---	64.7	---	---	<1.9
B.O.D.	63000	136000	---	26600	27400	815	583	280
O&G	6850	15600	2280	4460	5000	125	110	34
NO3-N	635	268	---	---	---	108	---	---
NO2-N	150	43	---	---	---	15	---	---
NH3-N	20400	8890	1520	7980	5420	220	360	
Org-N	5900	6190	2090	---	---	258	---	---
Tot-N	---	---	---	10580	---	---	---	---
Tot-P	4100	3620	826	---	---	---	---	---
MBAS	2850	2280	---	---	---	---	---	---
CN-	10	14	0.67	0.06	1.3	0.2	<0.74	---
Phenol	730	24.2	0.95	15.4	9.49	0.54	<0.04	---
Ag	5.15	14.0	1.67	3.91	2.05	0.26	0.02	---
As	6.6	6.4	1.1	0.64	0.84	0.17	0.82	---
Cd	2.55	5.91	3.01	2.79	1.94	0.33	0.01	---
Cr	40	32	21	11	5.8	<0.3	0.03	---
Cu	33.5	107	48.5	31.7	17.3	1.5	0.6	---
Hg	0.20	0.27	0.22	0.13	0.09	0.05	0.01	---
Ni	40	43	9.7	15	11	1.3	0.1	---
Pb	25	48	15	12	17	0.8	0.06	---
Se	5.5	2.7	0.3	4.8	---	---	---	---
Zn	95	150	59	52	19	1.7	1.4	---
DDT (Kg/Yr)	50	11	1.1	11	< 2.2	---	---	---
PCB (Kg/Yr)	80	54	22	660	2.2	<26	---	---
TICH (Kg/Yr)	200	70	37		56	<26	---	---

Table 5. 1985 Mass Emission (Metric Tons/year)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Flow															
MGD	931	922	955	967	985	1,027	966	1,015	1,054	1,097	1,097	1,134	1,166	1174	1190
L day x 10^9	3,524	3,490	3,615	3,360	3,728	3,889	3,658	3,840	4,000	4,160	4,160	4,292	4,414	4444	4504
General Constituents (mt/year)															
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	227,000	247,000	198,000	205,000
5-Day BOD	283,000	250,000	217,000	222,000	237,000b	259,000b	244,000	237,000b	246,000b	260,000b	264,000b	269,000b	256,000b	230,000	255,000
Oil and grease	63,500	60,600	57,400	54,700	57,400	59,100	49,000	49,000	45,000	39,000	37,000	31,900	36,300	30,200	34,300
NH3-N	56,600	39,900	45,900	37,000	36,620	37,350b	41,200	39,500	41,200	42,000b	41,000b	44,000	40,600b	40,800	44,200
Trace metals (mt/year)															
Silver	17.7	21.1	29.0	21.7	25.7	20.2	34.3	32.3	42.2	30.8	27.9	25.9	25.6	24.5	27
Arsenic	ND	ND	ND	20.9c	11.9c	10.5c	14.0	14.5	15.4	10.6	12.2	8.7	10.1	18.1	15.8
Cadmium	57.3	33.8	49.3	55.4	50.0	45.0	42.4	44.8	42.3	39.5	31.7	21.2	23.6	16.2	16.5
Chromium	676	673	695	690	580	593.0	366	280	237	275	187	203	164	140	110
Copper	559	485	509	575	511	507	412	417	359	336	339	286	247	252	240
Mercury	ND	ND	ND	3.1c	2.2c	2.6c	2.8	1.9	2.5	1.9	1.8	1.2	1.2	1	1
Nickel	339	273	318	314	234	307	264	320	256	224	167	169	165	134	120
Lead	243	226	180	199	196	191	152	219	223	175	130	123	98.7	94	120
Selenium	ND	ND	ND	17.75b	16.9d	22.0d	23.0d	23.0d	7.7d	10.5d	15.3d	9d	10d	9d	13.3
Zinc	1,880	1,210	1,360	1,320	1,142	1,064	837	905	724	730	540	549	505	374	377
Chlorinated Hydrocarbons (kg/year)															
Total DDT	21,700	6,600	4,120	2,120	1,989	1,673	920	1,110	760	644	474	289	218	306	73
Total PCB	8,730	9,830	4,620	9,390	6,011	4,310	2,183	2,510	1,190	1,129	1,250	857	1,440	1,340	891

a Oxnard included only since 1975. Serra and Encina included since 1982.
b Hyperion 7-mile effluent excluded.
c CSDOC data not included.
d Total for Hyperion and JWPCP only.

Table 6. Combined Annual Mass Emission Rates for Seven Southern California Municipal Wastewater Dischargers, 1971-1985

real; however, the low concentrations (below drinking water standards), small total emission and relatively high natural concentrations in seawater do not indicate that the increase should cause great concern at this time. The third metal, lead, reached its lowest emission level in 1984 since before 1971 but increased by 25 percent in 1985 because of a tripling of the emission through the Hyperion five mile outfall.

5. DDT continued its geometric decrease to 30 percent of its 1983 level, in part because of improved detection limits at JWPCP. PCBs decreased 35 percent since 1982.