

CHAPTER 2

EFFLUENT QUALITY

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INTRODUCTION

The goal of the Hyperion Treatment Plant (HTP) effluent monitoring program is to characterize the physical and chemical properties of treated wastewater discharged into Santa Monica Bay. The effluent monitoring data, in conjunction with receiving water monitoring data, are used to assess the effects of effluent disposal on the physical, chemical, and biological aspects of the receiving waters. HTP's NPDES Permit provides guidelines referred to as Ocean Discharge Criteria to prohibit discharges of chemicals that could cause degradation of the local marine environment and marine recreational areas.

HTP has a design capacity of 450 million gallons per day (MGD), and receives wastewater from the Los Angeles area and excess flow from the San Fernando Valley. The plant also receives solids from primary and secondary treatment processes from the Donald C. Tillman and Los Angeles-Glendale Water Reclamation Plants. The solids from these upstream plants are discharged into sewer lines transporting wastewater to HTP. Most of the sewage treated at Hyperion is domestic in nature. Approximately, 21% of the wastewater flow is from industrial/commercial discharge.

During the period from January 2003 through December 2004, HTP discharged an average of 317 MGD of treated wastewater into Santa Monica Bay through the 5-Mile Outfall. The

effluent released had received complete secondary treatment. Beginning in November 1998, 100% of HTP's effluent underwent full secondary treatment. Prior to 1998, HTP discharged a mixture of advanced primary treated effluent and secondary treated effluent. Due to the design of the diffuser, at the terminus of the 5-Mile Outfall, the effluent is diluted a minimum of 84:1 in the zone of initial dilution (ZID).

This chapter reports the concentrations of the HTP effluent constituents from January 2003 through December 2004 and summarizes trends in effluent quality from 1986 to 2004. It should be noted that some of the historical reporting periods shown in this chapter cover fiscal year data, while the recent reporting periods summarize calendar years. Table 2-1 lists constituents measured in the 5-Mile Outfall effluent under HTP's NPDES effluent monitoring program. Data for this reporting period is divided into separate tables for each year when necessary. Compounds listed in Tables 2-2a and 2-2b are grouped into three categories: 1) conventional constituents and nutrients, 2) inorganic priority pollutants, and 3) organic priority pollutants. Data pertaining to residual chlorine, radioactivity, effluent toxicity, and other constituents are discussed individually. All of these categories are discussed below in terms of contaminants found and their concentrations in effluent relative to current NPDES permit limits

Table 2-1. Constituents measured in the 5-Mile Outfall effluent monitoring program.

Constituent	Units of Analysis	Frequency of Analysis	Sample Type	Method*
BOD	mg/L	daily	24-hour composite	5210B
Oil & Grease	mg/L	weekly	3 grab samples	EPA 1664A
Total Organic Carbon	mg/L	weekly	24-hour composite	5310B
Suspended Solids	mg/L	daily	24-hour composite	2540D
Fecal Coliforms	#/100mL	5 times/month	grab	9222D
Total Coliforms	#/100mL	daily	grab	9222D
Enterococcus	CFU	daily	grab	9230C
Settleable Solids	mL/L	daily	grab & composite	2540F
Turbidity	NTU	weekly	24-hour composite	2130B
Dissolved Oxygen	mg/L	weekly	grab	4500-O C
Total Chlorine Residual	ug/L	daily	grab	4500-Cl C
Toxicity Concentration (Acute)	TU _a	monthly	24-hour composite	**
Toxicity Concentration (Chronic)	TU _c	monthly	24-hour composite	**
Radioactivity	pCi/mL	twice/month	24-hour composite	EPA9310
Nitrate-Nitrogen	µg/L	monthly	24-hour composite	4500-NO3-E
Ammonia-Nitrogen	µg/L	monthly	24-hour composite	4500-NH3-B&E
Floating particulates	mg/L	monthly	24-hour composite	2530 B
Flow	MGD	continuous	recorder/totalizer	
Temperature	°C	twice daily	grab	
pH	pH units	daily	24-hour composite	4600-H+
Arsenic	µg/L	monthly	24-hour composite	3030G, 3114B
Cadmium	µg/L	monthly	24-hour composite	3030H, 3120B
Chromium (hexavalent)	µg/L	monthly	24-hour composite	3500-Cr D, 3030G
Chromium (total)	µg/L	quarterly	24-hour composite	3030H, 3120B
Copper	µg/L	monthly	24-hour composite	3030H, 3120B
Lead	µg/L	monthly	24-hour composite	3030H, 3113B
Mercury	µg/L	monthly	24-hour composite	3030G, 3112B
Nickel	µg/L	monthly	24-hour composite	3030H, 3120B
Selenium	µg/L	monthly	24-hour composite	3030G, 3114B
Silver	µg/L	monthly	24-hour composite	3030H, 3113B
Zinc	µg/L	monthly	24-hour composite	3030H, 3120B
Tributyltin	ng/L	quarterly	24-hour composite	
Cyanide	µg/L	monthly	grab	EPA 335.4
Organic Nitrogen	µg/L	monthly	24-hour composite	4500-N-ORG
Total Phosphorus (as P)	µg/L	monthly	24-hour composite	4500-P E
Phenolic Compounds (non-chlorinated)	µg/L	quarterly	24-hour composite	EPA 625
Chlorinated Phenolics	µg/L	quarterly	24-hour composite	EPA 625
Aldrin and Dieldrin	µg/L	monthly	24-hour composite	EPA 608
Chlordane and Related compounds	µg/L	monthly	24-hour composite	EPA 608
DDT and Derivatives	µg/L	monthly	24-hour composite	EPA 608
Endrin	µg/L	monthly	24-hour composite	EPA 608
HCH's	µg/L	monthly	24-hour composite	EPA 608
PCB's	µg/L	monthly	24-hour composite	EPA 608
Toxaphene	µg/L	monthly	24-hour composite	EPA 608
Detected Priority Pollutants				
Volatiles	µg/L	monthly	3 grab samples	EPA 624
Others	µg/L	monthly	24-hour composite	***
Remaining Priority Pollutants				
Volatiles	µg/L	monthly	3 grab samples	EPA 624
Others	µg/L	quarterly	24-hour composite	***

* All methods are from Standard Methods, 20th Edition (APHA 1998) unless otherwise specified.
EPA Methods are: 335.4 (EPA 1993), 608 (EPA 1984), 624 (EPA 1984), 625 (EPA 1984), 1664A (EPA 1999), 9310 (EPA 1986).

** Acute toxicity is measured as described under EPA/600/4-85/013. Chronic toxicity is measured using EPA methods 600/4-87/028 and Anderson (90-10WQ) Marine Bioassay Project.

*** Chlorinated pesticides and base/neutral/acid extractable compounds are analyzed by EPA Method 608 and 625, respectively.

Table 2-2a. Annual averages, maximum and minimum concentrations of conventional constituents and other pollutants in the 5-Mile Outfall effluent (January 2003 through December 2003). All concentrations are reported in ug/L unless otherwise noted.

Constituents	Current NPDES Limits ^a	Concentrations in 5-Mile Effluent			Concentrations After Initial Dilution ^b			CA Ocean Plan (ug/L) Objectives ^{c,j}	
		Avg.	Max.	Min.	Avg.	Max.	Min.		
CONVENTIONAL CONSTITUENTS AND NUTRIENTS									
Total Suspended Solids (mg/L)	30	19	33	9	0.22	0.39	0.11		
Biochemical Oxygen Demand (mg/L)	30	18e	33	4e	0.21e	0.39	0.047		
Oil & Grease (mg/L)	25	ND	4	ND	ND	0.047	ND	25	
Settleable Solids (mL/L)	1.0	ND	21	ND	ND	0.25	ND	1.0	
Total Organic Carbon (mg/L)	NL	20.0	46.3	13.8	0.24	0.55	0.16		
Phosphorus (Total) (mg/L)	NL	2.5	3.2	1.8	0.030	0.038	0.021		
Ammonia-Nitrogen (mg/L)	51	34.8	37.0	31.8	0.41	0.44	0.38	0.6	
Organic-Nitrogen (mg/L)	NL	3.7	5.6	3.0	0.044	0.067	0.036		
Nitrate-Nitrogen (mg/L)	NL	0.016	0.076	ND	0.00019	0.00089	ND		
Turbidity (NTU)	75	8.3	12.1	4.7	0.099	0.14	0.055	75	
pH	6.0-9.0	6.8	7.3	6.4	d	d	d		
PRIORITY POLLUTANT INORGANICS (ug/L):									
Antimony	NL	0.81	2.0	ND	0.01	0.023	ND	1200	
Arsenic	12	2.61	5.0	DNQ(1.1)	0.031	0.059	DNQ(0.013)	8	
Beryllium	2.8	0.034	0.171	ND	0.0005	0.002	ND	0.033	
Cadmium	21	ND	DNQ(0.16)	ND	ND	DNQ(0.002)	ND	1	
Chromium (hexavalent) ^e	113	ND	DNQ(4)	ND	ND	DNQ(0.05)	ND	2	
Chromium (total)	NL	DNQ(1.03)	DNQ(1.7)	ND	DNQ(0.01)	DNQ(0.02)	ND	190000 ^f	
Copper	87	DNQ(13.9)	18.6	DNQ(10.0)	DNQ(0.16)	0.22	DNQ(0.18)	3	
Lead	101	ND	DNQ(4.5)	ND	ND	DNQ(0.05)	ND	2	
Mercury	1.1	DNQ(0.05)	DNQ(0.18)	ND	DNQ(0.001)	DNQ(0.002)	ND		
Nickel	113	9.36	12.0	6.13	0.11	0.14	0.072	5	
Selenium	1275	DNQ(1.11)	2.0	DNQ(0.24)	DNQ(0.013)	0.024	DNQ(0.003)	15	
Silver	26	0.80	1.79	ND	0.009	0.021	ND	0.7	
Thallium	1190	DNQ(0.305)	DNQ(0.68)	ND	DNQ(0.004)	DNQ(0.008)	ND	2	
Zinc	346	DNQ(18.5)	23.6	DNQ(12.0)	DNQ(0.218)	0.278	DNQ(0.141)	20	
Tributyltin (ng/L) *		119	2.6	10.4	ND		0.031	0.122	ND 1.4
Cyanide	85	DNQ(2)	DNQ(6)	ND	DNQ(0.02)	DNQ(0.07)	ND	1	
PRIORITY POLLUTANT ORGANICS:									
PESTICIDES:									
Aldrin	0.002	ND	ND	ND	ND	ND	ND	0.022 ng/L	
Dieldrin	0.004	ND	ND	ND	ND	ND	ND	0.040 ng/L	
Endrin	0.17	ND	DNQ(0.01)	ND	ND	DNQ(0.000)	ND	0.002	
Toxaphene	0.018	ND	ND	ND	ND	ND	ND	0.210 ng/L	
DDT & Derivates (ng/L)	14	ND	ND	ND	ND	ND	ND	0.17	
HCH's	0.34	ND	ND	ND	ND	ND	ND	0.004	
Endosulfan	0.765	ND	ND	ND	ND	ND	ND	0.009	
PCB's	0.002	ND	ND	ND	ND	ND	ND	0.019 ng/L	
Chlordane & Related Compounds	0.0019	ND	ND	ND	ND	ND	ND	0.023 ng/L	
Heptachlor	0.061 ^e	ND	ND	ND	ND	ND	ND	0.05 ng/L	
Heptachlor Epoxide	NL	ND	ND	ND	ND	ND	ND	0.02 ng/L	
VOLATILE ORGANIC COMPOUNDS:									
Acrolein	18700	ND	ND	ND	ND	ND	ND	220	
Acrylonitrile	9	ND	ND	ND	ND	ND	ND	0.10	
Benzene	NL	ND	ND	ND	ND	ND	ND	5.9	
Halomethanes	NL	2.86	4.87	2.06	0.049	0.06	0.02	130	
Carbon tetrachloride	76	ND	ND	ND	ND	ND	ND	0.9	
Chlorobenzene	NL	ND	ND	ND	ND	ND	ND	570	
Chloroform	NL	5.79	7.09	3.71	0.069	0.084	0.044	130	

Table 2-2a. Continued.

Constituents	Current NPDES Limits ^a	Concentrations in 5-Mile Effluent			Concentrations After Initial Dilution ^b			CA Ocean Plan (ug/L) Objectives ^{c,d}
		Avg.	Max.	Min.	Avg.	Max.	Min.	
Vinyl Chloride	NL	ND	ND	ND	ND	ND	ND	36
1,3-Dichloropropene	NL	ND	ND	ND	ND	ND	ND	8.9
Ethylbenzene	NL	ND	ND	ND	ND	ND	ND	4100
Methylene chloride	NL	8.68	18.1	2.85	0.102	0.213	0.034	450
1,1,2,2-Tetrachloroethane	NL	ND	ND	ND	ND	ND	ND	2.3
Tetrachloroethene	NL	2.40	3.65	1.44	0.028	0.043	0.017	2.0
Toluene	NL	0.14	0.23	ND	0.002	0.003	ND	85000
1,1,1-Trichloroethane	NL	ND	ND	ND	ND	ND	ND	540000
1,1,2-Trichloroethane	NL	ND	ND	ND	ND	ND	ND	9.4
Trichloroethene	NL	ND	ND	ND	ND	ND	ND	27
1,1-Dichloroethylene	NL	ND	ND	ND	ND	ND	ND	0.9
1,2-Dichloroethane	NL	ND	ND	ND	ND	ND	ND	28
Dichlorobromomethane	NL	1.350	1.672	0.921	0.016	0.020	0.011	6.2
Chlorodibromomethane	NL	1.547	2.263	0.995	0.018	0.027	0.012	8.6
ACID EXTRACTABLE COMPOUNDS:								
Non-Chlorinated Phenolic Compounds	NL	ND	ND	ND	ND	ND	ND	30
2,4-Dinitrophenol	340	ND	ND	ND	ND	ND	ND	4.0
4,6-Dinitro-2-Methyl Phenol	NL	ND	ND	ND	ND	ND	ND	220
Chlorinated Phenolic Compounds	85	0.047	0.187	ND	0.001	0.002	ND	1
2,4,6-Trichlorophenol	25	ND	ND	ND	ND	ND	ND	0.29
BASE AND NEUTRAL EXTRACTABLE COMPOUNDS:								
PAHs	0.748	ND	ND	ND	ND	ND	ND	8.8 ng/L
Fluoranthene	1270	ND	ND	ND	ND	ND	ND	15
Benzidine	0.006	ND	ND	ND	ND	ND	ND	0.069 ng/L
Bis (2-chloroethyl) ether	4	ND	ND	ND	ND	ND	ND	0.045
Bis (2-chloroethoxy) methane	374	ND	ND	ND	ND	ND	ND	4.4
Bis (2-chloroisopropyl) ether	NL	ND	ND	ND	ND	ND	ND	1200
Bis (2-ethylhexyl) phthalate	297	ND	3.9	ND	ND	0.046	ND	3.5
Di-n-butyl phthalate	NL	ND	ND	ND	ND	ND	ND	3500
1,4-Dichlorobenzene	NL	ND	1.67	ND	ND	0.020	ND	18
3,3-Dichlorobenzidine	0.688	ND	ND	ND	ND	ND	ND	0.0081
Diethyl phthalate	NL	ND	ND	ND	ND	ND	ND	33000
Dimethyl phthalate	NL	ND	ND	ND	ND	ND	ND	820000
2,4-Dinitrotoluene	221	ND	ND	ND	ND	ND	ND	2.6
Hexachlorobenzene	0.018	ND	ND	ND	ND	ND	ND	0.21 ng/L
Hexachlorobutadiene	NL	ND	ND	ND	ND	ND	ND	14
Hexachlorocyclopentadiene	4930	ND	ND	ND	ND	ND	ND	58
Isophorone	NL	ND	ND	ND	ND	ND	ND	730
Nitrobenzene	416	ND	ND	ND	ND	ND	ND	4.9
N-Nitrosodimethylamine	620	ND	ND	ND	ND	ND	ND	7.3
N-Nitrosodiphenylamine	212	ND	ND	ND	ND	ND	ND	2.5
N-Nitrosodi-N-propylamine	NL	ND	ND	ND	ND	ND	ND	0.38
Hexachloroethane	212	ND	ND	ND	ND	ND	ND	2.5
1,2-Diphenylhydrazine ^h	14	ND	ND	ND	ND	ND	ND	0.16
Dichlorobenzenes ⁱ	NL	ND	ND	ND	ND	ND	ND	5100
OTHERS:								
2,3,7,8-Dioxin (pg/L) * *	0.4	ND	ND	ND	ND	ND	ND	0.0039 pg/L
Residual Chlorine (mg/L)	0.17	ND	0.1	ND	ND	0.002	ND	0.002
a	TSS, BOD, O&G and settleable solids limit based on 30-day average concentration. All others are based on monthly average concentration.							
b	Calculated values based on a minimum initial dilution of 84 parts seawater + effluent to 1 part effluent.							
c	For O&G and settleable solids based on 30-day avg. concentration. All others are based either on 30-day avg. or 6-month median.							
d	Not applicable: The concept of dilutions does not apply to pH measurements.							
e	Not listed as priority pollutants.							
f	as Chromium (III)							
g	"Heptachlor" means the sum of heptachlor and heptachlor epoxide.							
h	as Azobenzene							
i	"Dichlorobenzenes" mean the sum of 1,2- and 1,3-dichlorobenzene							
j	Based on 6-month median and 30-day average limiting concentrations							
*	Tributyltin was analyzed by CRG Marine Laboratory, Torrance, CA.							
**	Dioxin is analyzed by Severn Trent Laboratories, Carol Stream Ill.							
NL = Not Listed; ND = Not Detected; DNQ=Detected but Not Quantified								
A lower case "e" after a numerical value denotes the numerical value as an estimate								

Table 2-2b. Annual averages, maximum and minimum concentrations of conventional constituents and other pollutants in the 5-Mile Outfall effluent (January 2004 through December 2004). All concentrations are reported in ug/L unless otherwise noted.

Constituents	Current NPDES Limits ^a	Concentrations in 5-Mile .Effluent			Concentrations After Initial Dilution ^b			CA Ocean Plan (ug/L) Objectives ^{c,j}
		Avg.	Max.	Min.	Avg.	Max.	Min.	
CONVENTIONAL CONSTITUENTS AND NUTRIENTS								
Total Suspended Solids (mg/L)	30	20	38	12	0.24	0.45	0.14	
Biochemical Oxygen Demand (mg/L)	30	18.7e	37	10	0.22	0.44	0.12	
Oil & Grease (mg/L)	25	ND	4.0	ND	0.0086	0.047	ND	25
Settleable Solids (mL/L)	1.0	ND	0.40	ND	ND	0.004	ND	1.0
Total Organic Carbon (mg/L)	NL	21.1	31.0	15.9	0.25	0.36	0.19	
Phosphorus (Total) (mg/L)	NL	2.9	3.5	2.1	0.034	0.041	0.025	
Ammonia-Nitrogen (mg/L)	51	35.1	39.6	32.5	0.41	0.47	0.38	0.6
Organic-Nitrogen (mg/L)	NL	3.8	4.5	2.9	0.045	0.053	0.034	
Nitrate-Nitrogen (mg/L)	NL	0.022	0.10	ND	0.00026	0.0012	ND	
Turbidity (NTU)	75	9.3	17.3	5.5	0.11	0.20	0.065	75
pH	6.0-9.0	6.8	7.2	6.5	d	d	d	
PRIORITY POLLUTANT INORGANICS:								
Antimony	NL	1.21	1.88	0.91	0.014	0.022	0.010	1200
Arsenic	12	2.69	4.0	DNQ(1.2)	0.032	0.047	DNQ(0.014)	8
Beryllium	2.8	0.10	0.419	ND	0.0012	0.0049	ND	0.033
Cadmium	21	DNQ(0.15)	DNQ(0.7)	ND	DNQ(0.002)	DNQ(0.008)	ND	1
Chromium (hexavalent) ^c	113	0.25	3.0	ND	0.003	0.035	ND	2
Chromium (total)	NL	DNQ(1.46)	DNQ(2.6)	ND	DNQ(0.017)	DNQ(0.031)	ND	190000 ^f
Copper	87	19.5	38.7	13.1	0.229	0.455	0.154	3
Lead	101	DNQ(3.22)	DNQ(14.3)	ND	DNQ(0.038)	DNQ(0.17)	ND	2
Mercury	1.1	ND	DNQ(0.038)	ND	ND	DNQ(0.000)	ND	0.04
Nickel	113	7.76	14	4	0.091	0.16	0.047	5
Selenium	1275	DNQ(0.91)	DNQ(1.4)	DNQ(0.2)	DNQ(0.011)	DNQ(0.016)	DNQ(0.002)	15
Silver	26	1.48	2.40	DNQ(0.8)	0.017	0.028	DNQ(0.09)	0.7
Thallium	1190	1.28	2.92	ND	0.015	0.034	ND	2
Zinc	346	22.8	45.9	DNQ(15.0)	0.27	0.54	DNQ(0.18)	20
Tributyltin (ng/L)*	119	ND	ND	ND	ND	ND	ND	1.4
Cyanide	85	ND	DNQ(6)	ND	ND	DNQ(0.07)	ND	1
PRIORITY POLLUTANT ORGANICS:								
PESTICIDES:								
Aldrin	0.002	ND	ND	ND	ND	ND	ND	0.022 ng/L
Dieldrin	0.004	ND	ND	ND	ND	ND	ND	0.040 ng/L
Endrin	0.17	ND	ND	ND	ND	ND	ND	0.002
Toxaphene	0.018	ND	ND	ND	ND	ND	ND	0.210 ng/L
DDT & Derivates (ng/L)	14	ND	ND	ND	ND	ND	ND	0.17
HCH's	0.34	ND	ND	ND	ND	ND	ND	0.004
Endosulfan	0.765	ND	ND	ND	ND	ND	ND	0.009
PCB's	0.002	ND	ND	ND	ND	ND	ND	0.019 ng/L
Chlordane & Related Compounds	0.0019	ND	ND	ND	ND	ND	ND	0.023 ng/L
Heptachlor	0.061 ^e	ND	ND	ND	ND	ND	ND	0.05 ng/L
Heptachlor Epoxide	NL	ND	ND	ND	ND	ND	ND	0.02 ng/L
VOLATILE ORGANIC COMPOUNDS:								
Acrolein	18700	ND	ND	ND	ND	ND	ND	220
Acrylonitrile	9	ND	ND	ND	ND	ND	ND	0.10
Benzene	NL	ND	ND	ND	ND	ND	ND	5.9
Halomethanes	NL	2.81	3.99	2.09	0.03	0.05	0.02	130
Carbon tetrachloride	76	ND	ND	ND	ND	ND	ND	0.9
Chlorobenzene	NL	ND	ND	ND	ND	ND	ND	570
Chloroform	NL	5.78	7.94	4.78	0.069	0.094	0.056	130

Table 2-2b (cont.)

Constituents	Current	Concentrations in			Concentrations After			CA Ocean Plan (ug/L) Objectives ^{c-j}
	NPDES Limits ^a	5-Mile Effluent Avg.	Max.	Min.	Initial Dilution ^b Avg.	Max.	Min.	
Vinyl Chloride	NL	ND	ND	ND	ND	ND	ND	36
1,3-Dichloropropene	NL	ND	ND	ND	ND	ND	ND	8.9
Ethylbenzene	NL	ND	ND	ND	ND	ND	ND	4100
Methylene chloride	NL	8.8	23.2	2.16	0.104	0.273	0.025	450
1,1,2,2-Tetrachloroethane	NL	ND	ND	ND	ND	ND	ND	2.3
Tetrachloroethene	NL	1.83	4.17	0.80	0.022	0.049	0.009	2.0
Toluene	NL	ND	0.176	ND	ND	0.002	ND	85000
1,1,1-Trichloroethane	NL	ND	ND	ND	ND	ND	ND	540000
1,1,2-Trichloroethane	NL	ND	ND	ND	ND	ND	ND	9.4
Trichloroethene	NL	ND	ND	ND	ND	ND	ND	27
1,1-Dichloroethylene	NL	ND	ND	ND	ND	ND	ND	0.9
1,2-Dichloroethane	NL	ND	ND	ND	ND	ND	ND	28
Dichlorobromomethane	NL	1.284	1.639	1.080	0.015	0.019	0.013	6.2
ChloroDibromomethane	NL	2.052	2.976	1.260	0.024	0.035	0.015	8.6
ACID EXTRACTABLE COMPOUNDS:								
Non-Chlorinated Phenolic Compounds	NL	ND	ND	ND	ND	ND	ND	30
2,4-Dinitrophenol	340	ND	ND	ND	ND	ND	ND	4.0
4,6-Dinitro-2-Methyl Phenol	NL	ND	ND	ND	ND	ND	ND	220
Chlorinated Phenolic Compounds	85	ND	ND	ND	ND	ND	ND	1
2,4,6-Trichlorophenol	25	ND	ND	ND	ND	ND	ND	0.29
BASE AND NEUTRAL EXTRACTABLE COMPOUNDS:								
PAHs	0.748	ND	ND	ND	ND	ND	ND	8.8 ng/L
Fluoranthene	1270	ND	ND	ND	ND	ND	ND	15
Benzidine	0.006	ND	ND	ND	ND	ND	ND	0.069 ng/L
Bis (2-chloroethyl) ether	4	ND	ND	ND	ND	ND	ND	0.045
Bis (2-chloroethoxy) methane	374	ND	ND	ND	ND	ND	ND	4.4
Bis (2-chloroisopropyl) ether	NL	ND	ND	ND	ND	ND	ND	1200
Bis (2-ethylhexyl) phthalate	297	ND	3.0	ND	ND	0.035	ND	3.5
Di-n-butyl phthalate	NL	ND	ND	ND	ND	ND	ND	3500
1,4-Dichlorobenzene	NL	1.0	2.3	ND	0.012	0.027	ND	18
3,3-Dichlorobenzidine	0.688	ND	ND	ND	ND	ND	ND	0.0081
Diethyl phthalate	NL	ND	ND	ND	ND	ND	ND	33000
Dimethyl phthalate	NL	ND	ND	ND	ND	ND	ND	820000
2,4-Dinitrotoluene	221	ND	ND	ND	ND	ND	ND	2.6
Hexachlorobenzene	0.018	ND	ND	ND	ND	ND	ND	0.21 ng/L
Hexachlorobutadiene	NL	ND	ND	ND	ND	ND	ND	14
Hexachlorocyclopentadiene	4930	ND	ND	ND	ND	ND	ND	58
Isophorone	NL	ND	ND	ND	ND	ND	ND	730
Nitrobenzene	416	ND	ND	ND	ND	ND	ND	4.9
N-Nitrosodimethylamine	620	ND	ND	ND	ND	ND	ND	7.3
N-Nitrosodiphenylamine	212	ND	ND	ND	ND	ND	ND	2.5
N-Nitrosodi-N-propylamine	NL	ND	ND	ND	ND	ND	ND	0.38
Hexachloroethane	212	ND	ND	ND	ND	ND	ND	2.5
1,2-Diphenylhydrazine ^h	14	ND	ND	ND	ND	ND	ND	0.16
Dichlorobenzenes ⁱ	NL	ND	ND	ND	ND	ND	ND	5100
OTHERS:								
2,3,7,8-Dioxin* *	0.4 pg/L	ND	ND	ND	ND	ND	ND	0.0039 pg/L
Residual Chlorine (mg/L)	0.17	ND	0.1	ND	ND	ND	ND	0.002
a	TSS, BOD, O&G and settleable solids limit based on 30-day average concentration. All others are based on monthly average concentration.							
b	Calculated values based on a minimum initial dilution of 84 parts seawater + 1 part effluent.							
c	For O&G and settleable solids based on 30-day avg. concentration. All others are based either on 30-day avg. or 6-month median.							
d	Not applicable: The concept of dilutions does not apply to pH measurements.							
e	Not listed as priority pollutants.							
f	as Chromium (III)							
g	"Heptachlor" means the sum of heptachlor and heptachlor epoxide							
h	as Azobenzene							
i	"Dichlorobenzenes" mean the sum of 1,2- and 1,3-dichlorobenzene							
j	Based on 6-month median and 30-day average limiting concentrations							
*	Tributyltin was analyzed by CRG Marine Laboratory, Torrance, CA.							
**	Dioxin was analyzed by Severn Trent Laboratories, Carol Stream Ill.							
MDL = Method Detection Limit; NL = Not Listed; NA = Not Available; ND = Not Detected; DNQ=Detected but Not Quantified								

and Ocean Plan water quality objectives (SWRCB 1990). Assessment of bacterial data associated with effluent monitoring is addressed in Chapter 3 of this report.

MATERIALS AND METHODS

SAMPLE COLLECTION

Representative 5-Mile effluent samples were collected from the effluent pumping plant wet-well. During the period from January 2003 through December 2004, the Hyperion Treatment Plant received influents from the five outfall sewers: North, North Central, Central, Coastal Water, and North Outfall Replacement (NOS, NCOS, COS, CWIS and NORS, respectively). Representative influent samples from these sewer outfalls were collected at sampling points located upstream of any in-plant return flows. Influent samples were collected with a programmed automatic sampler and the effluent was collected manually.

With the exception of oil and grease (O&G), cyanide, and volatile organic compounds (VOC's), analyses of all constituents listed in Tables 2-1 and 2-2 a & b were performed on 24-hr composite samples. The 5-Mile effluent samples were collected hourly whereas influent samples were collected at varying time intervals in proportion to the flow. The hourly effluent samples were manually composited in proportion to established diurnal flow data of the daily 24-hour collection period. The influent autosamplers were programmed to collect a flow-proportioned composite sample. In the event of an autosampler malfunction, bi-hourly influent samples were collected and composited manually in proportion to flow.

Cyanide analyses were performed on grab samples collected at peak loading hours. Peak loading hours were based on previous diurnal studies.

Three grab samples were collected for O&G analyses, one at peak flow, and the other two,

eight hours before and after. Solvent extracts from individual grabs were combined in proportion to flow and analysis continued on the extract composite.

Three grab samples for VOC analyses were also collected at eight-hour intervals, the middle grab at effluent peak flow. In accordance with the NPDES permit requirement, these grabs were first composited into a single sample in proportion to flow and then analyzed.

Samples for O&G and organics analyses were collected in glass bottles. Samples for VOC's were collected in amber glass bottles with Teflon[®] lined screw caps, and with no headspace remaining after collection. All other samples were collected in plastic bottles. Samples were preserved and stored as detailed in Standard Methods (APHA, 1998).

LABORATORY ANALYSIS

All samples were analyzed according to Environmental Laboratory Accreditation Program (ELAP) approved procedures while under ELAP accreditation. Specific methods used for individual analyte measurements are listed in Table 2-1.

DATA ANALYSIS

Data reduction methods providing more information than in past reports were included for this reporting period. In prior reports, results less than the Method Detection Limit (MDL) were listed as Not Detected (ND) and a value of zero was used in calculating the average. This convention remains. Estimated values for results greater than the MDL but less than the Practical Quantitation Limit (PQL) were included in the average, and were reported as Detected Not Quantifiable (DNQ). Annual averages were taken from values above the detection limit of the method. If a calculated average resulted in a value less than the MDL, then that average was ND.

If a constituent's MDL changed during the period, the most prominent MDL for that period was used. If there was no predominance, then the lowest MDL was applied.

Influent and effluent monitoring data for the 2003 and 2004 calendar years were averaged individually (Table 2-2 a & b, Tables 2-4 a & b). Key metals averaged for the two-year reporting period are shown in Table 2-5 and plotted in figures 2-2 and 2-3. It should be noted that prior to the 1999-00 reporting period the data are tabulated as fiscal years (i.e., July to June).

RESULTS AND DISCUSSION

CONVENTIONAL CONSTITUENTS AND NUTRIENTS

TSS, BOD, O&G, and Settleable Solids

The main objective in the treatment of wastewater is the removal of suspended and floatable materials and the treatment of biodegradable organics (Metcalf & Eddy 1979). The discharge of materials with high total suspended solids (TSS), biochemical oxygen demand (BOD), and O&G can cause degradation of the receiving environment through eutrophication and the introduction of toxic materials (Morel and Schiff 1983; p. 103).

HTP discharge limits for TSS, BOD, and O&G are 30, 30, and 25 mg/L, respectively. Since November 23, 1998, when Hyperion went to full secondary treatment, all the NPDES limits for TSS, BOD, and O&G have been met.

The quality of HTP's effluent has been well within the interim NPDES limits for TSS and O&G since 1986 and for BOD since 1987 (Figure 2-1). Additionally, Hyperion's effluent has been well within the current NPDES limits for TSS, O&G, and BOD since the completion

of the secondary treatment expansion. The trend of improved effluent quality resulted from implementation of a series of projects under the Hyperion Interim Improvement Program (HIIP). HIIP was conceived in early 1986 in an effort to produce the highest quality effluent possible until full secondary treatment came on-line in 1998. Under the program, the plant achieved an average of approximately 91% removal of TSS and 75% removal of BOD. Further immediate reductions in BOD, TSS and O&G were seen in December 1998 due to the switch to full secondary treatment in November (Figure 2-1).

Table 2-3 illustrates average concentrations of TSS, BOD, O&G, and settleable solids in the plant's influent and effluent during January 2003 to December 2004. During this period, removal efficiencies for these constituents were consistently high. On average, approximately 95% of TSS, 94% of BOD, >95% of O&G, and >99% of settleable solids were removed from the wastewater treated at HTP.

During the period from January 2003 to December 2004, TSS, BOD, O&G, and settleable solids averaged approximately 19.5, 18, <3 mg/L, and <0.1 mL/L, respectively, in the 5-Mile effluent (Table 2-3). The performance averages of the last reporting period, January 2001 through December 2002, were 16, 15, 1 mg/L, and <0.1 mL/L, respectively. Concentrations of three of these four constituents were consistently well below the NPDES permit limits (Table 2-2a, b) for full secondary treatment.

For the calendar year of 2003, HTP effluent was in full compliance with limitations for all constituents except settleable solids, where there was one permit exceedance. During September 2003, one 5-mile effluent grab sample had a settleable solids result of 21.0 mL/L, which exceeds the plant's instantaneous maximum limit of 3.0 mL/L. This was due to solids washout at the secondary clarifiers and was quickly remediated. Less than four hours later, the effluent tested below the instantaneous maximum limit, with a result of <0.1.

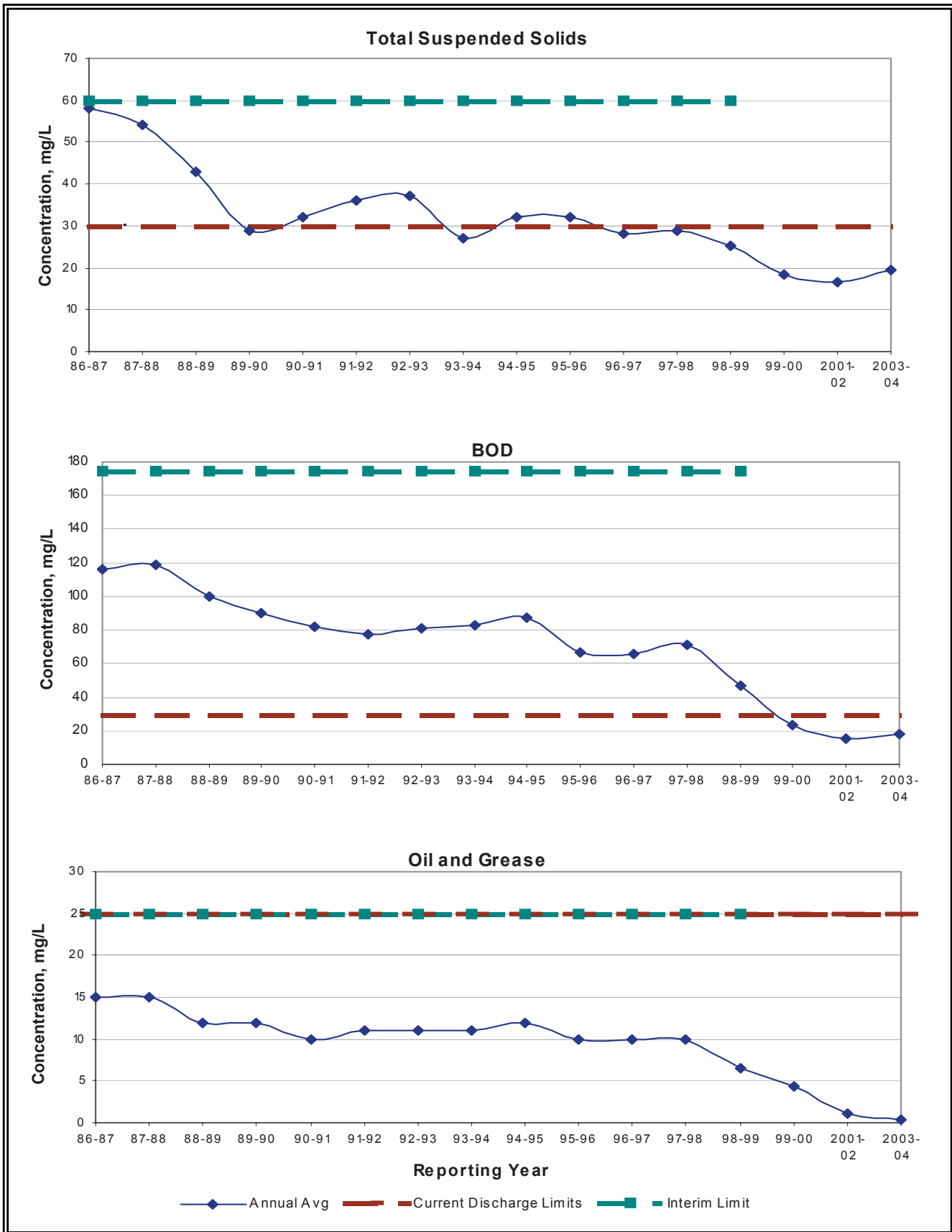


Figure 2-1. Average concentrations of total suspended solids, biochemical oxygen demand, and oil and grease in 5-Mile Outfall effluent from reporting years 1986-87 through 2003-2004.

Table 2-3. Average, maximum, and minimum monthly averages of total suspended solids (TSS), biochemical oxygen demand (BOD), oil & grease (O&G), and settleable solids in plant influent and 5-Mile Outfall effluent during January 2003 through December 2003 and January 2004 through December 2004.

Conc.		TSS			BOD		
		Influent mg/L	5 Mile mg/L	% Removal	Influent mg/L	5 Mile mg/L	% Removal
Avg.	2003	382e	19	95.0e	338e	18e	94.7e
	2004	360e	20	94.4e	320e	18.7e	94.1e
Max.	2003	665	33		499	33	
	2004	778	25		452	27	
Min	2003	352	18		307e	16	
	2004	323	18		295	15	
Conc.		O & G			Settleable Solids		
		Influent mg/L	5 Mile mg/L	% Removal	Influent mL/L	5 Mile mL/L	% Removal
Avg.	2003	59	ND	>95	22.4	<0.1	>99.6
	2004	59e	ND	>95e	20.6	<0.1	>99.5
Max.	2003	98	4		59.0	21	
	2004	87	4		40.0	0.4	
Min	2003	53	ND		15.0	<0.1	
	2004	49	ND		13.0	<0.1	

During a scheduled operational test of the One-Mile outfall gates on March 3, 2004, approximately 100,000 gallons of unchlorinated secondary effluent was discharged out the One-Mile Ocean Outfall (Serial Discharge No. 001). This occurred when the first of the three gates failed to close during the test. HTP Maintenance staff repaired all three gates, and on March 4, 2004, the first gate was successfully operated three times then sealed shut. During this second test, an estimated 55,000 gallons of chlorinated secondary effluent was released out the One-Mile Ocean Outfall.

Effluent settleable solids concentrations averaged <0.1 mL/L during the years 2003 and 2004. Except for September 2003, the remaining 23 months averaged <0.1mL/L, well below the permit limit (Table 2-2a, b).

Upon release from the 5-Mile Outfall, the effluent is diluted 84:1 within the Zone of Initial Dilution (ZID). For example, calculated

concentrations of the following contaminants in the receiving water after initial mixing varied between 0.11 to 0.45 mg/L for TSS, 0.05 to 0.44 mg/L for BOD, and 0 to 0.047 mg/L for O&G during the years 2003 and 2004 (Table 2-2a, b).

Nutrients

Nutrients, mainly nitrogen, enter the Bay from a variety of natural and anthropogenic sources and are essential for survival of phytoplankton. However, if nutrient inputs are excessive, phytoplankton and algal blooms can produce excessive biomass, resulting in eutrophic conditions. For this reason, ocean discharges of nutrients are regulated. Regulation of ammonia-nitrogen is especially important because ammonia, particularly in its un-ionized form, is highly toxic to fish and other aquatic species.

Nutrient levels in the 5-Mile effluent averaged 2.7 mg/L for total phosphorus and 35.0 mg/L

for ammonia-nitrogen in 2003-2004 (Table 2-2a, b). After an initial dilution of 84:1, calculated concentrations of phosphorus and ammonia were 0.03 mg/L and 0.41 mg/L, respectively. Ammonia levels in 5-mile effluent have been increasing slightly over the last five years. This is believed to originate from the recently completed conversion of the anaerobic digesters from a mesophilic to a thermophilic process. Higher levels of ammonia nitrogen occur in the digested sludge due to this process conversion. The water removed from the digested sludge, termed centrate, is returned for treatment at the primary stage of the process and is thought to be the source of the elevated ammonia. It is anticipated that the ammonia increase will gradually level off, since all digesters were converted over to thermophilic operation by late 2002 and a steady state should be obtained. This increase in ammonia should not impact compliance with the monthly average discharge limit of 51 mg/L. However, it may breach the plant's performance goal limit of 32 mg/L.

Concentrations of total phosphorus in Hyperion's influent were previously noted to have steadily declined, but appear now to have reached a steady-state range of 5-8 mg/L. Improved phosphorus removal was achieved through phosphorus precipitation by addition of iron salts (ferric and ferrous chloride) in the advanced primary treatment process and in the anaerobic digesters. On average, the plant achieved about 64% of phosphorus removal during 2003-2004. Total phosphorus in HTP's effluent has undergone a steady, gradual decline since the conversion to full secondary, and has maintained levels of about 2 to 3 mg/L.

PRIORITY POLLUTANT INORGANICS

Metals

During the 2003-2004 reporting period, five out of 13 priority pollutant metals were frequently detected in both Hyperion's influent and effluent. The five metals are arsenic, copper, nickel, silver,

Table 2-4a. Average, maximum, and minimum values of detected priority pollutant metals and cyanide ($\mu\text{g/L}$) in plant influent and 5-Mile Outfall effluent during January 2003 through December 2003.

Conc., $\mu\text{g/L}$	As Influent	As 5-Mile	Cd Influent	Cd 5-Mile	Cr Influent	Cr 5-Mile	Cu Influent	Cu 5-Mile
Avg.	3.9	2.6	1.6*	ND	10.4*	1.03*	142	13.9*
Max.	6.5	5.0	7.0	0.16*	14.7	1.7*	178	18.6
Min.	2.2	1.1*	ND	ND	5.3*	ND	101	10*
Conc., $\mu\text{g/L}$	Pb Influent	Pb 5-Mile	Hg Influent	Hg 5-Mile	Ni Influent	Ni 5-Mile	Se Influent	Se 5-Mile
Avg.	6.7*	ND	0.2*	0.05*	15	9.4	2.6*	1.1*
Max.	10.2	4.5*	0.4	0.18*	22	12	4.5	2.0
Min.	3.6*	ND	0.1	ND	9	6.13	1.0*	0.24*
Conc., $\mu\text{g/L}$	Ag Influent	Ag 5-Mile	Zn Influent	Zn 5-Mile	CN ⁻ Influent	CN ⁻ 5-Mile		
Avg.	8.8*	0.8	161	18.5*	ND	2*		
Max.	15	1.8	200	23.6	6	6*		
Min.	1.4*	ND	129	12.0*	ND	ND		

* This average includes values reported as DNQ and/or <MDL. Maximum and minimum values also denoted with "*" are a DNQ value. For the annual average, concentrations below detection limit were taken as zero.

Table 2-4b. Average, maximum, and minimum values of detected priority pollutant metals and cyanide (µg/L) in plant influent and 5-Mile Outfall effluent during January 2004 through December 2004.

Conc., µg/L	As Influent	As 5-Mile	Cd Influent	Cd 5-Mile	Cr Influent	Cr 5-Mile	Cu Influent	Cu 5-Mile				
Avg.	3.9*	2.7	1.5*	0.2*	13.6*	1.5*	161	19.5				
Max.	5.5	4.0	6.5	0.7*	25.9	2.6*	243	38.7				
Min.	2.2	1.2*	ND	ND	6.2*	ND	118	13.1				
Conc., µg/L	Pb Influent	Pb 5-Mile	Hg Influent	Hg 5-Mile	Ni Influent	Ni 5-Mile	Se Influent	Se 5-Mile				
Avg.	6.8*	3.2*	0.17*	ND	12.0*	7.8	1.7*	0.9*				
Max.	11.8	14.3*	0.28	0.04*	18.1	14	2.7	1.4*				
Min.	4.4	ND	0.07*	ND	6.1	4	1.1*	0.2*				
Conc., µg/L	Ag Influent		Ag 5-Mile		Zn Influent		Zn 5-Mile		CN⁻ Influent		CN⁻ 5-Mile	
Avg.	13.3		1.5		180		22.8		ND		ND	
Max.	27.0		2.4		281		45.9		8		6	
Min.	5.6		0.8*		123		15.0*		ND		ND	
* This average includes values reported as DNQ and/or <MDL. Maximum and minimum values also denoted with “*” are a DNQ value. For the annual average, concentrations below detection limit were taken as zero.												

and zinc. Cadmium, total chromium, lead, and mercury were consistently detected in the influent, but were mostly undetected or present in very low levels in the effluent (Table 2-4a, b). Antimony, beryllium, thallium, and hexavalent chromium were detected in low levels the effluent (Table 2-2a, b) but rarely detected in the influent. The 2003-2004 influent levels of priority pollutant metals were lower than that of the previous year. Concentrations of all detected metals were below NPDES limits and California Ocean Plan Standards (Table 2-2a, b).

The concentrations of most metals in the plant influent, except copper and zinc, have declined significantly since 1986-87 (Table 2-5). This is the result of the City’s vigorous source control programs (CLA, EMD 1993). Historically, there has been a slight gradual decrease of arsenic in the 5-mile effluent and in the influent (Table 2-5). Arsenic is prevalent in ground water and present in the City of Los Angeles Department of Water and Power’s water sources. This could explain

the low but persistent presence of arsenic in the wastewater. Other metals, such as chromium and lead, continue to reach lower concentrations in the effluent and retain a high removal efficiency (Table 2-5).

The removal efficiency of metals through the treatment processes is related to the chemical and physical characteristics of the individual metal. In general, higher removal efficiencies are found in metals that are less soluble in wastewater and have greater tendencies to associate with particles in the wastewater (Chen et al. 1974). This group of less soluble metals includes cadmium, chromium, mercury, lead, copper, silver, and zinc. Arsenic and nickel are more soluble in wastewater and are not easily removed. Similarly, metals in the former group were found to be associated with the particulate phase of sewage treated at HTP, while arsenic and nickel were found mostly in dissolved form (EMD, unpublished data).

Table 2-5. Concentrations ($\mu\text{g/L}$) of key metals in 5-Mile Outfall effluent and their removal efficiency for years 1986-87 through 2003-04.

Metal	Year	Influent Conc. ($\mu\text{g/L}$)	5-Mile Conc. ($\mu\text{g/L}$)	Percent Removal*
Arsenic	1986-87	11.2	7.6	32%
	1987-88	14.0	8.3	41%
	1988-89	10.6	6.8	36%
	1989-90	8.3	5.4	35%
	1990-91	6.2	4.0	36%
	1991-92	7.6	4.8	37%
	1992-93	7.3	5.1	30%
	1993-94	7.7	5.0	35%
	1994-95	7.9	5.2	34%
	1995-96	6.8	4.3	37%
	1996-97	4.9	3.2	35%
	1997-98	4.7	3.1	34%
	1998-99	3.6	2.4	33%
	1999-00	3.3	2.0	39%
	2001-02	4.4	2.6	41%
2003-04	3.9 [‡]	2.6	33%	
Chromium	1986-87	55.7	49.2	12%
	1987-88	56.9	21.0	63%
	1988-89	44.4	11.0	75%
	1989-90	38.1	6.3	84%
	1990-91	33.9	6.3	81%
	1991-92	23.5	4.0	83%
	1992-93	16.8	4.8	71%
	1993-94	16.9	3.0	82%
	1994-95	15.5	2.9	81%
	1995-96	17.8	4.2	76%
	1996-97	12.7	2.0	84%
	1997-98	16.2	3.0	82%
	1998-99	13.7	2.0	85%
	1999-00	13.5	0.5	96%
	2001-02	12.0 [‡]	0.5 [‡]	96%
2003-04	11.8 [‡]	1.2 [‡]	90%	
Copper	1986-87	202.9	74.4	63%
	1987-88	157.2	50.9	68%
	1988-89	152.4	45.4	70%
	1989-90	139.9	36.7	74%
	1990-91	142.3	35.2	75%
	1991-92	150.8	36.3	76%
	1992-93	183.3	29.9	84%
	1993-94	145.4	34.1	76%
	1994-95	140.9	37.2	74%
	1995-96	152.2	37.8	75%
	1996-97	143.6	34.2	76%
	1997-98	140.3	31.6	78%
	1998-99	140.9	25.9	82%
	1999-00	127.7	10.9	91%
	2001-02	159.0	13.5	92%
2003-04	152.0	16.7 [‡]	89%	

* Based on calculation. ND = Not Detected
[‡] Average calculated from values that are DNQ or <MDL. Concentrations below detection limit were taken as zero.

Table 2-5. (cont.)

Constituents	Current NPDES Limits ^a	Concentrations in 5-Mile Effluent			Concentrations After Initial Dilution ^b			CA Ocean Plan (ug/L) Objectives ^{c, j}
		Avg.	Max.	Min.	Avg.	Max.	Min.	
Vinyl Chloride	NL	ND	ND	ND	ND	ND	ND	36
1,3-Dichloropropene	NL	ND	ND	ND	ND	ND	ND	8.9
Ethylbenzene	NL	ND	ND	ND	ND	ND	ND	4100
Methylene chloride	NL	8.8	23.2	2.16	0.104	0.273	0.025	450
1,1,2,2-Tetrachloroethane	NL	ND	ND	ND	ND	ND	ND	2.3
Tetrachloroethene	NL	1.83	4.17	0.80	0.022	0.049	0.009	2.0
Toluene	NL	ND	0.176	ND	ND	0.002	ND	85000
1,1,1-Trichloroethane	NL	ND	ND	ND	ND	ND	ND	540000
1,1,2-Trichloroethane	NL	ND	ND	ND	ND	ND	ND	9.4
Trichloroethene	NL	ND	ND	ND	ND	ND	ND	27
1,1-Dichloroethylene	NL	ND	ND	ND	ND	ND	ND	0.9
1,2-Dichloroethane	NL	ND	ND	ND	ND	ND	ND	28
Dichlorobromomethane	NL	1.284	1.639	1.080	0.015	0.019	0.013	6.2
ChloroDibromomethane	NL	2.052	2.976	1.260	0.024	0.035	0.015	8.6
ACID EXTRACTABLE COMPOUNDS:								
Non-Chlorinated Phenolic Compounds	NL	ND	ND	ND	ND	ND	ND	30
2,4-Dinitrophenol	340	ND	ND	ND	ND	ND	ND	4.0
4,6-Dinitro-2-Methyl Phenol	NL	ND	ND	ND	ND	ND	ND	220
Chlorinated Phenolic Compounds	85	ND	ND	ND	ND	ND	ND	1
2,4,6-Trichlorophenol	25	ND	ND	ND	ND	ND	ND	0.29
BASE AND NEUTRAL EXTRACTABLE COMPOUNDS:								
PAHs	0.748	ND	ND	ND	ND	ND	ND	8.8 ng/L
Fluoranthene	1270	ND	ND	ND	ND	ND	ND	15
Benzidine	0.006	ND	ND	ND	ND	ND	ND	0.069 ng/L
Bis (2-chloroethyl) ether	4	ND	ND	ND	ND	ND	ND	0.045
Bis (2-chloroethoxy) methane	374	ND	ND	ND	ND	ND	ND	4.4
Bis (2-chloroisopropyl) ether	NL	ND	ND	ND	ND	ND	ND	1200
Bis (2-ethylhexyl) phthalate	297	ND	3.0	ND	ND	0.035	ND	3.5
Di-n-butyl phthalate	NL	ND	ND	ND	ND	ND	ND	3500
1,4-Dichlorobenzene	NL	1.0	2.3	ND	0.012	0.027	ND	18
3,3-Dichlorobenzidine	0.688	ND	ND	ND	ND	ND	ND	0.0081
Diethyl phthalate	NL	ND	ND	ND	ND	ND	ND	33000
Dimethyl phthalate	NL	ND	ND	ND	ND	ND	ND	820000
2,4-Dinitrotoluene	221	ND	ND	ND	ND	ND	ND	2.6
Hexachlorobenzene	0.018	ND	ND	ND	ND	ND	ND	0.21 ng/L
Hexachlorobutadiene	NL	ND	ND	ND	ND	ND	ND	14
Hexachlorocyclopentadiene	4930	ND	ND	ND	ND	ND	ND	58
Isophorone	NL	ND	ND	ND	ND	ND	ND	730
Nitrobenzene	416	ND	ND	ND	ND	ND	ND	4.9
N-Nitrosodimethylamine	620	ND	ND	ND	ND	ND	ND	7.3
N-Nitrosodiphenylamine	212	ND	ND	ND	ND	ND	ND	2.5
N-Nitrosodi-N-propylamine	NL	ND	ND	ND	ND	ND	ND	0.38
Hexachloroethane	212	ND	ND	ND	ND	ND	ND	2.5
1,2-Diphenylhydrazine ^h	14	ND	ND	ND	ND	ND	ND	0.16
Dichlorobenzenes ⁱ	NL	ND	ND	ND	ND	ND	ND	5100
OTHERS:								
2,3,7,8-Dioxin* *	0.4 pg/L	ND	ND	ND	ND	ND	ND	0.0039 pg/L
Residual Chlorine (mg/L)	0.17	ND	0.1	ND	ND	ND	ND	0.002
a	TSS, BOD, O&G and settleable solids limit based on 30-day average concentration. All others are based on monthly average concentration.							
b	Calculated values based on a minimum initial dilution of 84 parts seawater + 1 part effluent.							
c	For O&G and settleable solids based on 30-day avg. concentration. All others are based either on 30-day avg. or 6-month median.							
d	Not applicable: The concept of dilutions does not apply to pH measurements.							
e	Not listed as priority pollutants.							
f	as Chromium (III)							
g	"Heptachlor" means the sum of heptachlor and heptachlor epoxide							
h	as Azobenzene							
i	"Dichlorobenzenes" mean the sum of 1,2- and 1,3-dichlorobenzene							
j	Based on 6-month median and 30-day average limiting concentrations							
*	Tributyltin was analyzed by CRG Marine Laboratory, Torrance, CA.							
**	Dioxin was analyzed by Severn Trent Laboratories, Carol Stream Ill.							
MDL = Method Detection Limit; NL = Not Listed; NA = Not Available; ND = Not Detected; DNQ=Detected but Not Quantified								

Removal efficiencies of six detected priority pollutant metals are shown in Table 2-5. Figures 2-2 and 2-3 show historical influent and effluent trends. Consistent with the above findings, removal efficiencies of chromium, copper, and zinc were much higher than the removal efficiencies of the more wastewater soluble metals, arsenic and nickel. Removal efficiencies for all metals, except arsenic, have dramatically improved since 1986-87 (CLA, EMD 1993-2003). No significant change has been observed in arsenic removal efficiency.

Cyanide

Cyanide was not consistently detected in HTP's influent or 5-Mile effluent. The monthly average of cyanide in the effluent varied from below the minimum detection limit (MDL=4 µg/L) to 6 µg/L (Table 2-2a, b). The concentrations of cyanide in the 5-Mile effluent were always below the current NPDES permit limit (85µg/L). During both years the effluent cyanide concentration was well below the Hyperion Effluent Quality Goals (NPDES pp27) of 50µg/L, and was within the California Ocean Plan objectives (Table 2-2a, b).

Tributyltin

HTP's NPDES permit, issued in 1994, requires quarterly monitoring of tributyltin. Tributyltin was detected in the last quarter of 2003 in Hyperion's effluent, but not at all in 2004. (Table 2-2a, b). The level detected, 10.4 ng/L, was well below the permit limit of 119 ng/L.

ORGANIC CONSTITUENTS

After initial dilution, effluent concentrations of all organic compounds were low and less than NPDES limits and Ocean Plan levels (Table 2-2a, b). The priority pollutant limits are important because of their toxicity to the receiving environment. For example, lipid-soluble hydrophobic compounds such as polyaromatic hydrocarbons (PAH's), DDT's, and PCB's are

known to bioaccumulate in tissues of organisms resulting in toxic effects. The effluent contained no detectable concentrations of PAH's, DDT's, or PCB's during 2003-2004. The highest concentrations shown in Table 2-2a and b were for VOC's such as methylene chloride, toluene, and various halogenated hydrocarbons. There were no permit exceedances in this reporting period for any organic compound.

RESIDUAL CHLORINE

The current NPDES permit of HTP does not require chlorination of the final effluent. Only in the event of an emergency discharge through the 1-Mile outfall is chlorination of effluent required to prevent possible nearshore or beach contamination.

Residual chlorine in the 5-Mile effluent is monitored daily for the following reason. Part of Hyperion's secondary effluent, which is chlorinated for in-plant use, is eventually released into the ocean through the 5-Mile Outfall. Daily residual chlorine of 5-Mile effluent is monitored to ensure that none is discharged into the receiving water. For this reporting period, residual chlorine was detected once in 2003 and three times in 2004 (Table 2-2a, b), each time 0.1 mg/L. This level is far below the instantaneous maximum discharge limitation of 5.1 mg/L, and the monthly average remained <0.1 mg/L. Chlorinated effluent, discharged during a test of the One-Mile gates in March 2004, did result in a permit non-compliance. See prior discussion under the Conventional Constituents and Nutrients for details.

RADIOACTIVITY

A low level of gross beta radioactivity was consistently detected in the 5-Mile effluent throughout 2003-2004. However, the amount detected was always below the NPDES limit (0.030 pCi/ml).

Figure 2-2. Concentrations of arsenic, chromium, and lead in plant influent and 5-Mile Outfall effluent for reporting years 1986-87 through 2003-2004.

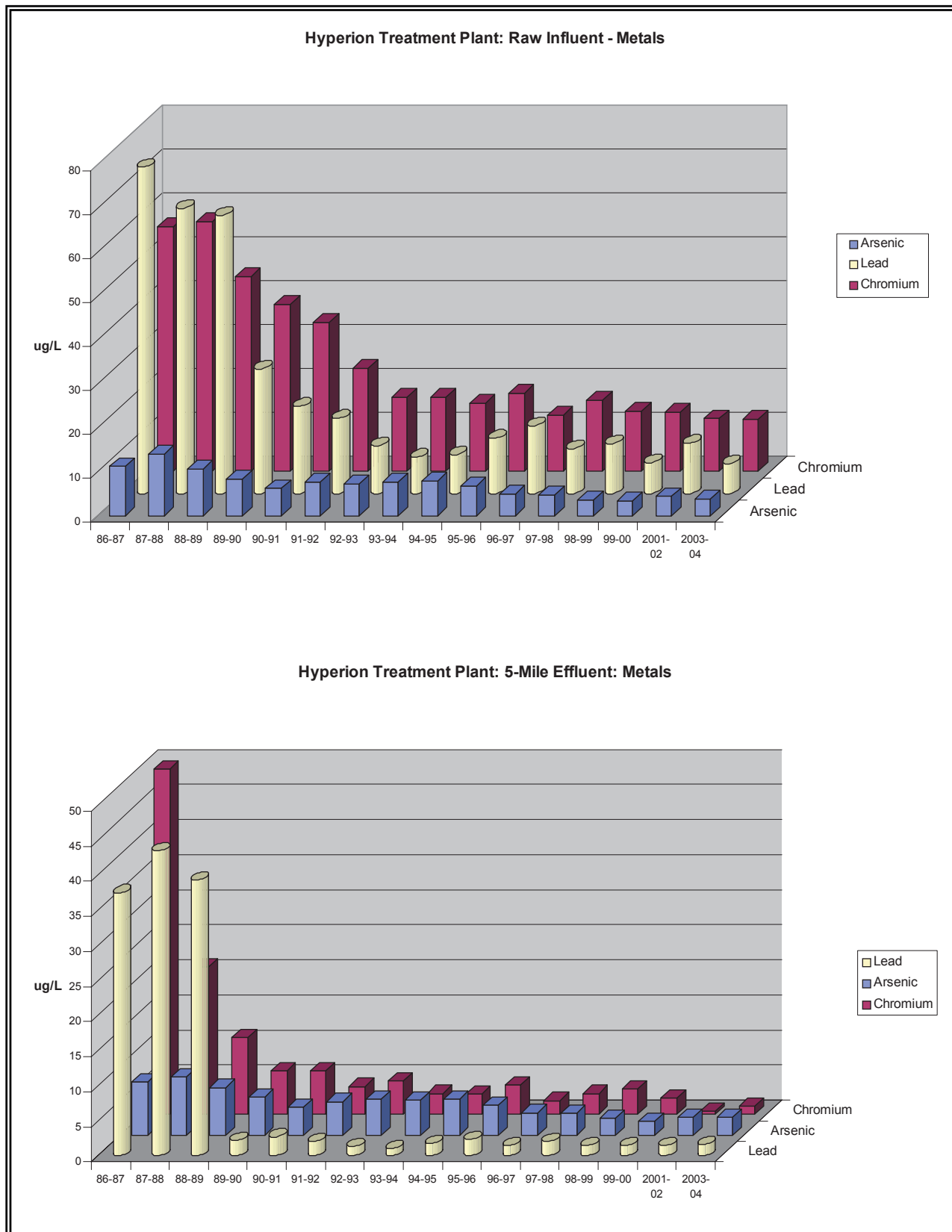
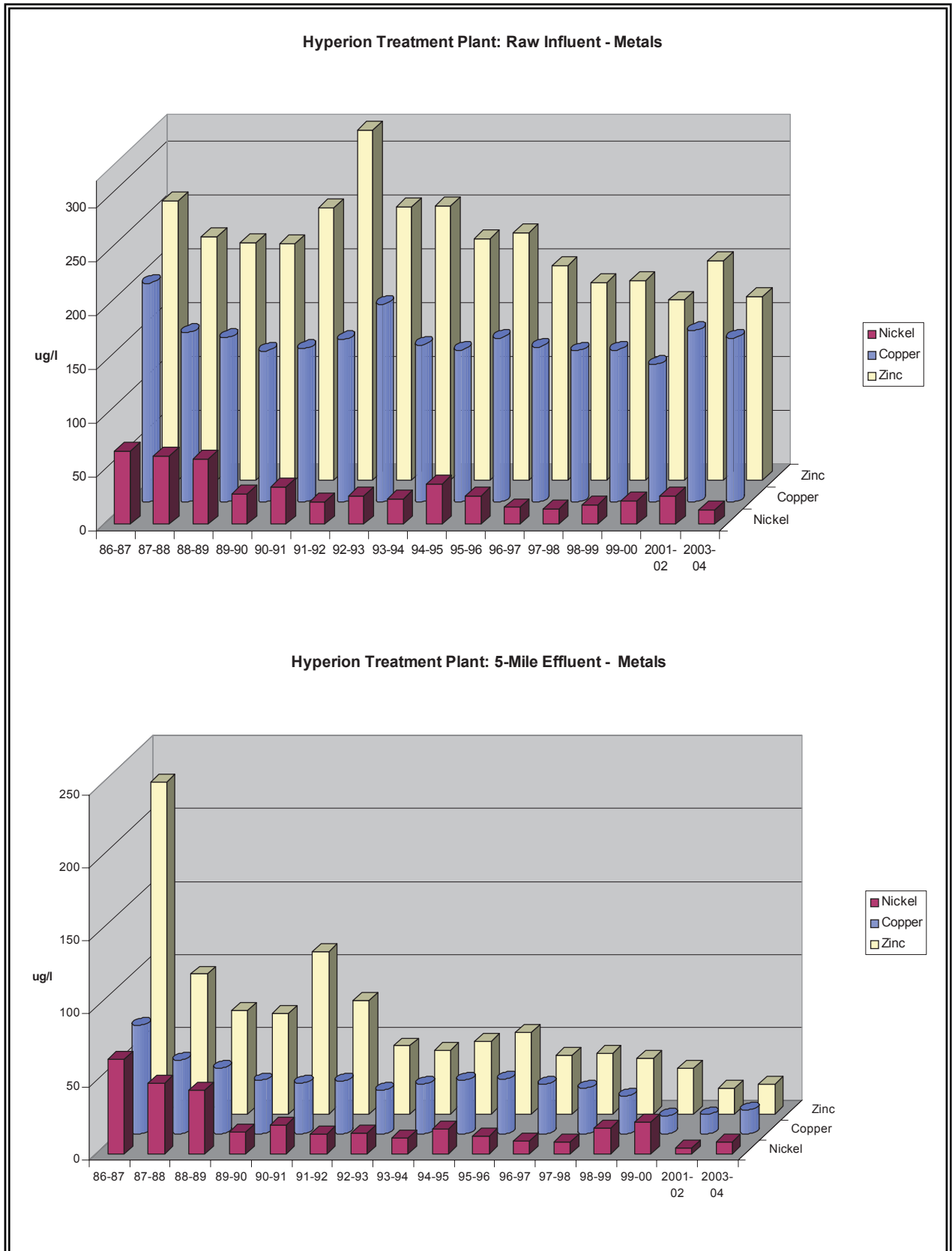


Figure 2-3. Concentrations of nickel, copper, and zinc in plant influent and 5-Mile Outfall effluent for reporting years 1986-87 through 2003-2004.



TOXICITY

To control discharge of toxic chemicals to the environment, the Federal Clean Water Act states, “the discharge of toxic pollutants in toxic amounts be prohibited”. The EPA, as authorized by the Clean Water Act, implements this policy through the use of “whole effluent toxicity” testing using the sensitive life stage of aquatic organisms exposed to wastewater effluents.

Effluent Acute Toxicity Tests

The Hyperion Treatment Plant is mandated by the Los Angeles Regional Water Quality Control Board under the NPDES permit to conduct acute toxicity testing of its 5-Mile effluent. This directive requires that the TUa (acute toxicity units) of the effluent be less than or equal to 1.5, which is to be determined by acute toxicity tests (EPA, 1985) using fathead minnow (*Pimephales promelas*).

For the periods January to December 2003 and January to December 2004, the 5-mile effluent of the Hyperion Treatment Plant met the acute limit of 1.5. The tests during these periods used pH adjustment (by CO₂ control) to counteract the drift that occurs in static-renewal acute toxicity tests. This modification was made as per an agreement with the RWQCB in order to accurately reflect the pH of the 5-Mile Effluent during the duration of the test.

Effluent Chronic Toxicity Tests

The Hyperion Treatment Plant is also required under its NPDES permit to conduct monthly chronic toxicity tests (EPA, 1987) of its effluent. This directive requires that three species of marine organisms be tested each year for three consecutive months to select the most sensitive species. The three test organisms chosen for these screening tests are the veliger larvae of the red abalone (*Haliotis rufescens*), sporophytes of the giant kelp (*Macrocystis pyrifera*), and the larvae of the inland silverslide (*Menidia beryllina*). At the end of this screening period, the most sensitive species is to be used for the remainder of the year.

In April 2003, the three-most-sensitive-species screening tests determined the red abalone to be the most sensitive for this treatment plant, and it was used for the remainder of the year. In 2004, after a series of three-most-sensitive-species screening tests, ending in October 2004, the red abalone was again determined to be the most sensitive, and thus it remained the test organism for the year.

The chronic toxicity test limit is currently set at 84.0 TUc (chronic toxicity units) under the HTP NPDES permit. To comply with the TUc limit of 84.0, test organisms must not show any acute or chronic response in 1.19% plant effluent. From January 2003 to December 2004, the 5-Mile effluent met the TUc limit of 84.0.

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