NPDES compliance summary report, fiscal year 1995

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NPDES COMPLIANCE SUMMARY REPORT
Fiscal Year 1995

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Background

The National Pollutant Discharge Elimination System (NPDES) Compliance Summary Report Fiscal Year 1995 presents and summarizes the monitoring and compliance data compiled and analyzed by the Massachusetts Water Resources Authority (MWRA) NPDES Compliance Unit during the period of July 1994 to June 1995. Although this report is not a regulatory requirement, it documents and tracks influent and effluent quality trends.

The NPDES permit calls for influent and effluent monitoring of the two treatment plants, Deer Island and Nut Island, and three Combined Sewer Overflow facilities (CSO), Cottage Farm, Prison Point, and Somerville Marginal. In addition, MWRA also monitors the influent and effluent quality of three additional CSO facilities, Constitution Beach, Fox Point, and Commercial Point although the outfalls from these three facilities are currently included in the Boston Water Sewer Commission (BWSC) NPDES Permit.

The discharge limits set in the MWRA NPDES Permit are limits for secondary treatment plants. Neither Deer Island nor Nut Island have secondary treatment capability. The MWRA currently operates under court-ordered limits while a secondary treatment plant is being built at Deer Island. Negotiations for a NPDES Permit for the new Deer Island Secondary Plant are in progress.

Highlights in FY95: Treatment Plants

Fiscal Year 1995 heralded a major milestone in the Boston Harbor Project. On January 20, 1995, wastewater was introduced to the first two of four batteries of the new Deer Island primary plant. The new plant was operated in tandem with the old plant. Approximately 88% of the influent was pumped to the new plant with the rest of the flow going to the old Deer Island Plant. By the end of February, all north system flow was pumped to the new plant. Although much of the effort was directed towards facility and system testing, correcting problems, and evaluating and optimizing new plant performance, NPDES permit compliance was paramount during these times. Except for some pump vibration problems and normal facility start-up problems, overall, the new plant performed well.

The Boston Harbor Project progresses. Construction of the secondary treatment plant and support systems continues. The residuals complex, consisting of three modules (4 egg-shaped digesters per module) and two sludge holding tanks is almost complete. Drilling of the 9.5 mile outfall tunnel gained headway. By November 1995, the outfall tunnel should reach the first of the 55 diffuser risers. In early FY96, primary batteries C and D, and the first two digesters will be put in service.

The South System flows will be sent to the new Deer Island plant via the inter-island tunnel through the Nut Island headworks. The Nut Island plant continues to operate as construction of the headworks progresses. During this fiscal year, Nut Island experienced some operational challenges. One of the three anaerobic digesters at Nut Island, Digester No. 1, has not been cleaned since 1978, and, over the years, has accumulated grit and rags which have made operation of the digester impossible. In FY95, Digester 1 was finally taken out of service for cleaning. However, taking this digester out of service added strain on Digesters 2 and 3. By mid-May, the active digesters started experiencing operational upsets. Increased sludge loads, which were experienced at the plant during late April and May, resulted in adverse operational impacts on Digesters 2 and 3. The digesters were not operating properly, and during these times, the semi-digested sludge was not sent to the Fore River Pelletizing plant, but disposed of in a landfill. Digester 1 should be put in service by early August 1995.

Monitoring Results

In general, the FY95 results compared well to FY94 for both Deer Island and Nut Island. The FY95 monitoring results from the Deer Island plant in the latter part of the year improved while Nut Island plant results were comparable to the last three years' monitoring results.

Flows

FY95 was a very dry year. The minimum, average, and maximum daily flow to Deer Island and Nut Island as well as the daily combined Deer Island and Nut Island flows were analyzed.

FY95 DAILY FLOW (MGD)

	Deer Island	Nut Island	Combined
Minimum	167	70	249
Average	236	111	349
Maximum	565	211	718

In FY95, the average combined flow was about 7% lower than in FY94.

FY95 flow data was also analyzed using the definition of dry and wet days used in the CSO Conceptual Plan and System Master Plan (CSO Plan) and also employed in the Design Project (DP-29) - Recommended Plan for Completion of the Deer Island Facilities study. The analysis show that in FY95, the average dry day, maximum dry day, and the maximum wet day were lower than the design criteria developed in the DP-29 study. These lower flows reflect a very dry year.

Average Annual Flow (MGD)

	FY95	DP-29 Design Criteria
Ave Dry Day	325	354
Max Dry Day	479	530
Max Wet Day (w/ storm)	718	998

Figures 1 and 2 illustrate the relationship between total precipitation and the daily average flow of the past seven fiscal years for Deer Island and Nut Island respectively. With the exception of FY93, which was a very wet year (total precipitation was 48.82 inches), the average daily flow from Deer Island has been on a downward trend over the past five years. The dependence of flow on precipitation is evident in these figures.

Figure 1 Deer Island Flows Compared to Total Precipitation FY89 - FY95

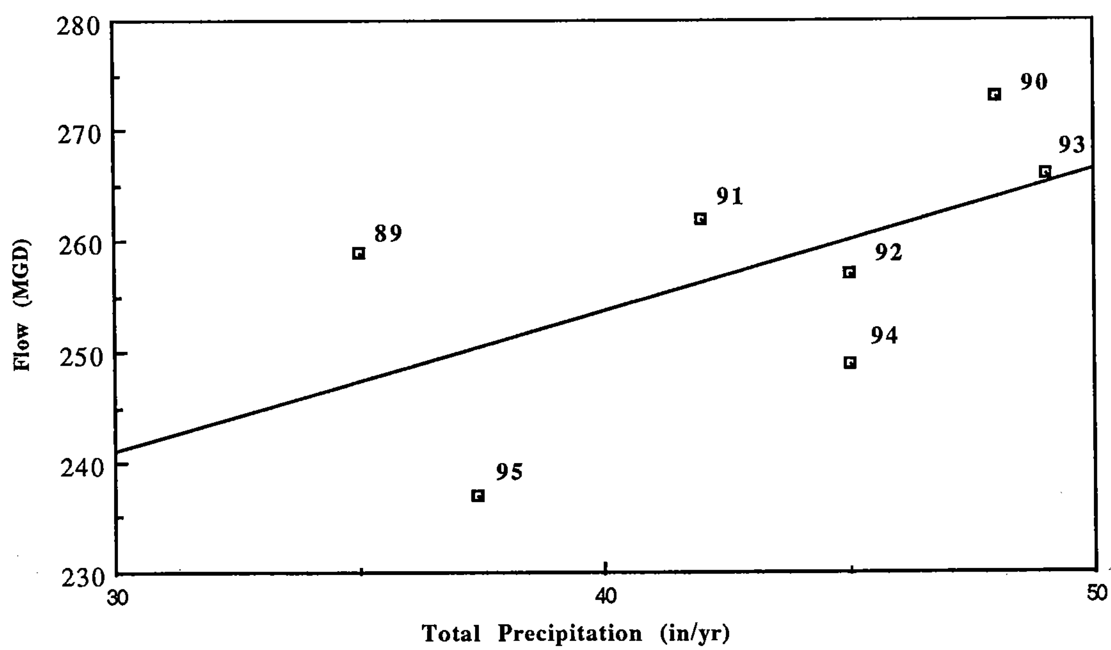
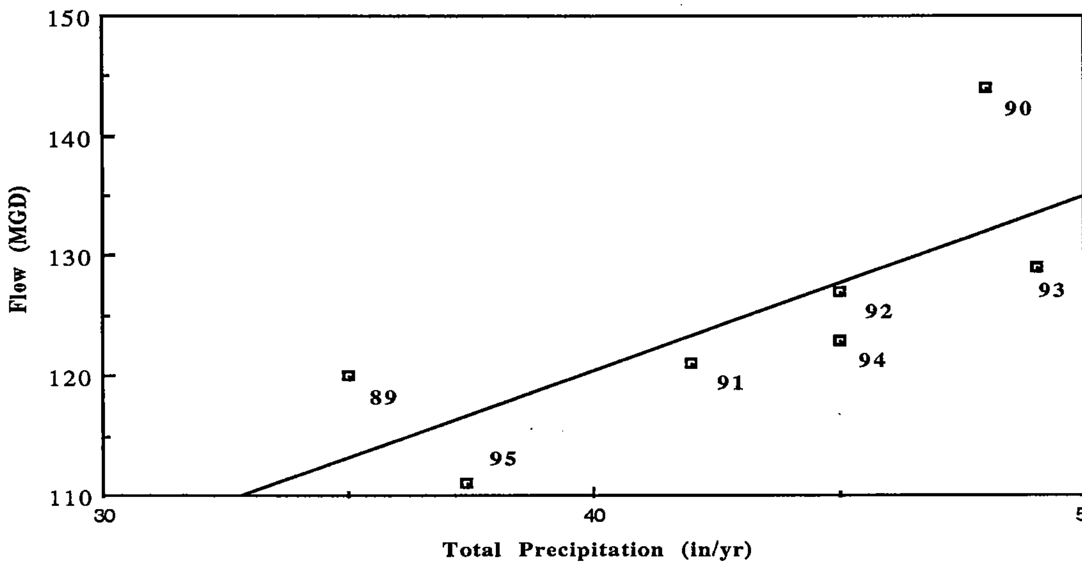


Figure 2 Nut Island Flows Compared to Total Precipitation
FY89 - FY95



Choking

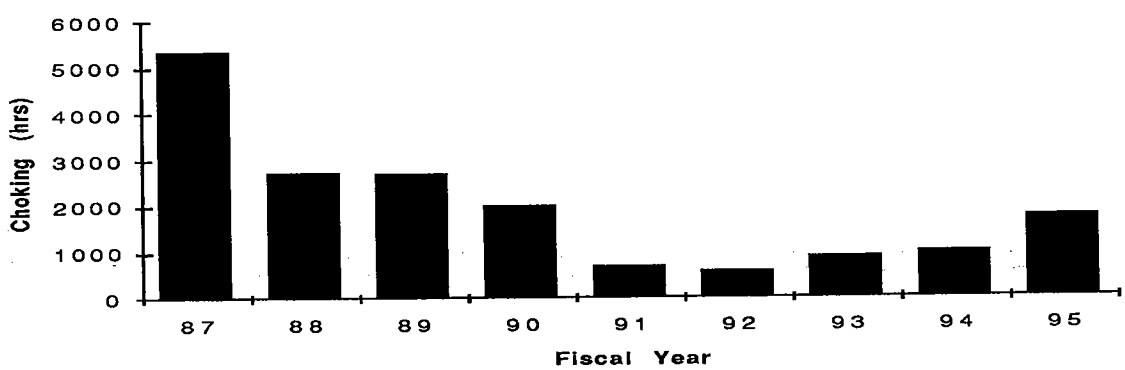
In FY95 there was a 73% increase in the number of hours the headworks choked the flows to Deer Island. However, the significant increase was mostly construction-related choking. Rain-related choking actually decreased by about 25% in FY95. During the latter part of the year, flow to Deer Island was restricted so that the new plant and its support systems could be tested. Because these scheduled system testings were conducted at night when sanitary flow was at a minimum, choking did not result in any dry weather overflows (DWO) at the CSO facilities.

Total Hours of Choking at the Headworks

	FY94	FY95
Rain-related	760	572
Construction-related	226	1133
Total	986	1705

BOD, TSS and other Conventional Parameters

The influent BOD and TSS concentrations at Nut Island were slightly higher than at Deer Island but both influents were generally classified as "weak." In FY95, Deer Island BOD and TSS concentrations were comparable to FY94 strength while at Nut Island, FY95 concentrations were slightly lower than in FY94. Concentrations of other measured parameters were comparable at both plants.



The effluent BOD and TSS concentrations at Nut Island and Deer Island reflect their respective removal efficiencies. Although TSS removal efficiencies at both plants are identical (53%), BOD removal at Nut Island (27%) is higher than at Deer Island (17%). Settleable solids, nitrates, and nitrites are higher in Nut Island while orthophosphorus is slightly higher in Deer Island effluent.

FY95 Influent and Effluent Characteristics

	Influent		Effluent	
	DI	NI	DI	NI
Annual Ave Concentration (mg/L)				
Biochemical Oxygen Demand	140	148	116	108
Total Suspended Solids	138	158	65	75
Settleable Solids	6	6	0.4	0.7
Oil and Grease	31	28	25	24
Total Kjeldahl Nitrogen	22	24	23	22
Ammonia-Nitrogen	14	15	14	14
Nitrates	0.15	0.23	0.08	1.25
Nitrites	0.06	0.06	0.08	0.25
Orthophosphorus	2.2	2.16	2.2	1.9
Total Phosphorus	3.63	4.6	3.35	3.38

Effluent Priority Pollutants

The NPDES Program monitoring results for priority pollutants at both Deer Island and Nut Island plants were comparable to the results from the previous three years.

Metals At both Deer Island and Nut Island plants, boron, molybdenum, copper, lead, and zinc were consistently detected in measurable amounts. Boron and molybdenum, however, are not priority pollutants. Arsenic and chromium were detected in measurable amounts at least 90% of the time.

Pesticides Pesticides were detected occasionally in Deer Island and Nut Island effluents. At both Deer Island and Nut Island, b-BHC, d-BHC, and heptachlor were detected in reportable amounts. Other pesticides were suspected present but these values were close to or at method detection levels.

Other Organics Several organic compounds were detected in both Deer Island and Nut Island effluents. The organic compounds most frequently detected at measurable concentrations include: 4-methyl phenol, benzoic acid, benzyl alcohol, acetone, 2-butanone, and several phthalates.

Priority Pollutants of Concern

Maximum and average concentrations of pollutants in both Deer Island and Nut Island effluents were compared to water quality criteria. The analyses assumed a dilution of 1 part effluent to 10 parts receiving water. The ratio of the maximum concentration to the acute criteria and the ratio of the average concentration to the chronic criteria estimate the critical dilutions required to meet water quality requirements. Ratios slightly greater than 10:1 may not necessarily mean violations of water quality criteria but serve as indicators of problematic parameters. At both Deer Island and Nut Island, copper, cyanide, chlordane, and heptachlor appear to be of concern. DDT also appears problematic at Deer Island.

Copper Copper violates both the acute and chronic criteria at both plants.

Cyanide The presence of cyanide in the effluent is suspect as it was never detected in the influent. We are currently running experiments to determine if the presence of cyanide in the effluent is real or

Critical Dilutions Required to Meet Water Quality Criteria

	Deer Island		Nut Island	
	Acute	Chronic	Acute	Chronic
Copper	38 : 1	21 : 1	41 : 1	23 : 1
Cyanide	98 : 1	21 : 1	210 : 1	21 : 1
Chlordane		16 : 1		24 : 1
Heptachlor	12 : 1	31 : 1	11 : 1	
4,4-DDT		17 : 1		

is the result of analytical interferences. Cyanide analysis is subject to several interferences.

Heptachlor Heptachlor appears to violate both the acute and chronic criteria at Deer Island but is only problematic for the acute criterion at Nut Island. The critical dilutions required to meet the acute criterion at both Deer Island and Nut Island plants are just above the required dilutions. The chronic criterion violation at Deer Island may not be real due to the conservative method used in determining the average concentrations of a pollutant. Heptachlor was present in only nine of 33 Deer Island effluent samples and in only three of 36 Nut Island samples. Heptachlor is mostly likely not a problematic pollutant.

Chlordane Chlordane appears to violate the chronic criterion at both Deer Island and Nut Island plants. Like heptachlor, the critical dilution requirements are on the high side due to the averaging methods used in calculating the average concentrations. Chlordane was detected in only two of the 33 Deer Island effluent samples and also in only two of the 36 Nut Island effluent samples. The analytical results at both plants are at or close to the reporting limit. Chlordane is mostly likely not a problematic pollutant.

4,4-DDT 4,4-DDT appears problematic only at Deer Island and is also subject to the same averaging bias as heptachlor and chlordane. 4,4-DDT was detected present in only two of the 33 Deer Island effluent samples. 4,4-DDT is not considered a problematic.

Plant Performance

Deer Island

Overall, plant performance was very good. The new plant was run in tandem with the old plant until the end of February. However, continuing system functional testing during the first 70 days of new primary plant operation necessitated diverting some of the flow to the old plant on occasion.

Improved treatment efficiencies were not realized until April 1995. The plant efficiencies in April, May, and June 1995 were well above the average removal rates of the old plant. However, the new Deer Island is still in a transition mode and fluctuations in plant performance should be expected as new systems are put in service. During the next several months, Deer Island staff and MWRA consultants will focus on fine-tuning systems and establishing optimum operation mode.

New Deer Island Plant Performance Summary					
	Design Range	New Plant April	May	June	Old Plant (FY92-FY94)
Removal Efficiency					
% BOD	25 - 40	24	27	28	16
% TSS	50 - 65	61	66	67	48

Nut Island

Nut Island's TSS and BOD influent concentrations were slightly higher than that at Deer Island's. However, it is believed that the influent results at Nut Island may be biased on the high side due to the influent sampler location. The influent sampler, which is located before and close to the grit chamber, may be picking up some resuspended solids. On the other hand, Operations staff also suspect that discharge from the sludge dewatering operation at the Fore River Pelletizing Plant contributed to the higher concentrations of BOD and TSS at Nut Island. There is minimal impact of the return filtrate from Fore River on Nut Island. Likewise, the concentrations of influent samples reported at Nut Island may be slightly higher than actual concentrations.

In FY95, the monthly BOD removal rates ranged from 16% to 38%, averaging about 27%. The monthly TSS removal rates ranged from 39% to 70%, averaging about 53% for the year.

Nut Island Performance Summary		
Removal Efficiency	Theoretical Range	FY95 Average
% BOD	25 - 40	27
% TSS	50 - 65	53

NPDES Permit Compliance

Plant performance and permit violations at the Deer Island plant reflect seven months of operation of the old plant and five months of operation of the new Deer Island plant. At Nut Island, plant performance and permit violations reflect the added impact of discharges from the Sludge Pelletizing Plant.

BOD At Deer Island, the daily maximum and monthly average BOD effluent limits were consistently met except for the 12-month running average BOD removal requirement. The removal rates ranged from a low of 14% to a high of 17%, violating the regulatory requirement of 27%.

At Nut Island, the 12-month running removal requirement was consistently met. There were nine BOD-related violations, four were violations of the monthly average limit and five were violations of the daily maximum limit.

TSS At both Deer Island and Nut Island plants, the average monthly TSS effluent concentration and the 12-month running average TSS removal requirement were consistently met. However, there were four violations of the daily maximum limit, one at Deer Island, and three at Nut Island.

Fecal and Total Coliforms There were no violations of the fecal coliform limit at either the Deer Island or Nut Island plant. There were no violations of the total coliform limit at Nut Island. At Deer Island, however, there was one reported violation. The reported violation was the flow-weighted average of the total coliform measurements from the old and the new plant. Individually, the effluents from either plant met the total coliform limit.

pH There were ten pH measurements that were in violation of the low pH threshold of 6.5, one at Deer Island, and nine at Nut Island.

PHC There were four high PHC measurements each at the Deer Island and Nut Island plants that were in violation of permit limits. It is suspected, however, that the high measurements reported for both Deer Island and Nut Island may be due to the limitations of the analytical method employed in the analyses. Split samples tested using the Petroleum Hydrocarbon by Infrared Detection (PHIR) and the Gas Chromatograph by Flame Ionization Detection (GCFID) method showed the analytical results consistently lower with the latter method. Although both methods are not approved from NPDES compliance, EPA, at this time, requires the use of the PHIR method.

Toxicity Both Deer Island and Nut Island plant consistently passed the chronic toxicity that used sheepshead minnow, but both plants consistently failed the chronic test that used the red alga. The acute static toxicity tests using mysid shrimp failed in six of the twelve tests and in eight of twelve tests at Deer Island and Nut Island respectively.

Deer Island Effluent Quality Compared to Regulatory Limits

Parameter	Regulatory Limits*	Range of Values Exceeding Limits	No of Violations
Biochemical Oxygen Demand			
Mo Ave (mg/L)	140		0
Dly Max (mg/L)	200		0
12-mo running removal rate (%)	27	14-17	12
Total Suspended Solids			
Mo Ave (mg/L)	110		0
Dly Max (mg/L)	180	184	1
12-mo running removal rate (%)	38		0
Settleable Solids (mg/L)	2.8		0
Fecal Coliform (#/100 mL)	200		0
Total Coliform (#/100 mL)	1000	1050	1
pH	6.5 - 8.5	6.3	1
PHCs Effluent Dly. Max (mg/L)	15	17-36	4
Toxicity	@		17
	Total Number of Violations		**36**

* Except for removal rates, the effluent quality must be equal or greater than limits.
@ Varies with test species and end points. See tables IV.A.3 and IV.B.3

Nut Island Effluent Quality Compared to Interim Limits

Parameter	Interim Limits*	Range Of Values Exceeding Limits	No of Violations
Biochemical Oxygen Demand			
Mo Ave (mg/L)	130	132 - 143	4
Dly Max (mg/L)	185	186 - 222	5
12-mo running removal rate (%)	15		0
Total Suspended Solids			
Mo Ave (mg/L)	110		0
Dly Max (mg/L)	195	222	3
12-mo running removal rate (%)	43		0
Settleable Solids (mg/L)	1.8		0
Fecal Coliform (#/100 mL)	200		0
Total Coliform (#/100 mL)	1000		0
pH	6.5 - 8.5	6.16 - 6.49	9
PHCs Effluent Dly. Max (mg/L)	15	17 - 38	4
Toxicity	@		19
	Total Number of Violations		**44**

* Except for removal rates, the effluent quality must be less than or equal to limits. Removal rates must be equal to or greater than limits.
@ Varies with test species and end points. See tables IV.A.3 and IV.B.3.

Highlights in FY95: Combined Sewer Overflows

In FY95, MWRA conducted several studies as part of the overall CSO Master Plan. One of these studies, the In-line Storage Program, directly impacted CSO activations. The In-line Storage Program, designed to contain combined sewage in the lines to adequately measure sewer capacity, required raising weir elevations at crucial overflow locations. The combined sewage held in the lines, instead of overflowing in any of the 85 CSO outfalls, was either treated at the CSO facilities or pumped to Deer Island.

Monitoring Results

Flows and Activations

FY95 was a very dry year and, as expected, there was a significant decrease in both the total number of times the CSO facilities activated and the total volume of combined sewage that was treated and discharged. There was a 20% decrease in the total number of activations from 144 in FY94 to 114 in FY95. Likewise, the total volume treated decreased from 1312 MG in FY94 to 1188 in FY95, a 9% decrease. Of the six CSO facilities, only Constitution Beach had more activations in FY95 than in FY94.

Combined Sewer Overflow Activations Summary

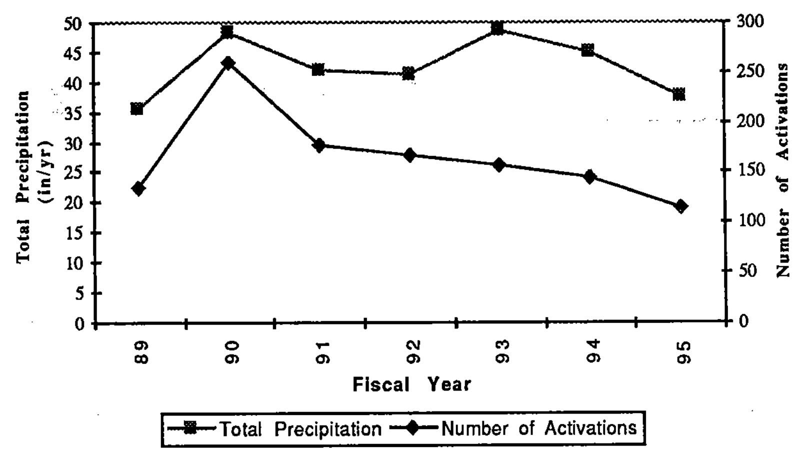
	FY95		FY94	
	Total Number of Activations	Total Volume Treated (MG)	Total Number of Activations	Total Volume Treated (MG)
Cottage Farm	25	574	31	621
Prison Point	26	460	26	449
Somerville Marginal	28	67	34	72
Constitution Beach	12	7	8	0.68
Fox Point	4	24	20	76
Commercial Point	19	56	25	93
Totals	114	1188	144	1312

Although Constitution Beach data showed a significant increase in both flow and frequency of activation, the data may not accurately reflect the true picture. Constitution Beach is greatly affected by tidal influences, and consequently, suffers from chronic malfunctioning flowmeters. For both FY94 and FY95 data, flows were estimated based on the amount of chlorine used during activation. FY94 data are probably underestimated and, in contrast, FY95 data are probably overestimated.

At Fox Point, the dramatic decrease in both the frequency of activations and flow treated at the facility was probably due to the diversion of flow to the Commercial Point CSO brought about by the sewer work on the Boston Main Interceptor.

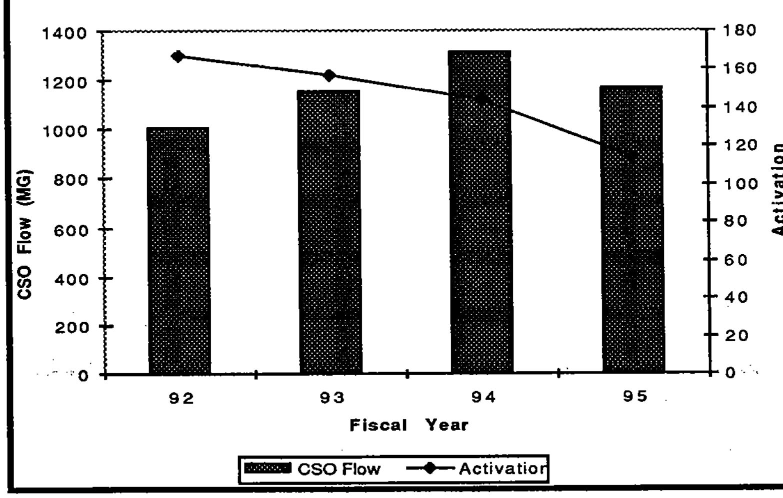
CSO activations have been on a downward trend (Figure 4). The dramatic increase in FY90 was primarily due to increased precipitation and the added activations from the new Constitution Beach facility. Since FY90, the number of times the CSOs activated has steadily been decreasing even with increasing rainfall (FY93). Increased pumping capacity (FY90) and opening outfall 004 (FY91) at Deer Island may have contributed to this trend.

Figure 4 CSO Activations Compared to Total Precipitation



Although the frequency of activations has been decreasing, the total treated CSO flow has increased even with less precipitation. For example, in FY92, the total rainfall was 41.38 in. and the total CSO volume treated was 1008 MG. In contrast, in FY95, the total rainfall was 37.47 in., almost 4 in. less, yet, the total CSO volume treated was 1170 MG. Although FY95 was significantly drier than FY92, there was a greater capture of CSO flow. This greater capture may have been the result of the In-line Storage Program.

Figure 5 Total CSO Flow Compared to Total Number of Activations



Effluent Characteristics

BOD, TSS and other Fecal Coliform

The wide ranges of BOD and TSS effluent values reported demonstrate the many factors that influence the concentration of wastewater constituents in CSO samples. For example, effluent BOD concentrations ranged from a low of < 0.4 mg/L at Constitution Beach to a high of 6300 mg/L at Commercial Point. These CSO treatment facilities were not designed to remove contaminants, rather, were designed to destroy pathogenic bacteria. Thus, BOD and TSS removal were not realized.

Disinfection reduced fecal coliform counts below the detection levels most of the time, but occasionally, there were some high measurements. Of 118 samples, only 10 samples exceeded the 2500 colonies/100 mL NPDES Permit threshold: three at Cottage Farm, two at Prison Point, one at Somerville Marginal, and four at Commercial Point.

Effluent Priority Pollutants

Metals

At Cottage Farm, Prison Point, and Somerville Marginal, measurable amounts of copper, lead, and zinc were consistently detected while mercury and cadmium were detected 50% of the time.

Pesticides

At Cottage Farm, g-BHC was present while at Prison Point, heptachlor and heptachlor epoxide were detected 14% of the time. At Somerville Marginal, 4'-4'-DDT, endosulfan I, b-BHC, and heptachlor epoxide were also detected present 14% of the time. only 14% of the time.

Semi-volatile Organics

Benzoic acid was consistently detected in measurable amounts in the Cottage Farm, Prison Point, and Somerville Marginal effluents. Benzoic acid, however, is not an EPA priority pollutant. Other semivolatiles were detected in measurable amounts. At Cottage Farm, di-n-butylphthalate and p-cresol were detected 29% and 14% respectively. At Prison Point, di-n-butylphthalate and bis(2-ethylhexyl)phthalate were detected 29% while p-cresol was detected only 14% of the time. At Somerville Marginal, hexachloroethane was detected only 14% of the time.

NPDES Permit Compliance

Fecal Coliforms There were a total of five fecal coliform permit violations, three at Cottage Farm, two at Prison Point, and none at Somerville Marginal. These violations exceeded the NPDES permit limit of "no more than 10% of the samples can exceed 2500 colonies/100 mL".

pH There were no pH violations at Cottage Farm. However, there were two at Prison Point and four at Somerville Marginal. At Prison Point, the two violations were exceedances of the upper pH limit while at Somerville Marginal, three were low pH measurements and one was a high pH exceedance. It is assumed that the low pH measurements were due to acidic rainfall while the high pH readings were caused by the addition of hypochlorite in the disinfection process.

I. Introduction

The objective of this report is to present and to summarize the National Pollutant Discharge Elimination System (NPDES) monitoring and compliance data compiled and analyzed by the Massachusetts Water Resources Authority (MWRA) NPDES Unit during the period of July 1994 to July 1995.

Although many of the limited parameters in the wastewater are given in concentrations as small as 0.01 ug/L, it is crucial to realize that despite the seemingly insignificant levels measured, the studies and monitoring efforts are essential to ensure compliance with water quality standards. The MWRA's treatment plants and Combined Sewer Overflow (CSO) facilities serve large communities' needs for sewer systems while maintaining healthy water environments for recreation and wildlife. Before presenting the monitoring data, some background information is introduced in various sections of the report. Section I defines how the report is presented as well as gives a short overview of what is included in each section.

Section II presents information on the permits and limits that the MWRA sewerage system operates by, the monitoring programs conducted in FY95, and the methodologies used in sample collection, sample analyses, and treatment of results.

Section III introduces some background information by giving an overview of the MWRA sewage treatment systems, system hydraulics, treatment facilities, and wastewater treatment processes.

Section IV presents monitoring results and summarizes facility compliance with permits and court-ordered interim limits. Two treatment plants and three CSOs were monitored to gather operational data and to comply with the MWRA NPDES Permit. Three additional CSOs that are owned and operated by the MWRA, but not included in the NPDES Permit, were monitored to gather operational data.

Section V compares Deer Island and Nut Island monitoring results. Section V also deals with current initiative and issues for the future. This part discusses how the MWRA can continue to maintain functional sewer systems as well as healthy bodies of water.

II. Background Information

The Environmental Protection Agency (EPA) mandates that any discharge to a body of water must be permitted through NPDES. The EPA and the Massachusetts Department of Environmental Protection (DEP) jointly issued a NPDES permit to MWRA for its two primary treatment plants, Deer Island and Nut Island, and three CSO treatment facilities, Cottage Farm, Prison Point, and Somerville Marginal. Somerville Marginal is a gravity CSO, unlike Cottage Farm and Prison Point which have pumping and detention capacities. The MWRA also owns and operates three additional gravity CSO facilities, Constitution Beach, Fox Point, and Commercial Point. The effluent from these facilities, however, discharges to the City of Boston sewer lines. Thus, the Boston Water and Sewer Commission (BWSC) NPDES Permit allows for the ultimate discharge of the effluent.

The limits set in the MWRA NPDES Permit are limitations for secondary treatment plants. Neither Deer Island nor Nut Island have secondary treatment capabilities. The MWRA currently operates under court-ordered interim limits while a secondary treatment plant is being built. The MWRA is now in negotiating stages for a new NPDES Permit for the soon-to-be-completed upgraded Deer Island Plant.

In addition, the MWRA, through the NPDES Pretreatment Program, monitors the influent quality of wastewater. The monitoring results provide the basis for determining the adequacy of existing Local Limits to protect the treatment plants and Boston Harbor. Local Limits provide the basis for regulating discharge of toxic chemicals from industrial sources. Current Local Limits were enacted in FY94 and, under the Pretreatment Program requirements, must be re-evaluated every five years.

Not only does the MWRA monitor to comply with the NPDES requirements, the MWRA has its own monitoring programs: Plant Monitoring Program and Harbor Studies. These studies serve to assure appropriate control of discharges to the system, to assure the most cost-effective wastewater treatment yet meet water quality standards, and to assure the quality of life of the organisms living in the receiving bodies of water.

A. Permits and Compliance Order

A.1 NPDES Permit

The MWRA is authorized to discharge under the NPDES "in compliance with the provisions of the Clean Water Act, as amended, 33 U.S.C. § 1251 et seq., and the Massachusetts Clean Water Act, as amended, Mass. Gen. Laws, ch. 21, § 266-53, the MWRA is permitted to discharge from (MWRA Publicly Owned Treatment Works, CSO Treatment Facilities, and CSO Outfalls), in accordance with effluent limitations, monitoring limitations, and other conditions..."

Monitoring Requirements and Effluent Limitations

The NPDES Permit establishes monitoring requirements for existing POTW outfalls as well as CSO treatment facility outfalls. In addition, the Permit also mandates CSO outfall identification and receiving water monitoring. The NPDES Permit also establishes numerical limitations for certain parameters as well as narrative limits for all authorized discharges.

Reporting Requirements

In addition to POTW and CSO monitoring requirements, the NPDES Permit requires certain reports on the state of the MWRA sewerage and operational systems (Infiltration/Inflow Report, CSO Facilities and Systems Inspection, Operational Upsets, Overflow reports, Operations Bypass Reports, and Maintenance Program), Monthly Discharge Monitoring Reports (DMRs), and effects of discharges (Annual Bioaccumulation Study). Table II-1 presents a summary of the Permit limits and monitoring requirements for POTWs while Table II-2 presents permit limits for CSOs.

A.2 Court Order

The MWRA operates under a court order issued in June, 1986. In addition to establishing interim discharge limits for existing treatment plants, the Court Order established a schedule for MWRA to upgrade the sewerage system and treatment plants. Table II-3 summarizes the court-ordered interim limits for both Deer Island and Nut Island.

Table II-1

NPDES PERMIT Numerical Effluent Limitations for POTW Outfalls Deer Island and Nut Island			
Effluent Characteristic	Discharge Limitation Average Monthly	Average Weekly	Max Daily
BOD	a	a	a
TSS	a	a	a
Settleable Solids	a	a	a
pH	Not less than 6.5 nor greater than 8.5 at any time to Boston Harbor, Quincy Bay, Hingham Bay, the Inner Harbor, and the Mystic River.		
Fecal Coliform	a	a	a
Total Coliform	a	a	a
Chlorine, Total Residue	(1) The total chlorine residual and other toxic components of the effluent shall not result in any demonstrable harm to aquatic life or violate any state of federal water quality standard which has been or may be promulgated. Upon promulgation of any such standards, this permit may be modified in accordance with such standards. (2) The permittee shall minimize the use of chlorine, still maintaining adequate bacterial control.		
Oil and Grease of Petroleum Origin (also called TPH or PHC)			15 mg/L
NOEC[b]	10% or greater (Sample which is composed of 10% or greater effluent.)		
LOEC[c] ; MATC[d] ; LC50[e]	(1) Chronic Toxicity Tests to Establish the NOEC, LOEC, and MATC- Chronic toxicity tests on representative 24-hour composite samples of the discharge using each of the following organisms:(i) the sheephead minnow, *Cyprinodon variegatus* (7-day tests to measure growth and survival); and (ii) the red marine alga, *Champia parvula* (2 to 4 day tests to evaluate the effects on sexual reproduction). The endpoints to be established in the chronic tests are the No Observed Effect Concentration (NOEC), the Lowest Observed Effect Concentration (LOEC), and the Maximum Acceptable Toxicant Concentration (MATC). (2) Acute Static Toxicity Tests to Establish the NOEL and LC50- 96-hour acute static toxicity tests on representative 24-hour composite samples of the discharge shall be conducted using one to five-day-old juvenile mysid shrimp, *Mysidopsis bahia*, to establish No Observed Acute Effect Levels (NOAEL) and LC50s of the effluents.		
NOAEL[f]			20% or greater (Sample which is composed of 20% or greater effluent, the remainder being dilution water.)
Other Monitored Parameters			
Pollutants listed in Appendix D of 40 CFR Part 122.			

[a] Court Ordered Interim Limit applies to this parameter.
[b] No Observed Effect Concentration- is the highest concentration of effluent to which organisms are exposed in a life cycle or partial life cycle test which contains no adverse effects (on growth survival, and reproduction).
[c] Lowest Observed Effect Concentration- is the lowest concentration of effluent to which organisms are exposed in a life cycle or partial life-cycle test which causes an adverse effect (on survival, growth, and reproduction).
[d] MATC is the Maximum Allowable Toxicant Concentration. It is the effluent concentration that may be present in a receiving water without causing significant harm to productivity or other uses. The MATC is determined by the results of chronic tests of either a partial life-cycle with sensitive life stages or a full life-cycle or the test organism. The MATC is the geometric mean of the No Observed Effect Concentration and the Lowest Observed Effect Concentration.
[e] LC50 is defined as the concentration effluent in a sample that causes mortality to 50% of the test population at a specific time of observation.
[f] No Observed Acute Level is the highest concentration of effluent to which organisms are exposed in a short-term test in which at least 90% of the test organisms survive.

Table II-2

NPDES PERMIT Effluent Limitations and Monitoring Requirements for CSO Treatment Facility Outfalls		
Characteristic	Discharge Limitation Average Monthly / Average Weekly / Maximum Daily	
pH	The pH of the effluent shall not be less than (1) 6.5 nor greater than 8.5 at any time to the Inner Harbor and Mystic River (2) 6.5 nor greater than 9.0 at any time to the Charles River	
Fecal Coliform	1000 MPN/100mL	Not more than 10% of the total samples can exceed 2500 per 100mL during any monthly sampling period.
Chlorine, Total Residual	(1) The total chlorine residual and other toxic components of the effluent shall not result in any demonstrable harm to aquatic life or violate any state or federal water quality standard which has been or may be promulgated. Upon promulgation of any such standard, this permit may be modified in accordance with such standard. (2) The permittee shall minimize the use of chlorine, still maintaining adequate bacterial control.	
Other Monitored Parameters		
Rainfall/Precipitation		
Flow		
BOD*		
TSS*		
Settleable Solids		
NOAEL**	"No Observed Acute Effects Level" (NOAEL) is the highest concentration of effluent to which organisms are exposed in a short-term test in which at least 90% of the test organisms survive.	
LC50**	"LC50" is defined as the concentration of effluent in a sample that causes mortality to 50% of the test population at a specific time of observation.	
Cadmium**		
Chromium (Hexavalent)**		
Copper**		
Lead**		
Mercury**		
Nickel**		
Zinc**		
Chlorinated Hydrocarbons**		
Ammonia Nitrogen**		
Total Phosphorus**		
Pesticides**		
PAHs**		
VOCs**		

* Report both influent and effluent results for this parameter.

** Conducted only during the first and fifth year of the permit. Not required to be monitored this period.

Table II-3

COURT ORDERED SEWAGE TREATMENT PLANT INTERIM LIMITATIONS			
Effluent Characteristic	Effluent Limits Average Monthly	Maximum Daily	Percent Removal*
Deer Island			
$BOD_{(5)}$	140 mg/L	200 mg/L	27%
$TSS_{(5)}$	110 mg/L	180 mg/L	38%
Settleable Solids	2.8 mL/L	N/A	N/A
Fecal Coliform	200/100 mL	N/A	N/A
Total Coliform	1000/100 mL	N/A	N/A
pH	The pH of the effluent shall not be less than 6.5 nor greater than 8.5 at any time unless these values are exceeded due to natural causes or as a result of approved modifications of treatment processes.		
Nut Island			
$BOD_{(5)}$	130 mg/L	185 mg/L	15%
$TSS_{(5)}$	110 mg/L	195 mg/L	43%
Settleable Solids	1.8 mL/L	N/A	N/A
Fecal Coliform	200/100 mL	N/A	N/A
Total Coliform	1000/100 mL	N/A	N/A
pH	The pH of the effluent shall not be less than 6.5 nor greater than 8.5 at any time unless these values are exceeded due to natural causes or as a result of approved modifications or treatment processes.		
Other Effluent Limitations			
Chlorine	The Authority shall minimize the use of chlorine consistent with maintaining adequate bacterial control.		
Reduction of Suspended Solids	Volatile suspended solids shall be reduced through anaerobic digestion as follows, with percentage reductions to be computed as a two month rolling average: Deer Island 50%, Nut Island 61%.		
Special Monitoring of Oil and Grease	The Authority shall separately measure the concentration of the following by means of a weekly grab sample: Influent oil and grease, effluent oil and grease, digester sludge influent oil and grease, and digester sludge effluent oil and grease.		

* Percent Removal is based on a 12 month running average.

B. Monitoring Programs

In FY95, the MWRA conducted several monitoring programs including NPDES Compliance, Plant Monitoring, and the Harbor Studies Programs. Other monitoring activities required by other MWRA programs were also conducted but are not included in this report.

B.1 NPDES Compliance Monitoring Program

The NPDES Compliance Unit manages the NPDES Compliance Monitoring Program. The program requires monthly priority pollutant scans and whole effluent toxicity (WET) tests on the Deer Island and Nut Island effluent, as well as chemical analyses of effluent from the Cottage Farm, Prison Point, and Somerville Marginal CSO facilities.

POTW Sampling At the treatment plants, effluent sampling normally took place on the second full week of the month and over a six-day period in order to fulfill the requirements of the chronic 7-day renewal test. The chronic 7-day renewal test required samples to be collected on Day 2, Day 4, and Day 6 of each sampling period. During each sampling event, two time-composite samplers were set up. One sampler collected samples for chemical analyses while the other collected samples for the WET tests. Grab samples were also collected at the onset of each sampling event.

Treatment plant influent sampling, managed by TRAC, monitored the same chemical parameters called for by the NPDES effluent characterization. Influent samples were collected at the same time effluent samples were collected. No WET tests were conducted on the influent.

CSO Facilities Sampling At the CSO facilities, during each activation, grab samples were collected for bacteria analyses and composited samples for other conventional parameters analyses. In addition to conventional parameter testing, composite samples were collected from Cottage Farm, Prison Point, and Somerville Marginal, the three permitted CSO facilities, for selected priority pollutant analyses. Priority pollutant monitoring was conducted only once a month usually during the first activation of the month.

In FY95, these laboratories performed analyses:

Chemical analyses	Aquatec, Inc. New Bedford, Massachusetts.
	Energy and Environmental Engineering Somerville, Massachusetts
	Central Laboratory Environmental Quality Department MWRA
WET tests	Aquatec, Inc. Colchester, Vermont.

Table II-4 lists parameters, sampling frequency, analytical procedures, and other information relevant to the NPDES Compliance Monitoring Program.

B.2 Plant Monitoring Program

The Plant Monitoring Program consists of Process Control as well as NPDES-required monitoring. This report, however, will only present data addressing NPDES Permit compliance concerns. Time-composite samplers were set up at the influent, effluent, and at several process control locations. Grab samples were taken at the end of the 24-hour composite sampling period from the influent and effluent sampling locations.

The Central Lab performed most of the analyses for both the Deer Island and Nut Island samples except for Nut Island influent and effluent bacteria analyses, which were conducted by the Nut Island Lab. In addition, the Nut Island Lab also conducted analyses on sludge samples. Table II-5 lists parameters, sampling frequency, analytical procedures, and other information relevant to the Plant Monitoring Program.

B.3 Harbor Studies Monitoring Program

The Harbor Studies Monitoring Program was a specialized study done to better estimate the concentration of pollutants in the effluent. The program used analytical methods that have detection levels that were lower by a magnitude of 1,000 than EPA approved methodologies. The Harbor Studies Monitoring Program analyzed for polynuclear aromatic hydrocarbons (PAHs), pesticides and polychlorinated biphenyls (PCBs), and eight selected metals.

C. Treatment of Results

Sometimes it is hard to decipher analytical results and to be sure if the results of analyses are truly reflecting what is in the sample. For conventional parameters, calculating the average concentration of a particular parameter is straightforward, taking the straight average. However, in dealing with metals, pesticides, and organics, where very frequently the analytical results were below method detection level, data was manipulated. Appendix I gives a brief description of method detection limits and how measurements below detection limits are treated in this report.

Keep in mind that with the large flows going through both Deer and Nut Island Treatment Plants, taking one small sample may not always be truly representative. It is also important to keep in mind that certain parameters (conventional) were analyzed daily while other parameters (priority pollutants) were only analyzed two or three times per month.

Monthly average concentrations for priority pollutants (metals, cyanide, pesticides/PCBs, and organic compounds) were calculated by adding the loadings of the pollutant during each sampling event for that month and then dividing it by the total flow during those sampling events.

$$\frac{\sum_{i-n}^{n=\#\text{ sampling events}} \left[(\text{concentration}_i)(\text{daily flow}_i)\right]}{\sum_{i-n}^{n=\#\text{ sampling events}} \left[\text{daily flow}_i\right]}$$

Average annual concentrations were calculated using the same method, taking each individual sampling event in the calculation.

Table II.4

NPDES Compliance Monitoring Program

Parameter	Sample Type[1]	Sampling Frequency Influent	Sampling Frequency Effluent	Analytical Method[2]
Metals				
Antimony	Composite	2 x month	3 x per month	204.2
Arsenic	Composite	2 x month	3 x per month	206.2
Beryllium	Composite	2 x month	3 x per month	200.7
Boron	Composite	2 x month	3 x per month	200.7
Cadmium	Composite	2 x month	3 x per month	213.1
Chromium	Composite	2 x month	3 x per month	200.7
Lead	Composite	2 x month	3 x per month	239.2
Mercury	Composite	2 x month	3 x per month	245.1
Molybdenum	Composite	2 x month	3 x per month	200.7
Nickel	Composite	2 x month	3 x per month	200.7
Selenium	Composite	2 x month	3 x per month	270.2
Silver	Composite	2 x month	3 x per month	200.7
Thallium	Composite	2 x month	3 x per month	279.2
Zinc	Composite	2 x month	3 x per month	200.7
Cyanide	Grab	2 x month	3 x per month	335.2
TPH	Grab	2 x month	1 x per week	418.1
Pesticides/PCBs	Composite	2 x month	3 x per month	608
Semi-volatiles	Composite	2 x month	3 x per month	625
Volatiles	Grab	2 x month	3 x per month	624
Whole Effluent Toxicity[3]	Composite		1 x per month	WET Test Protocols

1 Influent and effluent composite samples are 24-hour time composite samples
2 EPA Methods
3 Effluent sample only

Table II.5

Deer Island and Nut Island Treatment Plants Monitoring Program

Parameter	Type[1]	Frequency	Analytical Method [2]
Conventional			
pH	Grab	1 x day	150.1
Settleable Solids	Grab	1 x day	160.5
Biochemical Oxygen Demand	Composite	1 x day	405.1
Total Suspended Solids	Composite	1 x day	160.2
Total Coliform	Grab	3 x day	9222 D [3]
Fecal Coliform	Grab	3 x day	9222 B [3]
Oil and Grease	Grab	1 x week	413.1
Total Chlorine Residual	Grab	3 x day	330.5
Chlorides	Composite	1 x day	4500 B [3]
Metals			
Copper	Composite	1 x week	220.1
Zinc	Composite	1 x week	289.1
Iron	Composite	1 x week	236.2
Lead	Composite	1 x week	239.2
Nutrients [4]			
Total Kjeldahl Nitrogen	Composite	1 x week	351.3
Ammonia	Composite	1 x week	350.2
Nitrates	Composite	1 x week	353.3
Nitrites	Composite	1 x week	354.1
Orthophosphorus	Composite	1 x week	365.2
Total Phosphorus	Composite	1 x week	365.2

1 Influent and effluent composite samples are 24-hour time composite except for samples for metals analyses which are aliquot portions of the 24-hour daily composite sample

2 EPA Methods

3 Standard Methods

4 Sampling frequency is once a week at Deer Island but once a month at Nut Island.

III. An Overview of the MWRA Sewerage System and Facilities

The MWRA is responsible for the collection, transport, pumping, treatment, and disposal of sewage in Boston and the greater Boston area. The MWRA also operates a third treatment plant. This plant serves the Town of Clinton and the Lancaster Sewer District under special arrangements originating at the time the Metropolitan District Commission (MDC) acquired land in Clinton for the Wachusett Reservoir. The Clinton Treatment Plant operates under a permit separate from the Boston NPDES permit and will not be discussed in this report.

The MWRA serves 43 communities with a total population of over 2.0 million people, over 5,500 businesses, and over 1,400 industries. Over 5,400 miles of town and city-owned local sewers connect at over 1,800 points to over 230 miles of MWRA interceptor sewers. Also included in the vast sewerage system are nine pumping stations, four headworks, over 85 combined sewer overflows, six CSO treatment facilities and two treatment plants. Table III.1 lists the MWRA treatment facilities and relevant information pertaining to each facility.

The two plants, Deer Island in Winthrop and Nut Island in Quincy, serve the 43 communities in the metropolitan Boston sewerage system and are allowed to discharge under the Boston NPDES Permit. The sewerage system is divided into two major regions: the North and the South. Deer Island provides primary treatment to sewage flows from the North System while Nut Island provides primary treatment to sewage flows from the South System. Table III-2 lists the sewerage service area population by community.

A. North System

The North System serves a population of about 1.3 million and is located to the north and west of Boston. Most of the North System is separate, that is, sanitary wastewater and stormwater are carried in different conduits. However, portions of Boston, Cambridge, Somerville, and Chelsea, still have combined sewers. Community sewer lines tie into the MWRA system through interceptor lines that feeds into remote headwork facilities.

Three remote headworks connect to the North Main Pumping Station (NMPS) at Deer Island by two deep rock tunnels, the Boston Main Drainage Tunnel (BMDT) and the North

Facilities Metropolitan Relief Tunnel (North Metro Relief). The seven-mile BMDT originates from the Ward Street Headworks and runs under Boston Harbor to the NMPS. Columbus Park Headworks empties into the BMDT. The four-mile North Metro Relief connects the Chelsea Creek Headworks to the NMPS. The two tunnels combined can handle approximately 800 MGD, matching the combined peak flow capacity of 788 MGD from the three remote headworks.

A fourth headwork, the Winthrop Terminal, is located on Deer Island and receives flows from the City of Winthrop and the Caruso Pump Station through the North Metro Trunk Sewer. Figure III-1 shows the North System schematics.

A.1 Pumping Stations

Five pumping stations are located throughout the MWRA North System. Alewife Brook (64 MGD), Caruso (110 MGD), DeLauri (90 MGD), Allison Hayes (11 MGD), and Prison Point (5 MGD), convey wastewater to the headwork facilities. The five pumping stations receive flow from interceptor lines as follows:

Alewife Brook	Lexington Branch Sewer Alewife Branch Sewer Alewife Branch Conduit
Caruso Station	Revere Branch Sewer East Boston Branch Sewer Chelsea Branch Sewer North Metro Relief Sewer *
DeLauri Station	Cambridge Branch Sewer Charlestown Branch Sewer Medford-Somerville Branch Sewer Prison Point Pump Station Somerville Marginal CSO overflow **
Allison Hayes Station	Wakefield Branch Sewer
Prison Point	Boston Marginal Conduit Cambridge Marginal Conduit

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* When flow to the Chelsea Headworks is held back, wastewater is diverted to the Caruso Station.

** During low-intensity rainfall when line capacity is not exceeded, the combined wastewater is pumped back to the trunk sewers and ultimately to the DeLauri Station.

Table III.1 List of Treatment Facilities and Discharge Locations

Facility Name	Location	First year of Operation	Treatment Process	Design Flow (MGD)	Conduit Size At Facility In	Conduit Size At Facility Out	Outfall Number	Receiving Water
POTW								
Deer Island	Deer Island Boston, MA (North System)	1968	Screening Sedimentation Chlorination	343		9'x 10' 6'x 6.5' BLOCKED 9' Dia 9' Dia	MWR001 MWR002 MWR003 MWR004 MWR005	Boston Harbor
Nut Island	147 Sea St. Quincy, MA (South System)	1952	Screening Sedimentation Chlorination	112		5'Dia 5'Dia 5'Dia 5'Dia	MWR101 MWR102 MWR103 MWR104	Boston Harbor
CSO FACILITIES								
Cottage Farm	Memorial Dr. near Boston University Bridge, Cambridge	1971	Screening Settling Chlorination Detention	233	72" N. Charles Relief 42" S. Charles Relief 54" Brookline	96" Outfall	MWR201	Charles River
Prison Point	Near Museum of Science Bridge, Cambridge	1980	Screening Settling Chlorination Detention	385	10' Conduit	8' Conduit	MWR203	Inner Harbor
Somerville Marginal	McGrath Highway under Route I-93, Somerville	1973*	Screening Chlorination	245	7' x 7.5' Conduit 84" Conduit	6' x 8' Conduit	MWR205	Mystic River
Constitution Beach	Off Shore St. East Boston	1987	Screening Chlorination	20	36" Conduit	36" Conduit	BOS002	Boston Harbor
Fox Point	Freeport Street near Southeast Expressway, Dorchester	1989	Screening Chlorination	119	10' x 12' Conduit	10' x 12' Conduit	BOS089	Dorchester Bay
Commercial Point	Victory Road Dorcester	1991	Screening Chlorination	194	15' x 11' Conduit	15' x 11' Conduit	BOS090	Dorchester Bay

* Rehabilitated in 1988
MWR refers to MWRA
BOS refers to BWSC

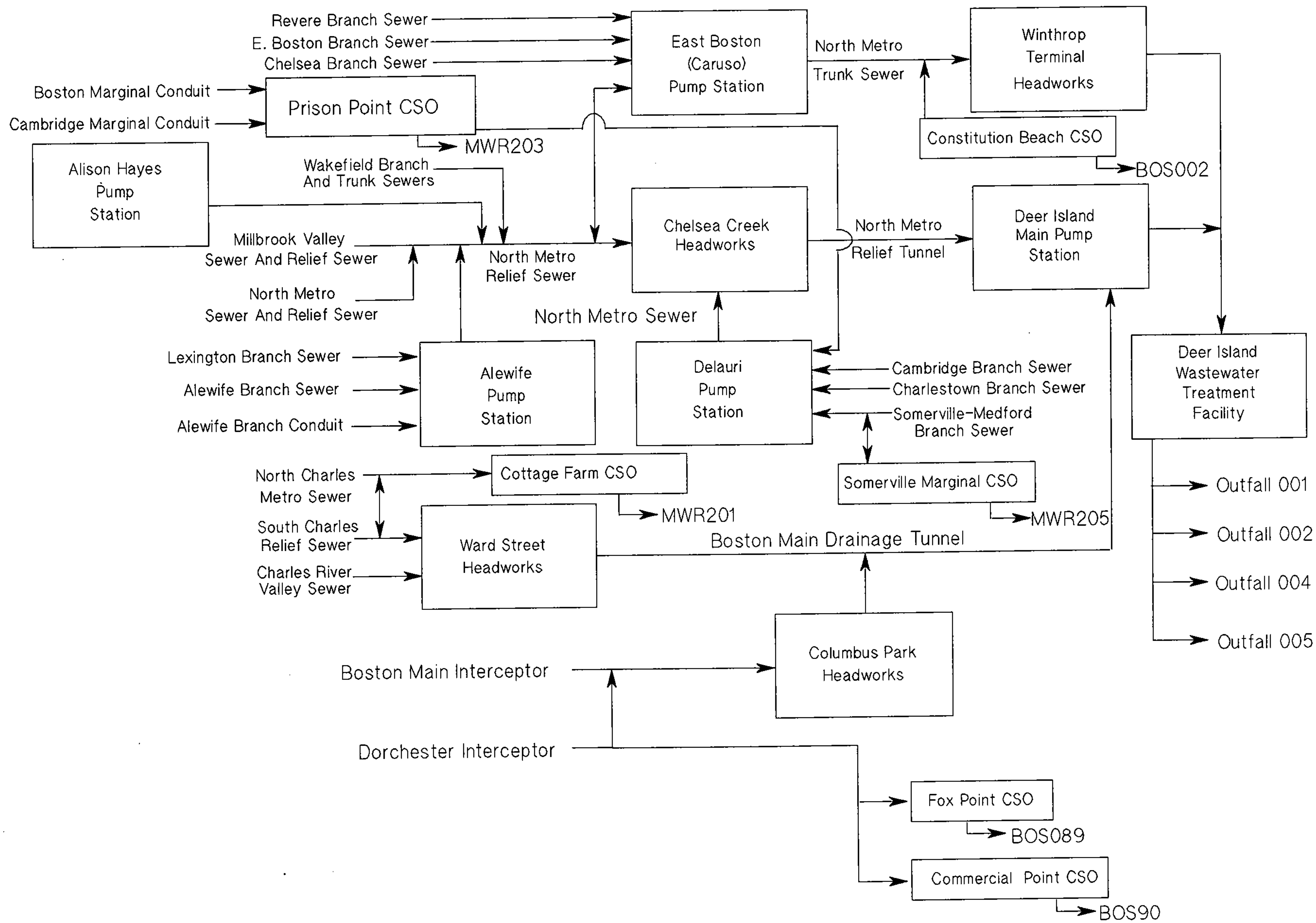
SEWERAGE SERVICE AREA POPULATION BY COMMUNITY
1992

March 16, 1995

TOWN	N. SYSTEM	S. SYSTEM	SEWERED N. SYSTEM	SEWERED S. SYSTEM	TOTAL	SEWERED TOTAL
Arlington	44,126		44,082		44,126	44,082
Ashland		12,355		7,166	12,355	7,166
Bedford	12,942		10,095		12,942	10,095
Belmont	24,367		23,855		24,367	23,855
Boston	415,727	135,948	415,311	135,812	551,675	551,123
Braintree		33,840		32,994	33,840	32,994
Brookline	21,240	31,823	21,155	31,696	53,063	52,851
Burlington	23,301		21,903		23,301	21,903
Cambridge	93,554		93,460		93,554	93,460
Canton		19,112		13,570	19,112	13,570
Chelsea	26,786		26,759		26,786	26,759
Dedham		23,662		21,532	23,662	21,532
Everett	35,087		35,052		35,087	35,052
Framingham		63,352		58,258	63,352	58,258
Hingham		6,098		5,061	6,098	5,061
Holbrook		11,050		6,630	11,050	6,630
Lexington	28,998		26,968		28,998	26,968
Malden	53,709		53,655		53,709	53,655
Medford	56,702		56,645		56,702	56,645
Melrose	27,777		27,749		27,777	27,749
Milton	1,902	23,999	1,750	22,079	25,901	23,829
Natick		30,428		24,738	30,428	24,738
Needham		27,674		24,353	27,674	24,353
Newton	30,537	51,589	29,713	50,196	82,126	79,909
Norwood		28,654		28,147	28,654	28,147
Quincy		84,457		84,373	84,457	84,373
Randolph		30,372		29,765	30,372	29,765
Reading	22,671		20,404		22,671	20,404
Revere	42,751		42,708		42,751	42,708
Somerville	72,303		72,231		72,303	72,231
Stoneham	22,183		21,628		22,183	21,628
Stoughton		26,979		15,888	26,979	15,888
Wakefield	25,118		24,038		25,118	24,038
Walpole		20,545		12,163	20,545	12,163
Waltham	56,698		56,641		56,698	56,641
Watertown	32,443		32,411		32,443	32,411
Wellesley		26,655		24,549	26,655	24,549
Westwood		12,940		10,352	12,940	10,352
Weymouth		54,584		49,671	54,584	49,671
Wilmington	18,488		1,997		18,488	1,997
Winchester	20,504		20,483		20,504	20,483
Winthrop	17,980		17,962		17,980	17,962
Woburn	36,407		34,951		36,407	34,951
TOTALS	1,264,302	756,115	1,233,607	688,992	2,020,417	1,922,599

Source: Infiltration / Inflow Report, MWRA FY95

Figure III.1 North System Pump Stations, Headworks, CSO's and Tunnel Hydraulic Schematic



A.2 Headworks

The Deer Island Treatment Plant receives flow from three remote headworks and the Winthrop Terminal Headworks. The three remote headworks, the Ward Street Headworks (256 MGD) located in Roxbury, the Columbus Park Headworks (182 MGD) located in South Boston, and the Chelsea Creek Headworks (350 MGD) located in Chelsea, have a combined pumping capacity of 788 MGD. The Winthrop Headworks (125 MGD) is located on Deer Island. The four headworks receive flows from interceptor lines or Pumping Stations as follows:

Ward Street	South Charles Relief Sewer Charles River Valley Sewer North Charles Metro Sewer * Cottage Farm CSO *
Columbus Park	Boston Main Interceptor Dorchester Interceptor
Chelsea Creek	Alewife Pump Station North Metro Relief Sewer DeLauri Pump Station Caruso Pump Station Overflow
Winthrop Terminal	Winthrop Sewer Caruso Pump Station **

* During low-intensity rainfall when line or holding capacity are not exceeded, the combined wastewater is pumped back to the trunk sewers and ultimately to the Ward Street Headworks.

** Overflow from the Caruso Pumping Station.

A.3 Combined Sewer Overflow Facilities

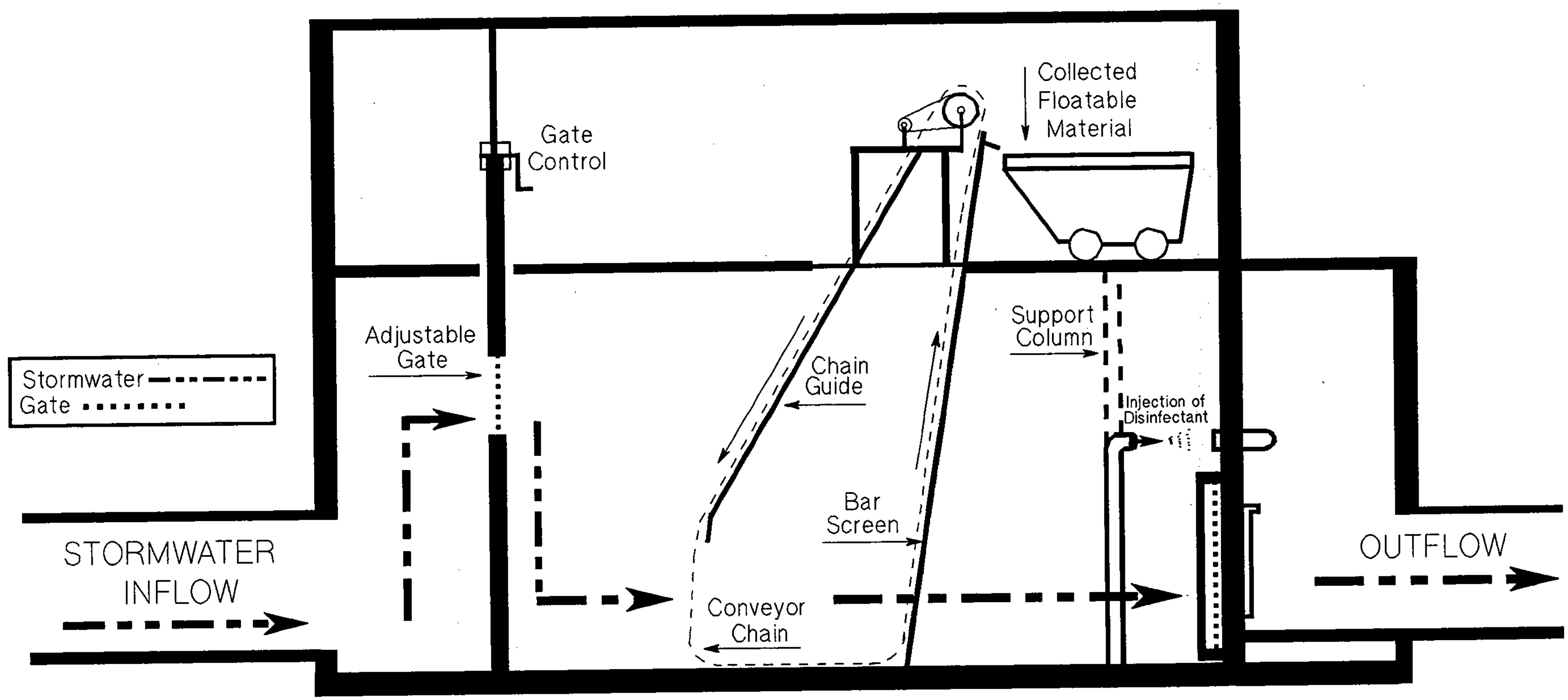
The conditions for discharge of effluent from three CSO chlorination facilities are also included in the Boston NPDES Permit. These three CSO chlorination facilities, Cottage Farm in Cambridge, Prison Point in Cambridge, and Somerville Marginal in Somerville discharge to the Charles River, the Inner Harbor, and the Mystic River respectively. Three other CSO chlorination facilities, Constitution Beach in East Boston, Fox Point in Dorchester, and Commercial Point in Dorchester, are owned and operated by the MWRA. Effluent from these facilities discharge to BWSC lines and are included in the BWSC NPDES permit.

Discharge of combined wastewater from a CSO treatment facility to a receiving body of water is defined in this report as a CSO activation. Discharge of combined wastewater to a CSO outfall pipe is defined as a CSO overflow. CSO overflows will not be discussed in this report. In general, CSO activations occur as a result of heavy rain, snowmelt, or choking at the headworks. Choking is the process by which the headworks restrict the flow to Deer Island. During wet weather, when the wastewater volume exceeds the hydraulic capacity of the treatment plant, the headworks "chokes" the flow and holds the wastewater in the lines. As a result, the combined wastewater backs up into the system, forcing the combined wastewater to overflow to CSO treatment facilities and CSO outfall pipes, resulting in potential CSO activations and overflow. In addition to choking in response to hydraulic demand on the system, the headworks may choke to perform emergency repairs, system testing, or maintenance work at the treatment plant. Most of the choking that occurred in FY95 was for these reasons and did not result in any CSO activations. Choking at Ward Street and Columbus Park Headworks influences Cottage Farm activations. Choking at the Columbus Park Headworks influences activations at Fox Point and Commercial Point CSOs. Backups at the DeLauri Pumping Station brought about by choking at the Chelsea Headworks activates the Somerville Marginal CSO.

At the CSO facility, the combined wastewater is chlorinated prior to discharge. Of the six CSO facilities, only Cottage Farm and Prison Point have pumping and tank storage capacities. This allows for chlorinated wastewater to be held at these facilities up to their storage capacities. Any wastewater exceeding that storage capacity overflows and is discharged to the river. Four other CSO facilities are gravity CSO facilities, which means combined wastewater arrives and leaves the CSO facility by gravity. This type of facility provides disinfection and allows the chlorinated combined wastewater to overflow to the receiving water as quickly as the wastewater arrives at the facility. Figure III.2 is a schematic of a typical CSO treatment facility.

The six CSO facilities provide treatment for approximately 50% of the CSO volume while the other half overflows in any of the 85 permitted CSO overflow structures of the sewerage system without the benefit of any type of treatment. Of the 85 permitted CSO overflow structures, 53 are located in Boston, 15 in Cambridge, 5 in Chelsea, and 12 in Somerville. These outfalls discharge into Boston Harbor, the Alewife Brook, the Mystic River, the Charles River, and the Neponset River.

Figure III.2 Combined Sewer Overflow Treatment Facility



Prison Point Combined Sewer Overflow Facility

Prison Point is both a dry weather and stormwater pumping station. The dry weather phase is a five-MGD capacity sewer pumping station that receives flow from the Boston Marginal Conduit and the Cambridge Marginal Conduit. Prison Point feeds into the DeLauri Pumping Station.

The stormwater phase has a maximum pumping capacity of 385 MGD. Treatment includes screening, detention, and disinfection. During wet weather, if the dry pumping capacity is exceeded, the combined flow is screened, chlorinated, and held in detention basins. Once the basins fill, treated flow is discharged downstream below the new Charles River Dam at outfall MWR203. Combined wastewater volume that is held back (up to 1.2 MGD) is pumped back to the DeLauri Station. This facility came on line in 1980.

Cottage Farm Combined Sewer Overflow Facility

Cottage Farm, like Prison Point, is a two-phase facility. During dry weather conditions, wastewater arrives at the Ward Street Headworks where it is pumped to the Deer Island Plant. Under storm conditions, wastewater backs up into sewer lines and into the Cottage Farm CSO facility. Cottage Farm detains wastewater up to a volume of 1.3 MG. Any excess flow is screened, settled, chlorinated, and discharged to the Charles River through outfall MWR201. Combined wastewater that is held back is pumped back to the Ward Street Headworks. This facility, on line since 1971, has a design pumping capacity of 233 MGD.

Somerville Marginal Combined Sewer Overflow Facility

Somerville Marginal CSO is an unmanned gravity facility with a design capacity of 245 MGD. It receives wet weather flow from the northeast portion of Somerville and part of Medford. Normally, dry weather flow from these areas arrives at the DeLauri Station via the Somerville-Medford trunk sewers. During wet weather, combined sewer flow backs up to the Somerville CSO facility. Unlike Cottage Farm or Prison Point, this facility does not provide any detention capacity during storm conditions. Treatment consists of screening and chlorination. Effluent is discharged to the lower Mystic River basin at outfall number MWR205. During low-intensity rainfall when line capacity is not exceeded, the combined wastewater is pumped back from a wet well to the DeLauri Station. This facility came on line in 1973 and was upgraded in 1988.

Constitution Beach Combined Sewer Overflow Facility

Constitution Beach is an unmanned gravity facility with a design capacity of 20 MGD. It receives flows from the North Metro Trunk sewer. Treatment consists of screening and disinfection. Effluent is discharged to a BWSC line that ultimately discharges to Boston Harbor through BOS002. This outfall is included in the BWSC permit. Since the issuance of that permit, full ownership of Constitution Beach CSO Facility has been transferred to MWRA. This facility came on line in 1987.

Fox Point Combined Sewer Overflow Facility

Fox Point has a design capacity of 119 MGD. It receives wet weather flows from the Dorchester Interceptor sewer line. Operation of this facility parallels that of the Constitution Beach CSO; treatment includes screening and disinfection. Effluent is discharged to a BWSC sewer line that discharges to Dorchester Bay through BOS089. This outfall is included in the BWSC permit. This facility came on line in 1989.

Commercial Point Combined Sewer Overflow Facility

Commercial Point is an unmanned gravity CSO with a design capacity of 194 MGD. This facility also receives wet weather backups from the Dorchester Interceptor. Treatment includes screening and disinfection. Effluent is discharged to a BWSC line that ultimately discharges to Dorchester Bay through BOS090. This outfall is included in the BWSC permit. This facility came on line in 1991.

A.4 Deer Island Treatment Plant

Deer Island Plant receives wastewater at the NMPS and the Winthrop Terminal. The NMPS consists of ten pumps, each rated at 110 MGD. Currently, five pumps are in service while the other five are being overhauled. Once these pumps are put in service, which is expected in FY98, the NMPS will have a total rated pumping capacity of 1100 MGD.

The Deer Island Treatment Plant, in operation since June of 1968, serves 22 communities and portions of Boston, Brookline, Newton, and Milton. The service area encompasses approximately 168 square miles. Grit removal and screening is provided at the remote headworks. Flow from the City of Winthrop is degritted at the Winthrop Terminal. Grit chambers and screens remove heavy particles and debris from the wastewater. Grit and screenings are landfilled off-site. The old Deer Island facility consisted of a preaeration channel, eight sedimentation tanks, four thickeners, and four digesters. Figure III.3 presents the old Deer Island process flow diagram and includes:

- preaeration
- primary settling
- disinfection
- anaerobic digestion

Wastewater flowed through the preaeration channel where air was introduced to help in the settling process and to avoid odor problems. The wastewater then flowed to the sedimentation tanks where floatables, consisting mainly of oil, grease, and plastics, rose to the surface while the sludge, consisting of heavy solid particles, settled to the bottom. Effluent from the sedimentation tanks was disinfected with sodium hypochlorite prior to discharge. The scum (floatables) was skimmed off the top while the sludge (settled solids) was scraped from the bottom of the sedimentation tanks. Scum was pumped to the scum concentrator while the sludge was pumped to the sludge thickeners. After the scum and sludge were concentrated and thickened, they were conveyed to the anaerobic digesters for further treatment. The digested sludge was barged to the Fore River Pelletizing Plant where it was converted into fertilizer.

The new primary treatment plant came on line on January 21, 1995. The new primary plant has new grit chambers (16 units) and two batteries of primary sedimentation tanks (24 tanks). Two other batteries of primary tanks, sludge gravity thickeners (3), two modules of anaerobic sludge digesters (8 units), and other components of the new Deer Island plant are scheduled to be put in service within the next fiscal year. The remaining units are scheduled on-line in FY97, FY98, and FY99. Figure III-4 presents the new Deer Island plant process flow diagram.

Effluent is channeled through a common conduit to four potential outfall pipes, 001, 002, 004 and 005. Figure III-5 illustrates the Deer Island outfall schematics while Table III-3 presents the specifics of each outfall. Outfalls 001, 002 and 004 connects to Chamber C while 005 connects to Chamber A. A sluice gate in Chamber A controls discharge from 005. Likewise, a sluice gate in Chamber C isolates discharge from 004. Of the five permitted outfalls, only outfalls 001 and 002 are used regularly. Outfalls 004 and 005 are used only during high flow conditions. Outfall 003 is out of service.

Figure III-3 - (Old) Deer Island Treatment Facility Flow Diagram

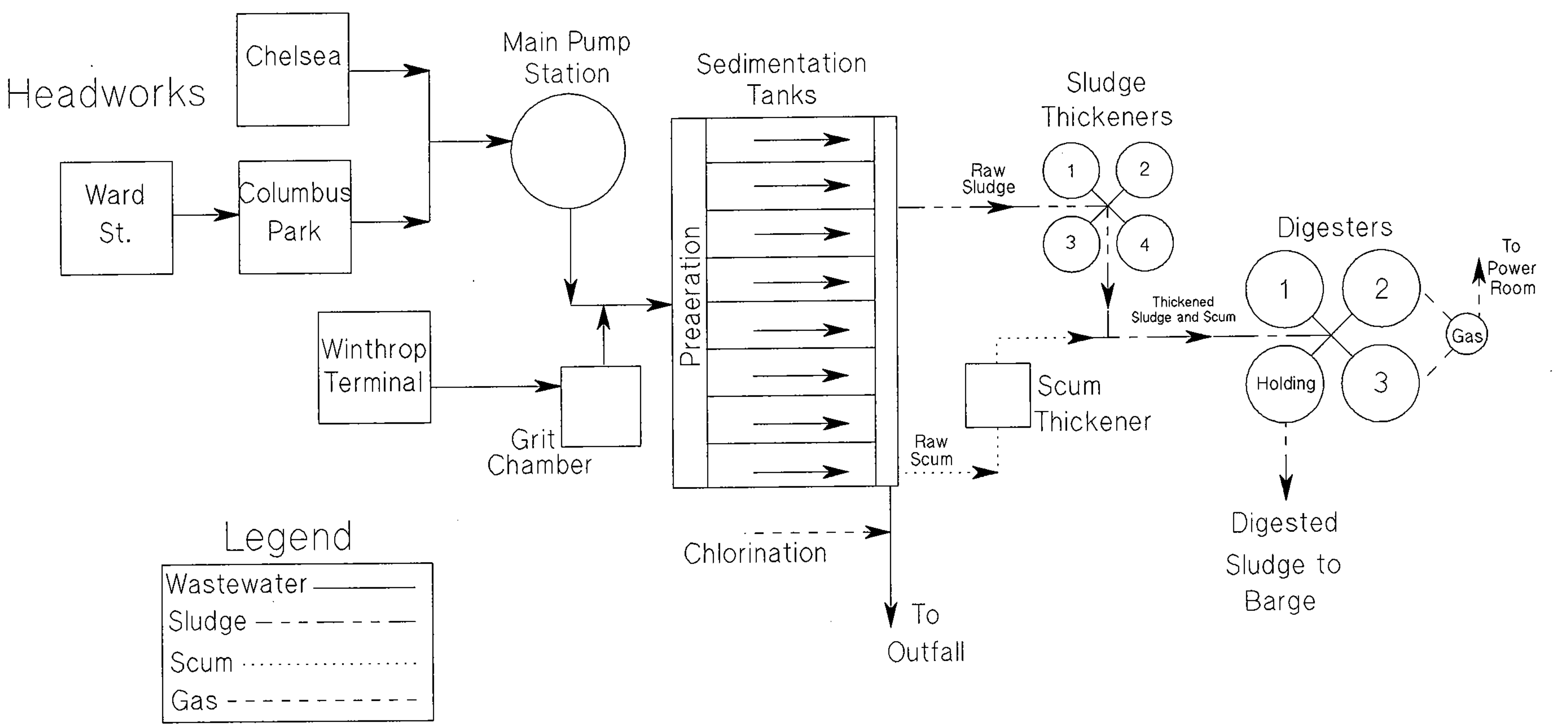


Figure III-4 - (New) Deer Island Treatment Facility Flow Diagram

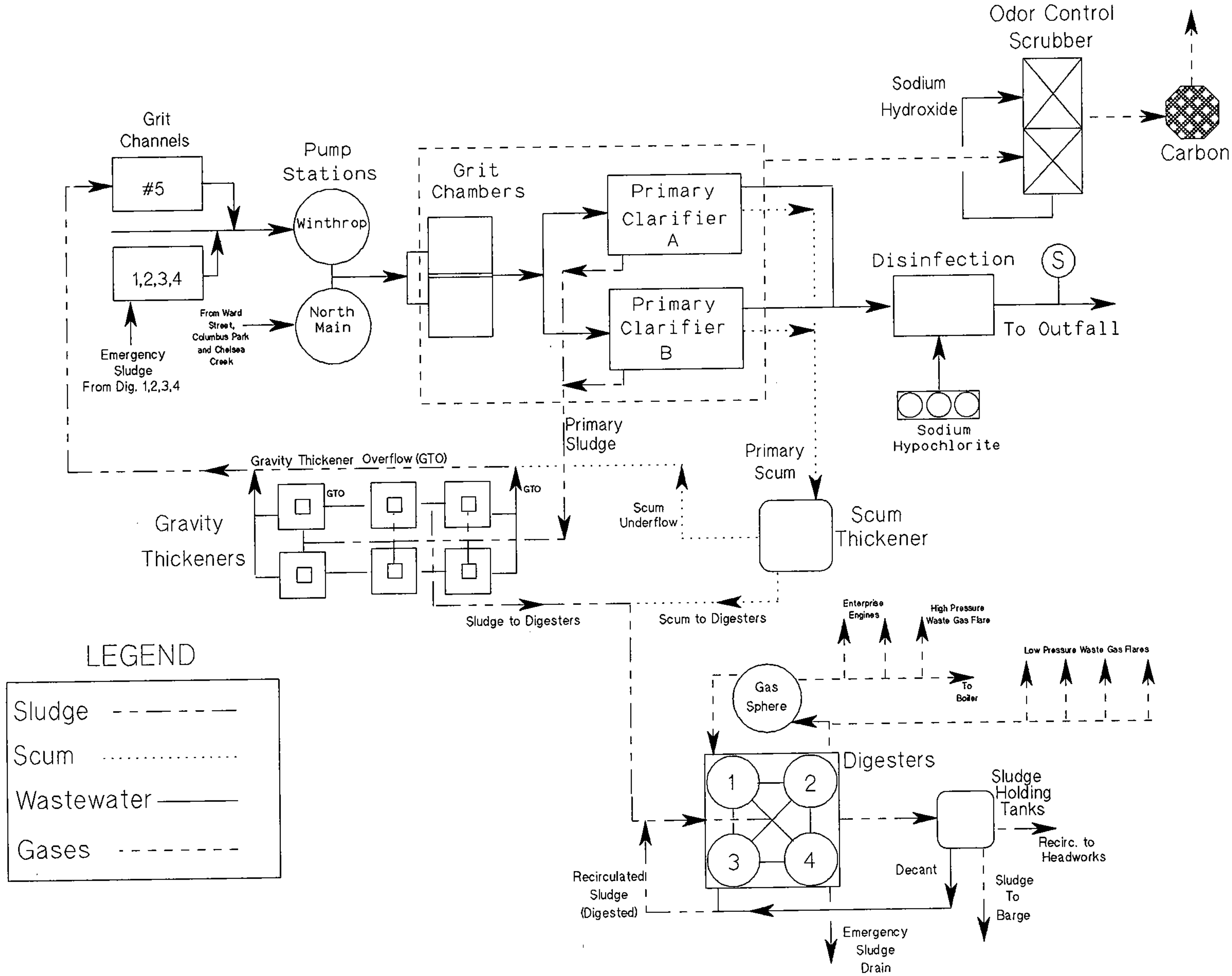
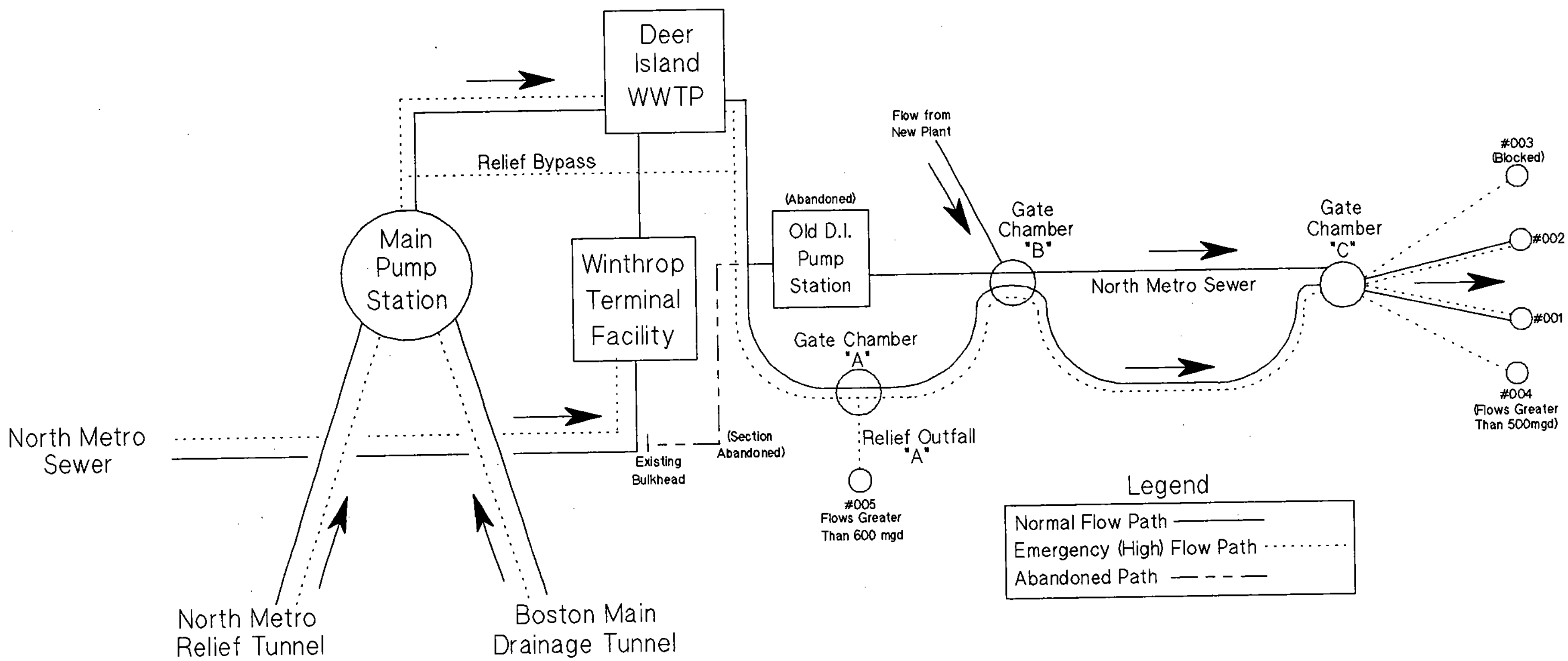


Figure III.5 Deer Island Outfall System Schematic



Relief outfall 005, although not used, can be activated during extremely high flows or emergency situations. In FY95, Outfall 005 was only activated to divert the flow during the construction work for the new plant effluent tie-in to Chamber B. Outfall 003 is permanently blocked.

Table III-3
Deer Island Outfall Characteristics

	Outfall Number			
	No. 001	No. 002	No. 004	No. 005
Length, ft	2260	2565	500	135
Discharge Elevation, ft	54.7	54.7	97.8	98
Number of Open Ports	14	47	1	1
Port Diameter, ft	1.67	1.69	9	9
Chamber Invert Elevation, ft	98.1	98.1	98.1	103.2
Chamber Overflow Elevation,ft	120	120	120	125
Pipe Size, in	16 x 12 to 12 x 10 to 10 (diam)	6 x 6.25 to 9 (diam)	9 (diam)	9 (diam)
Pipe Material	Concrete to Concrete to RC	Brick with Concrete Encasing	Reinforced Concrete (RC)	RC
Year Built	1896	1959	1959	1959

The amount of wastewater that can be pumped to the plant is not only limited by sewer line capacity, treatment plant capacity, and pumping capacity, but also by the outfall pipe capacity. The approximate amounts of treatment plant effluent that can be discharged through the outfalls are as follows:

Outfalls 001 & 002
High tide 400 MGD
Low tide 735 MGD

Outfalls 001 & 002 & 004
High tide 635 MGD
Low tide 900 MGD

Outfalls 001 & 002 & 004 & 005
High tide 900 MGD
Low tide 1,270 MGD

B. South System

The South System serves a population of about 0.70 million and is located to the south and southwest of Boston. The South System is all separate. Figure III-6 illustrates the South System schematics. Community sewer lines tie into the South System through MWRA interceptor lines. The Framingham Extension Sewer, Wellesley Extension Sewer, Upper Neponset Valley Sewer, Wellesley Extension Relief Sewer, Neponset Valley Sewer, Walpole Extension Sewer, Stoughton Extension Sewer, Braintree-Randolph Trunk Sewer, and several other branch sewers discharge to the High Level Sewer. Five pump stations move the wastewater through the High Level Sewer to Nut Island Treatment Plant.

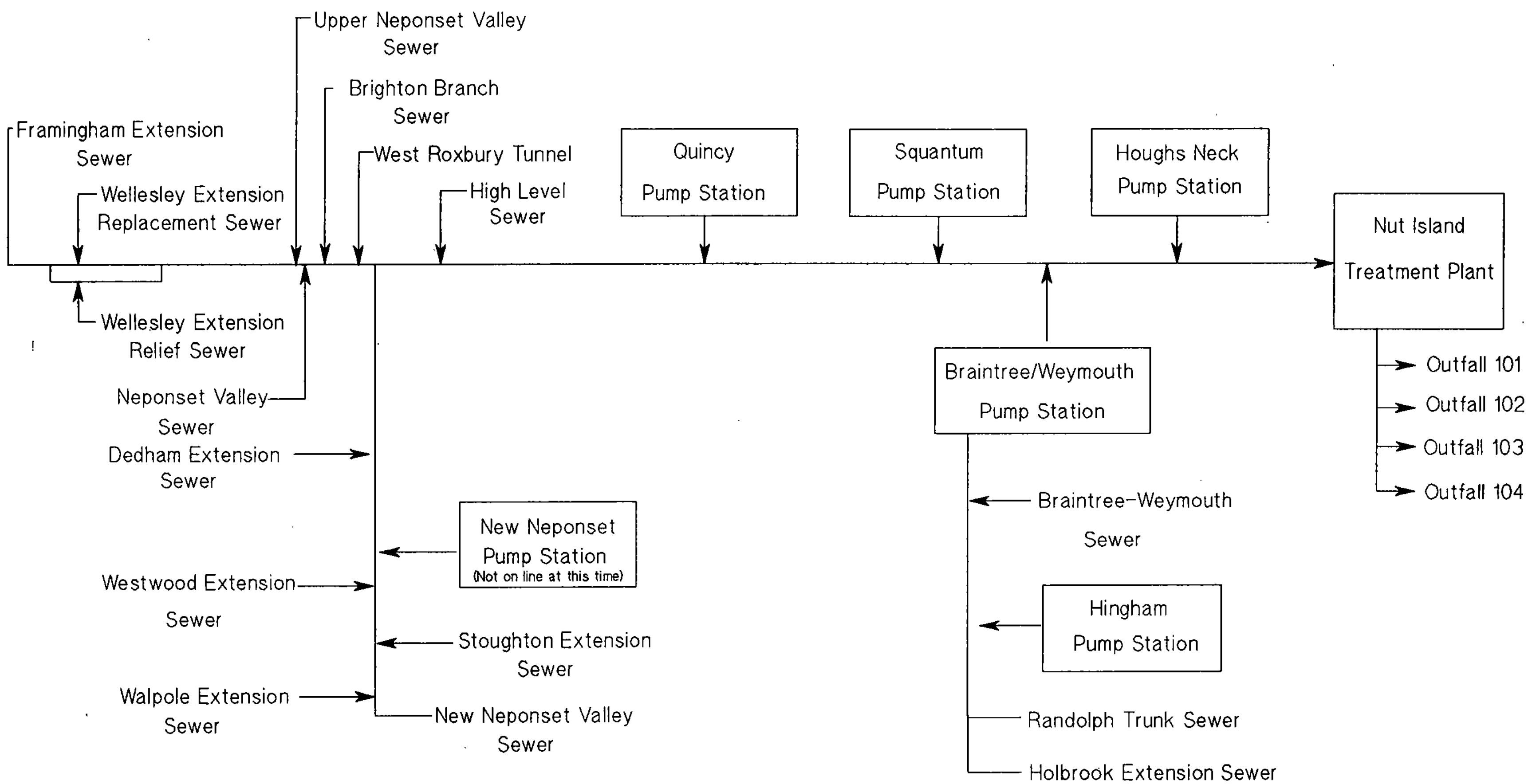
B.1 Pumping Stations

Gravity lines feed into the high level sewer. Five MWRA pumping stations move wastewater from low-lying areas to the High Level Sewer: Hingham Pump Station (16.5 MGD), Braintree-Weymouth Pump Station (60 MGD), Quincy Pump Station (52 MGD), Squantum Pump Station (12 MGD), and Houghs Neck Pump Station (2.8 MGD). The high level sewer conveys wastewater to the Nut Island Plant.

The five pumping stations receive flow from interceptor or community lines as follows:

Hingham Pump Station	Weymouth-Hingham Sewer Lines
Braintree-Weymouth Pump Station	Braintree-Randolph Trunk Sewer Braintree-Weymouth Extension Sewer Holbrook Extension Sewer Hingham Pumping Station
Quincy Pump Station	Quincy Sewers
Squantum Pumping Station	Squantum Sewers
Houghs Neck Lift Station	Houghs Neck Sewer

Figure III.6 South System Hydraulic Schematic



B.2 Nut Island Treatment Plant

The Nut Island Treatment Plant, in operation since 1952, serves 17 communities in the southern portion of the sewerage system and parts of Boston, Brookline, Newton, and Milton, a total of 21 communities. The area served by Nut Island is approximately 238 square miles. Nut Island plant was designed to provide primary treatment for an average daily flow of 112 MGD and a peak flow of 230 MGD. Figure III.7 presents the Nut Island process flow diagram.

Current treatment processes include:

- screening and grit removal
- preaeration
- primary settling
- disinfection
- anaerobic digestion.

Nut Island consists of two bar screens, six grit chambers, five preaeration tanks, six sedimentation tanks, and four digesters. Wastewater entering Nut Island passes through bar screens and grit chambers. Grit and screenings are sent to a landfill. Wastewater is pumped to the preaeration channels and then flows by gravity through the sedimentation tanks. Scum is skimmed off the top and sent to a landfill. Sludge is scraped from the bottom and pumped to the anaerobic digesters for further treatment. The digested sludge is barged to the Fore River Pelletizing Plant where it is converted to fertilizer. Effluent is disinfected with chlorine gas prior to discharge through outfalls that discharge to Nantasket Roads Channel in Boston Harbor and Hingham Bay.

The Nut Island outfall system consists of four outfalls. The three main outfalls, designated 101, 102 and 103 are each five feet in diameter but of varying lengths. Outfalls 101 and 102 are used on a daily basis while outfall 104 is used only during extreme high tide conditions (el. 115.7) and plant inflows approaching 230 MGD. Outfalls 101, 102, and 103 discharge to Boston Harbor. Outfall 104 is used to handle flow in excess of the capacity of the three main outfalls. Outfall 104 discharges to Hingham Bay.

The amount of wastewater that can be pumped to the plant is not only limited by sewer line capacity, treatment plant capacity, and pumping capacity, but also by the outfall pipe capacity. Figure III.8 shows the Nut Island outfall system schematic while Table III-4 lists pertinent information about the Nut Island outfalls.

Figure III.7 Nut Island
Wastewater Treatment Plant

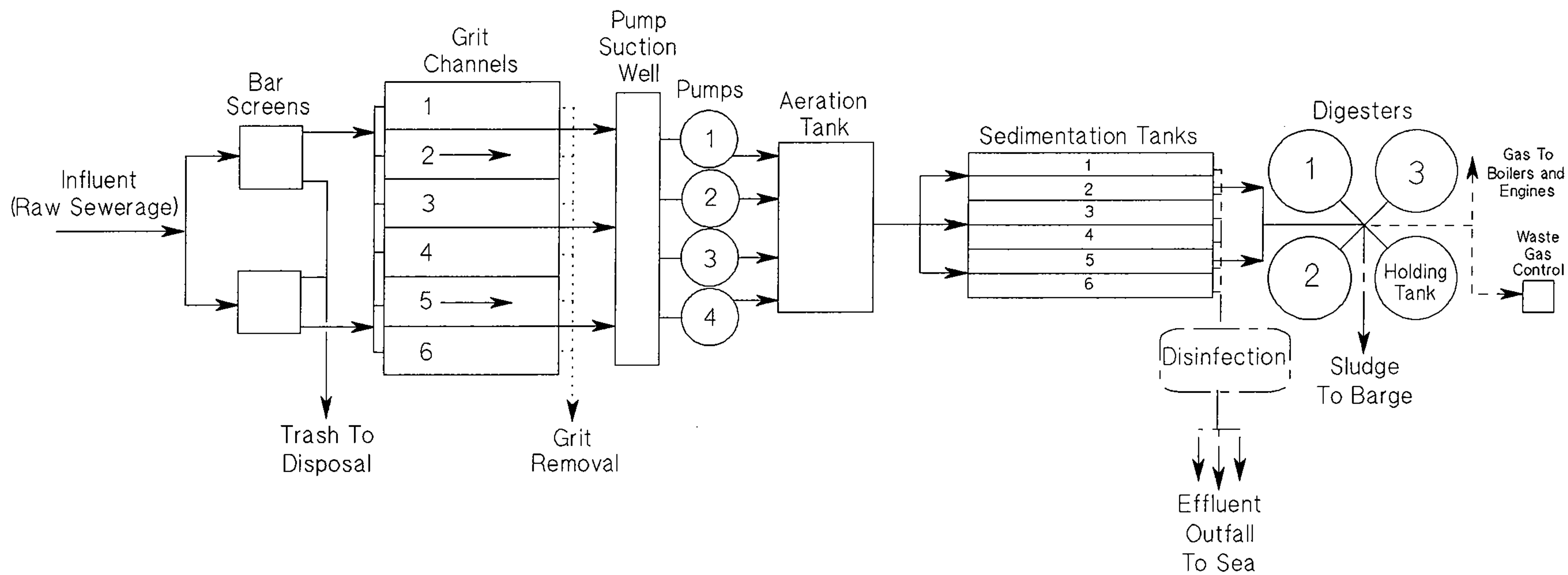
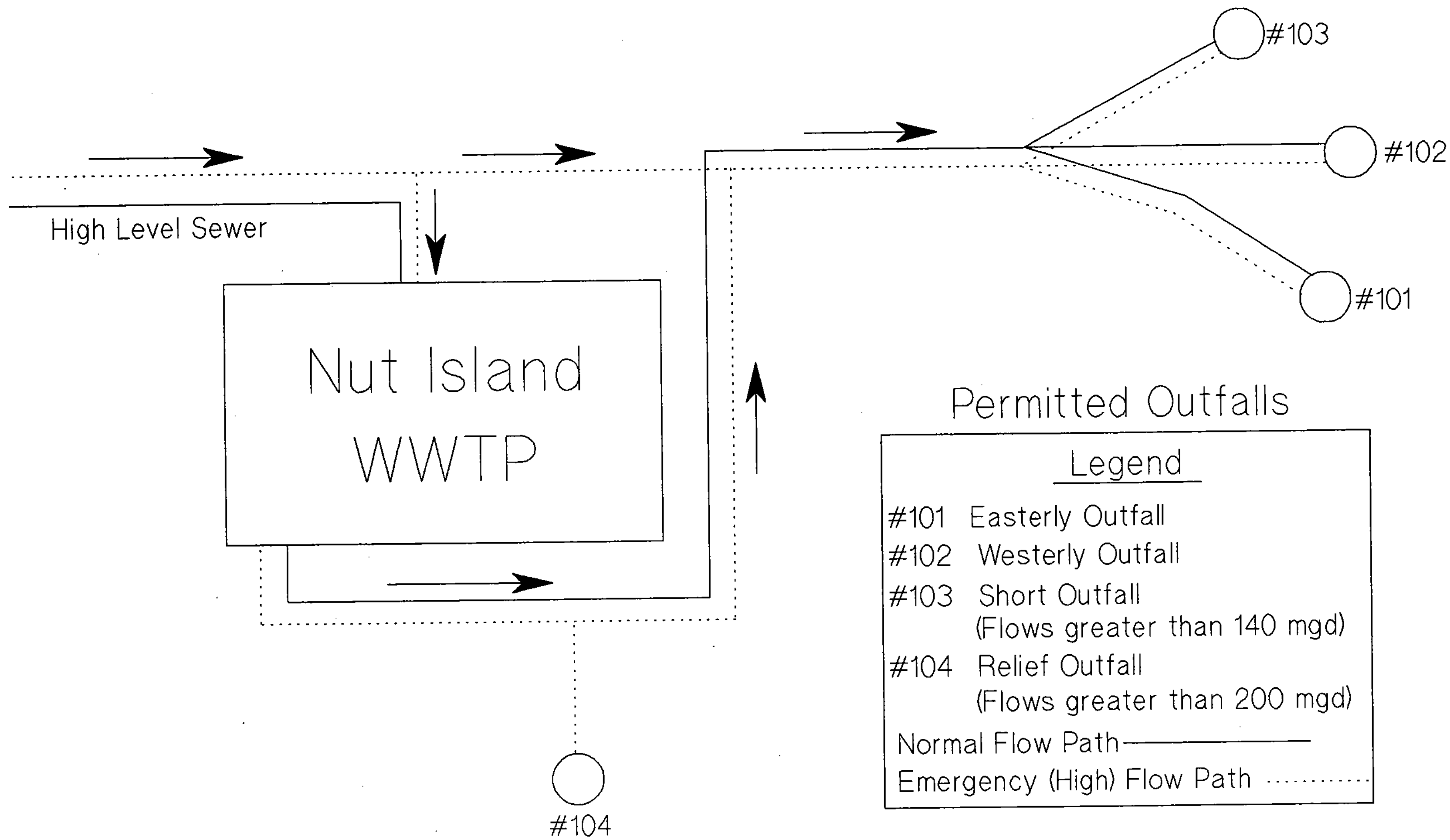


Figure III.8 Nut Island Outfall System Schematic



The approximate amounts of treatment plant effluent that can be discharged through the outfalls are estimated as follows:

Outfalls 101 & 102
High tide 105 MGD
Low tide 150 MGD

Outfalls 101, 102 & 103
High tide 166 MGD
Low tide 245 MGD

Outfalls 101, 102, 103 & 104
High tide 245 MGD
Low tide 260 MGD

Table III-4
Nut Island Outfall Characteristics

	Outfall Number			
	No. 101	**No. 102**	**No. 103**	**No. 104**
	101	102	103	104
Length, ft	5830	5545	1412	663
Pipe Size, in	60 (diam)	60 (diam)	60 (diam)	60 (diam)
Pipe Material	Cast Iron	Cast Iron	Cast Iron	Reinforced Concrete (RC)
Year Built	1904		1904	

IV. Monitoring Results and Discussion

Section IV embodies the main objective of the FY95 Report - to present and discuss monitoring results. The results are analyzed through tables, text, and graphs to provide a practical look at the monitored constituents of MWRA wastewater in FY95. Historical data are provided to keep track of trends and to flag any abnormalities.

This section discusses at length influent and effluent characteristics from the treatment plants at Deer Island and Nut Island. The influent characteristics presented are flow, conventional parameters, nutrients, and priority pollutants (metals, cyanide, pesticides/PCBs, and organic compounds). The effluent characteristics presented are conventional parameters, nutrients, priority pollutants, whole effluent toxicity, and the 1994 Deer Island Bioaccumulation Study.

In addition to Deer Island and Nut Island, this section presents monitoring data from Cottage Farm, Prison Point, and Somerville Marginal CSO facilities including: activations, conventional parameters, priority pollutants, priority pollutant loadings, and NPDES Permit compliance.

Finally, Section IV also presents operational data from the three BWSC-permitted CSO facilities, Constitution Beach, Fox Point, and Commercial Point.

A. Deer Island

A.1 Influent Characteristics

A.1.a Flow

In FY95, the average flow reaching the Deer Island plant was 236 MGD. The minimum flow recorded was 167 MGD. Because some towns in the North System have combined sewers, the amount of flow reaching the Deer Island Plant during periods of rain or snowmelt depends on the intensity and duration of the rainfall event. The maximum flow, recorded on December 5, was 565 MGD. Total precipitation that day was 1.42 inches. Figure IV.A.1 shows how monthly flow averages throughout FY95 followed the same trend as precipitation.

FIGURE IV.A.1 DEER ISLAND FLOWS VS PRECIPITATION
FY95

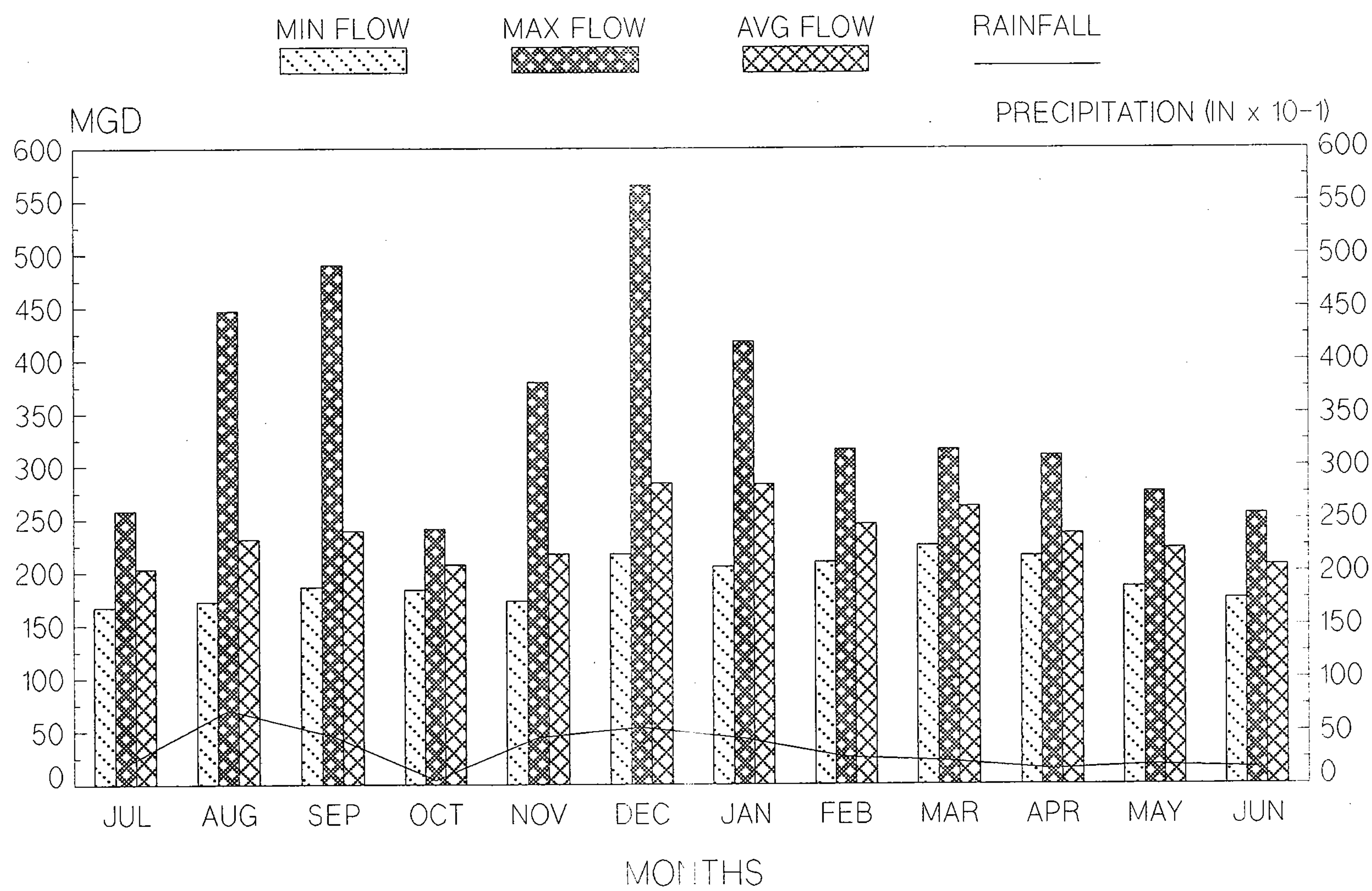


Figure IV.A.2 compares the monthly average flows in FY95 with the last five-year monthly average flows. In FY95, the monthly average flows were lower than the 5-year average monthly flows except for the months of December and January. In December 1994 and January 1995, the total rainfall measured was about an inch higher than the 5-year average monthly total rainfall.

Figure IV.A.3 compares Deer Island average daily flow to total yearly precipitation for FY88 to FY95. The graph depicts the impact of rainfall on the flow reaching Deer Island. The graph also shows that in FY88 and FY89, the average monthly flows to Deer Island were 283 and 259 MGD respectively. The corresponding total precipitations during these periods were 34.95 and 35.41 inches respectively. In contrast, in FY94 and FY95, the average monthly flows to Deer Island were 249 and 234 MGD, corresponding to total rainfalls of 45 and 37.47 inches respectively. Although the total rainfall was slightly higher in the latter years, the average flow reaching the plant was significantly lower. Although the decreased flows are in general due to lower rainfall, they are probably due to decreased water usage and possibly to MWRA and member communities' efforts to reduce infiltration and inflow. More frequent inspection and maintenance of the sewer system have also resulted in timely sewer repairs, which in turn resulted in reduced flow contribution from wet weather.

A.1.b Conventional Parameters

Table IV.A.1 provides an overview of some conventional and nutrient influent concentrations and loadings to the Deer Island Plant for FY95 and the previous three years. In general, the Deer Island influent in FY95 can be classified as weak, BOD and ammonia being slightly on the stronger side.

Settleable solids showed an apparent increase of concentration and loading from FY94. However, the only other parameter to show any significant change was oil and grease. Although oil and grease concentrations showed a 52% decrease from FY92, it is suspected that there was no real reduction in oil and grease concentration over the past years. From February 1993 (midway through FY93) on, the analytical procedure employed for the analysis of oil and grease was one designated for water and wastewater samples. Before that time, the analysis used was one designated for solids samples. The two methods are very similar.

Figure IV.A.2 Deer Island FY95 Average Flows Compared to Historical Data

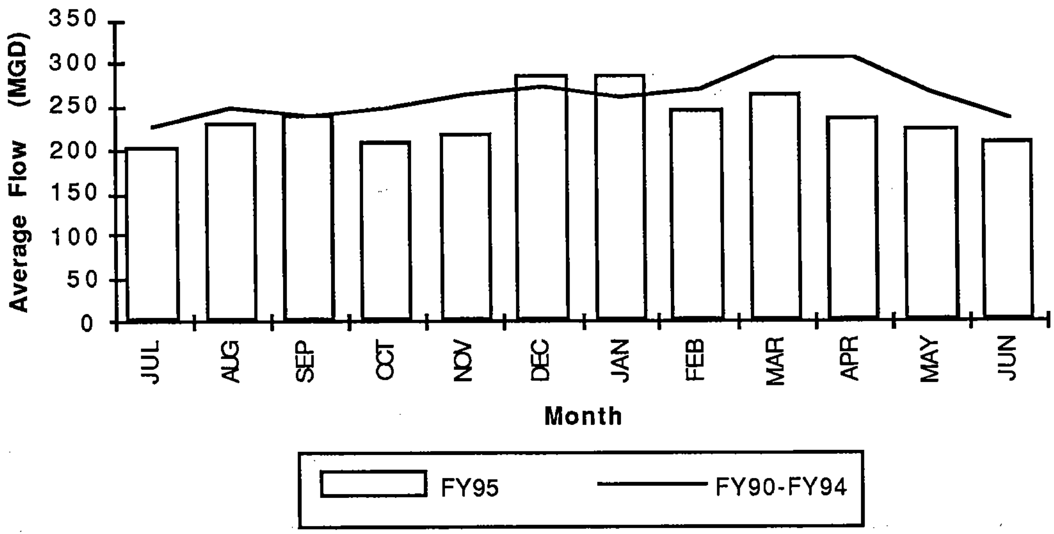


Figure IV.A.3 Deer Island Average Daily Flow Compared to Precipitation

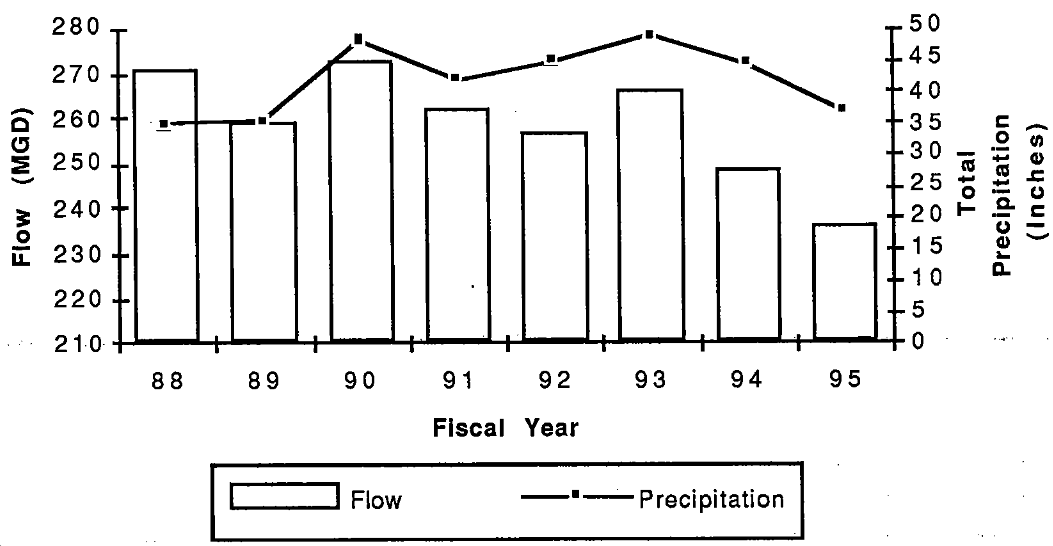


Table IV.A.1 Deer Island Influent Characterization, FY 1995

PARAMETER	FY95	FY94	FY93	FY92
Flow (MGD)				
Minimum	167	171	174	166
Average	236	249	266	257
Maximum	565	528	628	582
Total Suspended Solids				
Min Conc (mg/L)	102	93	121	113
Ave Conc (mg/L)	138	137	153	132
Max Conc (mg/L)	160	175	193	170
Average Loading (lbs/d)	271617	284502	339421	282926
Biochemical Oxygen Demand				
Min Conc (mg/L)	99	99	123	123
Ave Conc (mg/L)	140	149	159	146
Max Conc (mg/L)	173	175	190	169
Average Loading (lbs/d)	275554	309422	352732	312933
Settleable Solids				
Min Conc (mg/L)	3.5	1.9	1.4	3.1
Ave Conc (mg/L)	5.6	3.9	3.7	3.0
Max Conc (mg/L)	7.3	5.6	5.0	3.9
Average Loading (lbs/d)	11022	8099	8208	6430
Oil and Grease				
Min Conc (mg/L)	17	14	20	28
Ave Conc (mg/L)	31	36	43	64
Max Conc (mg/L)	37	64	84	127
Average Loading (lbs/d)	61015	74760	95393	137176
Total Kjeldahl Nitrogen				*
Min Conc (mg/L)	14	11.2	13.9	
Ave Conc (mg/L)	22	21.9	26.9	
Max Conc (mg/L)	29	29.3	44.7	
Average Loading (lbs/d)	43301	45479	59676	

Table IV.A.1 (cont)

PARAMETER	FY95	FY94	FY93	FY92
Ammonia-Nitrogen				*
Min Conc (mg/L)	7.3	5.6	6.8	
Ave Conc (mg/L)	13.7	12.3	13.4	
Max Conc (mg/L)	18.0	17.9	17.9	
Average Loading (lbs/d)	26965	25543	29727	
Nitrates				*
Min Conc (mg/L)	0.02	0.10	0.13	
Ave Conc (mg/L)	0.15	0.80	0.70	
Max Conc (mg/L)	0.59	2.70	2.15	
Average Loading (lbs/d)	295	1661	1553	
Nitrites				*
Min Conc (mg/L)	0.02	0.00	0.02	
Ave Conc (mg/L)	0.06	0.10	0.06	
Max Conc (mg/L)	0.19	0.20	0.13	
Average Loading (lbs/d)	118	208	133	
Orthophosphorus				*
Min Conc (mg/L)	1.00	0.40	2.04	
Ave Conc (mg/L)	2.20	2.30	2.04	
Max Conc (mg/L)	5.66	5.10	2.04	
Average Loading (lbs/d)	4330	4776	4519	
Total phosphorus				*
Min Conc (mg/L)	2.11	0.60	2.63	
Ave Conc (mg/L)	3.63	4.00	6.04	
Max Conc (mg/L)	4.79	8.30	9.07	
Average Loading (lbs/d)	7145	8307	13399	

* Not Available

The one significant difference between the two methods is that the amount of time needed to digest the samples is longer for solids samples. As expected, the analytical results were higher with the solids analysis procedure. It is suspected, therefore, that there was no significant reduction in oil and grease concentration since FY92. Concentrations from FY94 to FY95 did not change significantly. The average monthly analytical results of Deer Island Laboratory monitoring for influent, effluent, and residuals are presented in Appendix A, Table A-1, Deer Island Treatment Plant Operations Summary.

A.1.c Nutrients Nitrogen in wastewater influent mainly exists in the form of ammonia and organic nitrogen, together called Total Kjeldahl nitrogen (TKN). Other forms of nitrogen found in wastewater are nitrites and nitrates. From Table IV.A.1, nitrates and nitrites showed significant decreases in concentrations and loading. From FY94 to FY95, nitrate concentration and loading decreased by 81% and 82% respectively, and nitrite concentration and loading decreased by 40% and 43% respectively. In FY95, phosphorus concentrations, expressed as orthophosphorus and total phosphorus, were comparable to FY94 measurements; the loadings, however, show a slight decrease.

A.1.d Priority Pollutants

There were two sets of influent priority pollutant parameters data during FY95: the Deer Island Laboratory and the Local Limits data set. The Deer Island Laboratory measured the concentration of select metals. The Local Limits Study conducted a complete priority pollutant scan. Appendix A, Table A-1 and A-2 respectively present the results of these analyses. The following section on influent priority pollutants discusses Local Limits data.

Metals The influent data consistently showed measurable amounts of boron, copper, lead, zinc, molybdenum, and chromium. Arsenic, mercury, silver, and nickel were detected more than 30% of the time. Selenium and cadmium were occasionally detected but at very low concentrations. Antimony and beryllium, although detected at least once in 24 samples (less than 5% of the time) were considered not present in the influent according to regulatory definition. Thus, these constituents were not included in the Appendix A, Table A-2.

Cyanide Cyanide was detected in two of 18 samples. There were no samples analyzed in February, March, and April.

Pesticides/PCBs Of the pesticides and PCBs, 4,4'-DDD was detected in six (four hits and two suspects) and estimated present in two of samples. Heptachlor epoxide was estimated to be present in two of 24 samples.

Organic Compounds Of the semi-volatiles, phthalates, 4-methyl phenol, benzoic acid, and benzyl alcohol were detected in measurable amounts. Naphthalene, phenols, 2-methylnaphthalene were estimated to be present. Of the volatile organic compounds, acetone, 2-butanone, carbon disulfide, and chloroform were detected in measurable amounts. Benzene, methylene chloride, tetrachloroethene, toluene, total xylenes, trans-1,2-dichloroethene, and trichloroethene, although consistently detected were estimated to be present. These compounds were detected at very low concentrations and reported values were between the method detection and quantitation limits. These values are often referred to as "J" values, estimated values below the reporting or quantitation limits.

The method detection limit is the smallest amount of a substance that can be detected above background noise by following a particular method of analysis. The reporting or quantitation limit is the smallest concentration that can be quantified. It is the smallest concentration for which there is a linear relationship between pollutant concentration and instrument response (Appendix I). Substituting one tenth the quantitation limit for below detection level (BDL) values (i.e. values below method detection limits) to derive average values may have artificially raised the average concentration.

A.2 Effluent Characteristics

A.2.a Conventional Parameters

Appendix A Table A-1 contains the effluent characteristics for conventional parameters, and Table IV.A.2 summarizes it. The average concentrations of conventional parameters have remained constant over the past four years except for oil and grease, which was much higher in FY92. A change in analytical methods used caused the discrepancies in the oil and grease concentrations (see section A.1.b).

Table IV.A.2 Deer Island Effluent Characterization, FY 1995

Parameter	FY95	FY94	FY93	FY92
Flow (MGD)				
Minimum	167	171	174	166
Average	236	249	266	257
Maximum	565	528	628	582
Total Suspended Solids				
Min Conc (mg/L)	52	65	58	65
Ave Conc (mg/L)	65	73	70	70
Max Conc (mg/L)	90	86	77	77
Average Loading (lbs/d)	127936	151596	155291	150037
Biochemical Oxygen Demand				
Min Conc (mg/L)	85	87	89	103
Ave Conc (mg/L)	116	123	128	130
Max Conc (mg/L)	138	142	152	147
Average Loading (lbs/d)	228316	255429	283960	278639
Settleable Solids				
Min Conc (mg/L)	0.1	0.1	0.1	0.1
Ave Conc (mg/L)	0.4	0.5	0.3	0.2
Max Conc (mg/L)	0.7	0.9	0.5	0.4
Average Loading (lbs/d)	768	976	643	493
Oil and Grease				
Min Conc (mg/L)	17	12	15	22
Ave Conc (mg/L)	25	25	27	44
Max Conc (mg/L)	30	36	37	67
Average Loading (lbs/d)	49206	51917	59898	94309
Total Kjeldahl Nitrogen				
Min Conc (mg/L)	13.70	12.80	14.90	10
Ave Conc (mg/L)	23.01	21.70	22.20	21
Max Conc (mg/L)	28.60	32.80	26.20	27.7
Average Loading (lbs/d)	45289	45064	49249	45011

PARAMETER	FY94	FY94	FY93	FY92
Ammonia				
Min Conc (mg/L)	7.28	6.08	7.59	6.30
Ave Conc (mg/L)	14.43	12.58	12.35	11.70
Max Conc (mg/L)	19.60	18.51	15.70	15.30
Average Loading (lbs/d)	28402	26124	27398	25078
Nitrates				
Min Conc (mg/L)	0.03	0.13	0.05	0.20
Ave Conc (mg/L)	0.08	1.04	0.66	1.17
Max Conc (mg/L)	0.28	5.98	1.63	3.70
Average Loading (lbs/d)	157	2160	1453	2501
Nitrites				
Min Conc (mg/L)	0.02	0.01	0.02	0.00
Ave Conc (mg/L)	0.08	0.10	0.16	0.56
Max Conc (mg/L)	0.22	0.26	0.48	1.80
Average Loading (lbs/d)	157	208	357	1196
Orthophosphorus				
Min Conc (mg/L)	0.90	0.48	0.98	1.80
Ave Conc (mg/L)	2.22	2.15	2.27	2.53
Max Conc (mg/L)	3.39	4.09	3.59	3.30
Average Loading (lbs/d)	4369	4465	5036	5431
Total phosphorus				
Min Conc (mg/L)	2.11	1.19	2.03	3.20
Ave Conc (mg/L)	3.35	2.92	3.64	3.97
Max Conc (mg/L)	4.35	5.18	4.71	5.20
Average Loading (lbs/d)	6594	6064	8068	8501

A.2.b Nutrients

The MWRA monitors nitrogen and phosphorus because of their potential detrimental effects on receiving bodies of water. Nutrients stimulate algae growth resulting in oxygen deprivation and/or nuisance blooms in the water. Inorganic nitrogen is closely monitored because nitrogen is the limiting nutrient in a marine environment. Algae easily take up the inorganic forms of nitrogen (ammonia, nitrite, and nitrate) resulting in rapid algal growth (blooms). When the blooms die, the bacteria decaying the algae consume valuable oxygen. The water may become hypoxic (low in oxygen) or even anoxic (no oxygen) resulting in the death of fish and other aquatic species. Not only does nitrogen encourages algal growth, a potential BOD problem, but certain forms are very harmful to fish. Nitrites and the ammonium ion are particularly toxic to fish and other aquatic species.

Phosphorus, like nitrogen is a limiting nutrient, however, phosphorus is limiting in fresh water environment. There is no toxicity associated with phosphorus compounds. They are problematic because they accelerate the process of eutrophication, the aging process of a body of water caused by high loads of nutrients that stimulate plant growth. Phosphorus is taken up by algae, and the algae undergo rapid growth. When the algae die, bacteria decomposing the dead cells use up oxygen. As a result, the body of water experiences low oxygen levels. Cell mass also accumulates more rapidly in the body of water eventually upsetting the natural rate of eutrophication of the body of water. However, phosphorus poses more of a threat to fresh water than it does to marine environments.

Concentrations of nutrients that were monitored in FY95 were TKN, ammonia, nitrates, nitrites, orthophosphorus, and total phosphorus. Nutrient data for this monitoring period are included in the Deer Island Operations Summary, Appendix A, Table A-1 and are also summarized in Table IV.A.2. Unlike in FY94, nutrient data did not show any seasonality. The effluent levels were similar to influent levels. This is to be expected since nutrients are not removed with primary treatment. There appears to be no overall change in nutrient concentrations over the past six years (Figure IV.A.4).

A.2.c Priority Pollutants

NPDES, Harbor Studies, and the Deer Island Laboratory monitoring programs tested Deer Island effluent. The NPDES program conducted full priority pollutant scans, the Deer Island Lab analyzed for select metals, and Harbor Studies Program analyzed certain metals, pesticides/PCBs, and PAHs. Results from the Deer Island, NPDES, and Harbor Studies analyses are found in Appendix A, Tables A-1, A-4, and A-6 respectively. NPDES Monitoring Program tested influent and effluent on the same days. In addition, a third effluent sample was taken which was used for the whole effluent toxicity (WET) testing required by the NPDES Permit. The following sections analyze data from the NPDES Monitoring Program data.

Metals All of the metals detected in the influent were also detected in the effluent, as expected of a primary treatment facility. Of 36 samples, boron, copper, lead, molybdenum, and zinc were detected in all samples, chromium was detected in 27, and arsenic was detected in 17 samples. Other metals were detected less frequently and were close to method detection levels. Figure IV.A.5 graphs the metal loadings calculated from Local Limits results from FY91 to FY95 and show the continued steady trend of metal loadings.

Cyanide Cyanide was detected in 26 of 37 samples. Although not normally present in the influent, cyanide has been consistently detected in the effluent. The cyanide test procedure is subject to interferences. This issue is being investigated by the Central Lab.

Total Petroleum Hydrocarbons Total petroleum hydrocarbons were detected in 54 of 57 samples. Four of those detects, ranging from 17 to 36, exceeded the 15 ug/L NPDES limit.

Pesticides Pesticides and PCBs were detected occasionally in the effluent. These values were close to method detection limits. The pesticides and PCBs detected were 4,4'-DDT, a-BHC, b-BHC, chlordane, d-BHC, endosulfan II, g-BHC, heptachlor, and heptachlor epoxide.

Organic Compounds Of the semi-volatiles, 4-methyl phenol, benzoic acid, benzyl alcohol, bis(2-ethylhexyl)phthalate, butylbenzyl phthalate, di-n-butylphthalate,

Figure IV.A.4 Deer Island Effluent, Nutrient Concentration

FY 1990 - 1995 Deer Island Laboratory

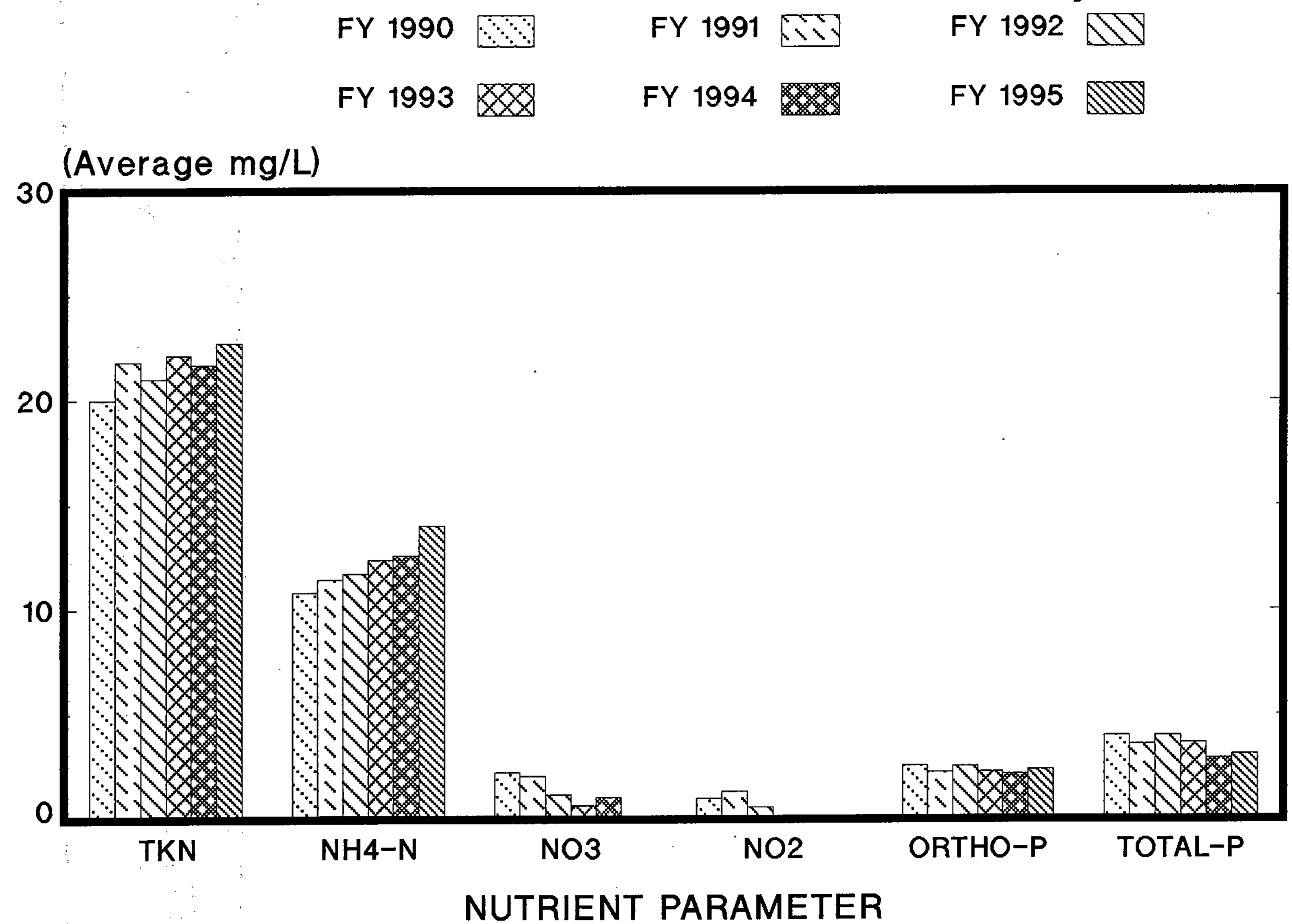
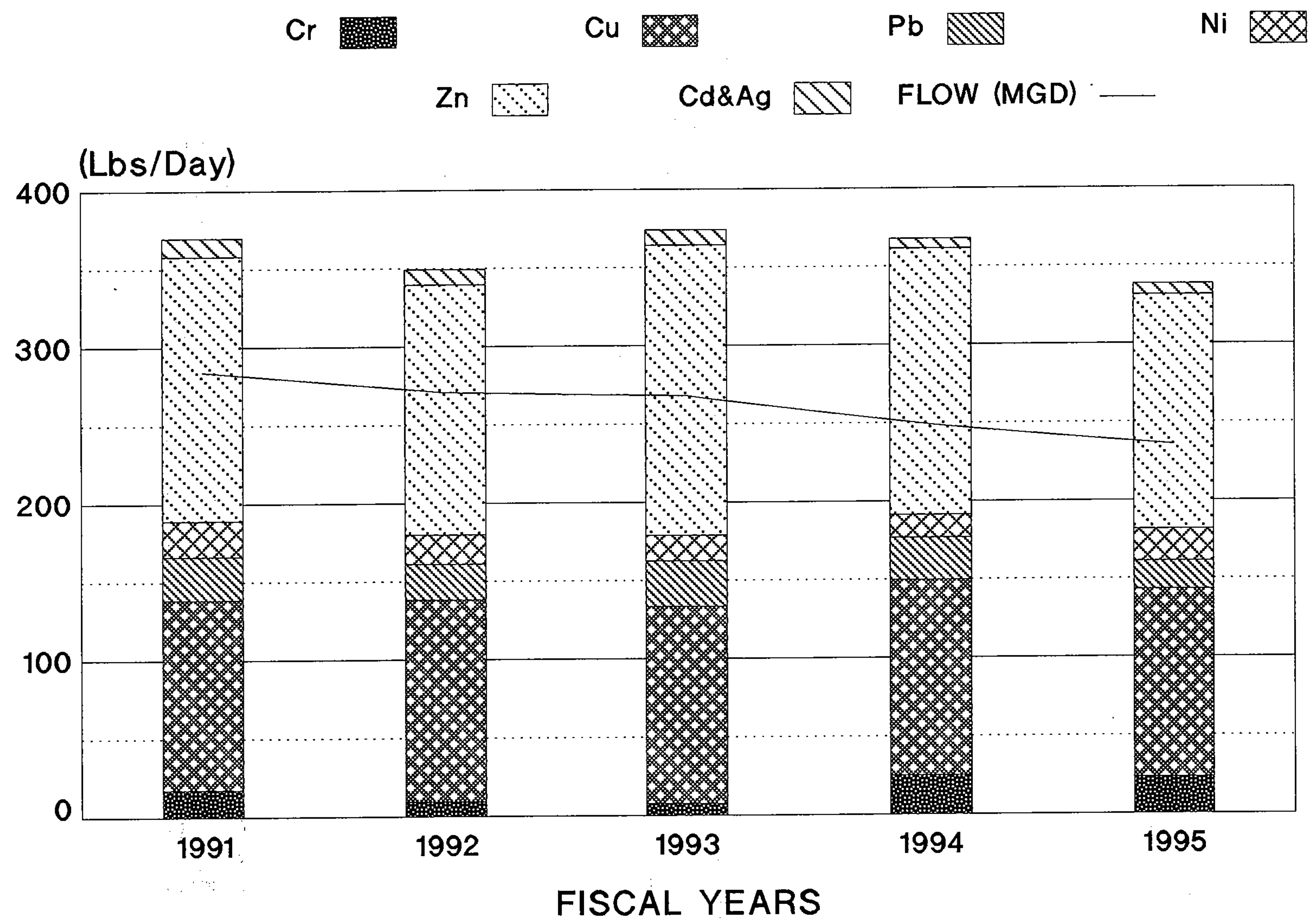


Figure IV.A.5 Deer Island Effluent, Mean Metal Loadings
NPDES Data



diethlyphthalate, and phenol were consistently detected. 2-methylnaphthalene, di-n-octylphthalate, and naphthalene were occasionally detected. Of all the volatile compounds, 2-butanone, acetone, bromodichloromethane, bromomethane, chloroform, methylene chloride, tetrachloroethene, toluene, trans-1,2-dichloroethene, trichloroethene, and xylene were consistently detected. Others organic compounds were occasionally detected.

A.2.d Whole Effluent Toxicity

The MWRA tested effluent toxicity every month at the Deer Island treatment plant: an acute static toxicity test using mysid shrimp, *Mysidopsis bahia*, a chronic survival and growth test using the sheepshead minnow, *Cyprinodon variegatus*, and a chronic reproduction test using the red alga, *Champia parvula*. The results of toxicity testing in 1995 were consistent with previous years. Table IV.A.3 summarizes the results of the toxicity testing in FY95.

Acute Static Toxicity Test The results of the mysid shrimp acute tests showed that the NOEC limit of 20% was not met in six of the 12 tests. In a separate study in 1989, EPA found that the probable cause of most acute toxicity in Deer Island's wastestream was surfactants, a widely used ingredient in household detergents. Currently, concentrations of surfactants in the effluent from the two plants are consistent with the concentrations that could cause the observed mortality. The EPA study further concluded that surfactants are readily biodegraded with secondary treatment.

Chronic Toxicity Tests The results of the sheepshead minnow chronic tests showed that the NOEC limit of 10% for both growth and survival endpoints were consistently met. The results of the chronic test on the red alga, a test to assess effects on sexual reproduction, always failed. The EPA has concluded that using the red alga for toxicity compliance is compromised by its ultrasensitive and inconsistent results; thus, it has been withdrawn as a test species in permit renewals.

A.2.e 1994 Bioaccumulation Study, Boston Harbor

Bioaccumulation studies measure the potential for long-term build-up of pollutants in aquatic species. In the summer of 1994, the MWRA conducted a mussel bioaccumulation study for Deer Island effluent. The study was designed to duplicate studies conducted in

Table IV.A.3 Deer Island, Results of Toxicity Testing, FY95

	Mysid acute LC50	Mysid acute NOEC	Cyprinodon chronic Survival NOEC	Cyprinodon chronic Growth NOEC	Champia chronic NOEC
Limits (%)	None	20	10	10	10.0
July	29	20	60	60	2.0
August	39	20	60	60	2.0
September	18	**10**	40	40	2.0
October	15	**<5**	40	40	0.7
November	17	**<5**	20	20	0.7
December	39	20	60	60	2.0
January	32	20	60	60	2.0
February	14	**10**	*	*	2.0
March	14	**10**	40	40	2.0
April	19	**10**	40	40	*
May	29	20	20	20	2.0
June	36	20	60	60	0.7
Average	25	14	45	45	1.6
Violations		6			11.0

Notes:
Test results must be equal to or greater than permit limits.
Bold numbers violated permit limits
* Quality control failure, test invalid

1987, 1991, 1992, and 1993. Mussels were collected in Gloucester and deployed in cages at the following locations for 60 days: the Deer Island effluent discharge, the proposed offshore discharge site in Massachusetts Bay (clean control and pre-discharge baseline data), and the New England Aquarium in Boston's Inner Harbor (dirty control). At the end of the 60-day deployment, the mussel tissue was analyzed for PAHs, PCBs, organochlorine pesticides, lead, and mercury. A summary of bioaccumulation study results are in Table IV.A.4.

Mussels deployed at Deer Island showed significant bioaccumulation of PAHs, PCBs, DDTs, alpha-chlordane, dieldrin, and trans-nonachlor. Although LMW PAH levels were highest in Deer Island mussels, LMW PAHs at Deer Island mussels are still significantly lower than the levels seen in previous years. All other contaminants show no historical trends. The mussels deployed at the Aquarium had body burdens of most contaminants which were significantly greater than those of the mussels at pre-deployment or Deer Island mussels, suggesting that the Aquarium site has separate sources of contaminants.

Table IV.A.4 Concentration of Contaminants Bioaccumulating in Boston Harbor Mussels

	PRE-DEPLOYMENT*	CLEAN CONTROL*	DIRTY CONTROL*	DEER ISLAND
Copper (ug/g)				
1987	6.6	7.1		9.5**
1991	8.8	7.4	12.7**	9.3
Lead (ug/g)				
1987	2.8	3.1		6.7**
1991	6.5	5.0	6.4	5.9
1993	5.1	3.7**		5.9
1994	8.6	4.8**	6.7	9.1
Zinc (ug/g)				
1987	83.0	92.0		152**
1991	148.0	173.0	220**	143.0
Mercury (ug/g)				
1993	0.39	0.10**		0.18**
1994	0.26	0.13	0.16	0.21
Total PAH's (ng/g)				
1987	581	465		2363**
1991	217	228	2570**	1207**
1992	216	129**	3545**	1937**
1993	188	166	1321**	665**
1994	264	122	2255**	848**
LMW PAH's (ng/g)				
1987				1221
1991	113	74	239**	516**
1992	80	61	199**	427**
1993	66	66	110	169**
1994	106	61	79	217**
HMW PAH's (ng/g)				
1987				1123
1991	104	154	2330**	691**
1992	136	69	3347**	1507**
1993	122	101	1210**	496**
1994	158	61	2174**	631**
Total PCB's (ng/g)				
1987	317	227		630**
1991	77	77	477**	199**
1992	65	44**	652**	133**
1993	AP	110	596**	321**
1994	107	89	500**	161**

	PRE-DEPLOYMENT*	CLEAN CONTROL*	DIRTY CONTROL*	DEER ISLAND
Total DDT's (ng/g)				
1987	52	30		63
1991	28	28	94**	48**
1992	15	12	103**	25**
1993	AP	30	130**	63**
1994	27	19	86**	50**
Alpha-Chlordane (ng/g)				
1987	8.7	6.7		21.5**
1991	2.4	2.5	19**	10.3**
1992	1.9	1.7	19**	6.9**
1993	2.9	3.8	10.5**	8.2**
1994	3.5	3.6	12.8**	13.8**
Dieldrin (ng/g)				
1987	6.6	3.6		11.4
1991	< 1.4	2.3	9**	2.9
1992	< 1.0	1.2	6.7**	2.7
1993	< 2.9	2.2	4.5**	3.4
1994	< 1.2	2.0	15.6**	10.4**
Lindane (ng/g)				
1987	1.8	0.8		5.5
1991	< 1.5	< 2.2	< 3.2	< 2.5
1992	< 1.0	< 1.0	< 1.9	< 1.3
1993	AP	< 1.7	2.3	2.7
1994	< 0.9	< 0.6	< 2.2	1.6
Trans-nonachlor (ng/g)				
1987	7.7	6.2		18**
1991	< 1.4	< 1.5	< 2.5	8.9**
1992	2.1	2.5	21.3**	8.3**
1993	4.8	4.0	11.0**	10.7**
1994	4.0	3.8	11.0**	11.2**

Hexachlorobenzene, heptachlor, aldrin, heptachlor epoxide, mirex have not been detected at any station.

* Mussels collected from Barnstable in 1987 and Gloucester in 1991. Clean control at proposed offshore discharge in 1987 and in Gloucester in 1991. Dirty control at New England Aquarium. IN 1987 MUSSELS DEPLOYED FOR 30 DAYS; in all other years, 60 days.

** Statistically different ($p=<0.05$) from pre-deployment.

AP Analytical problem, no data

In conclusion, the FY94 study indicated that mussels were continuing to bioaccumulate several contaminants, but at lower levels than in 1987. Only low molecular weight PAHs, which make up 90% of the PAHs in the Deer Island discharge, have shown a true decreasing trend since 1987.

A.3 Compliance with Regulatory Limits

Plant performance during FY95 measured against regulatory permit limits is presented in Table IV.A.5 and Figures IV.A.6 to IV.A.11.

BOD The monthly average and the maximum BOD limit were consistently met. However, there were twelve violations of the BOD removal requirement (Figure IV.A.6). Even though the new plant came on line in January of FY95, the improved efficiencies were not realized until the last two months of FY95. Since the removal efficiencies were calculated on the 12-month running average, the reported removal efficiencies very much reflect the performance of the old, aging primary plant and not the new plant. In the coming year, better BOD removal efficiencies are expected.

TSS The TSS 12-month running average limit was consistently met. However, there was one TSS daily maximum limit violation in September (Figure IV.A.7).

Total and Fecal Coliform There was one total coliform violation (Figure IV.9) and no violations of the fecal coliform limit (Figure IV.A.8).

pH There was one low pH reading of 6.3 (Figure IV.A.10).

Settleable Solids There was no violation of this constituent (Figure IV.A.11).

Total Petroleum Hydrocarbon There were four violations of the PHC daily maximum limit. However, it is believed that the values reported included constituents other than PHCs. The EPA method, petroleum hydrocarbon by infrared detector (PHIR), assumes that any matter that passes through the clean-up and extraction procedure, and is detected by infrared, is considered to be petroleum-based.

Toxicity There were 17 violations. See section A.2.d for a further discussion.

Table IV.A.5 Deer Island Effluent Quality Compared to Regulatory Limits

Parameter	Regulatory Limits*	Range of Values Exceeding Limits	No of Violations
Biochemical Oxygen Demand			
Mo Ave (mg/L)	130		0
Dly Max (mg/L)	185		0
12-mo running removal rate (%)	27	14-17	12
Total Suspended Solids			
Mo Ave (mg/L)	110		0
Dly Max (mg/L)	180	184	1
12-mo running removal rate (%)	38		0
Settleable Solids (mg/L)	2.8		0
Fecal Coliform (#/100 mL)	200		0
Total Coliform (#/100 mL)	1000	1050	1
pH	6.5 - 8.5	6.3	1
PHCs Effluent Dly. Max (mg/L)	15	17-36	4
Toxicity	@		17
	Total Number of Violations		**36**

* Except for removal rates and pH, the effluent quality must be equal or less than limits. Removal rates must be equal or greater than limits, pH must be within range

@ See Table IV.A.3

A.4 Effluent Quality Compared to Water Quality Criteria

Almost all of the priority pollutant concentrations were reported as being below method detection limits. The priority pollutants that were detected in the effluent were detected at very low concentrations. In order to compare treatment plant effluent concentrations with water quality standards, the average concentrations were calculated for those constituents that were detected at least 5% of the time during the fiscal year.

For metals and cyanide, half the method detection limit was assigned for those measurements that were below detection. For organics, one tenth of the reporting or quantitation limit was used (see Appendix I). For results that were below the quantitation limit but above the method detection limit, the estimated "J" values were used. This assumption agreed with the Harbor Studies results conducted using analytical methods with very low detection levels (10 ng/L reporting limit).

Figure IV.A.6 Deer Island Treatment Plant

Effluent BOD, Trend Analysis, FY95

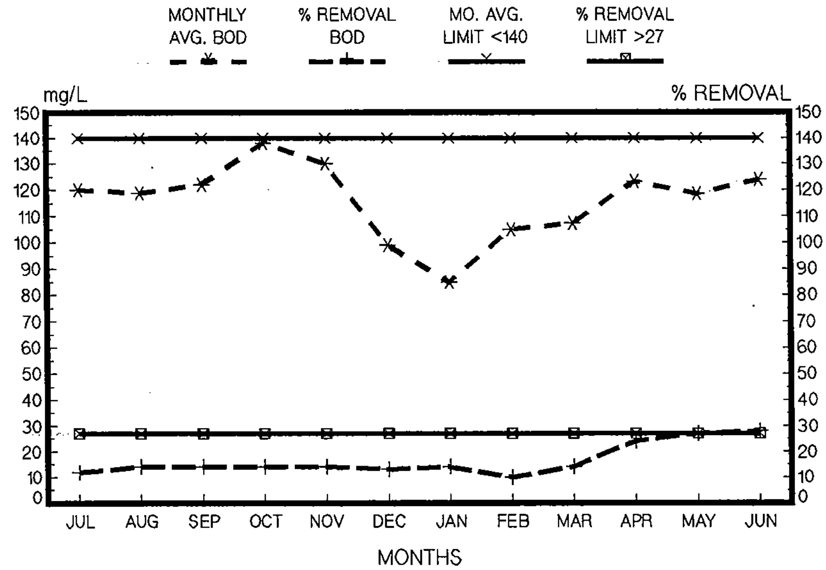
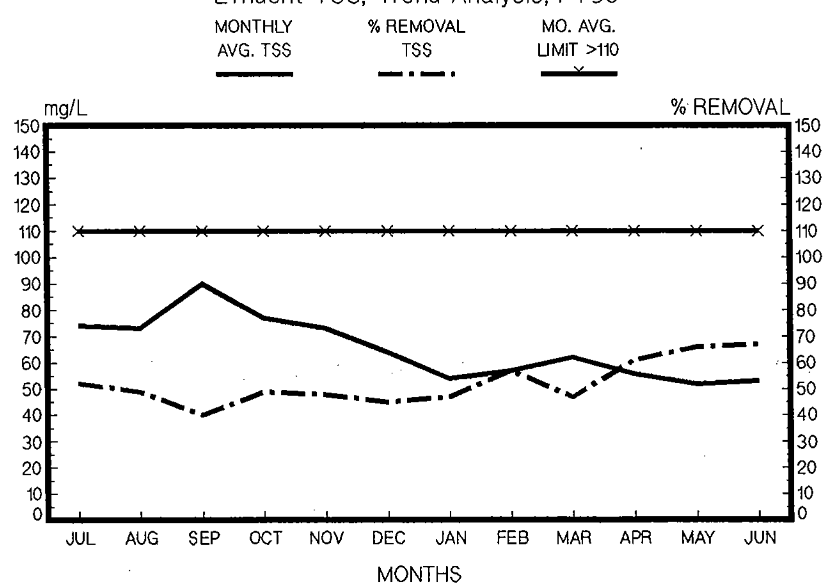


Figure IV.A.7 Deer Island Treatment Plant

Effluent TSS, Trend Analysis, FY95



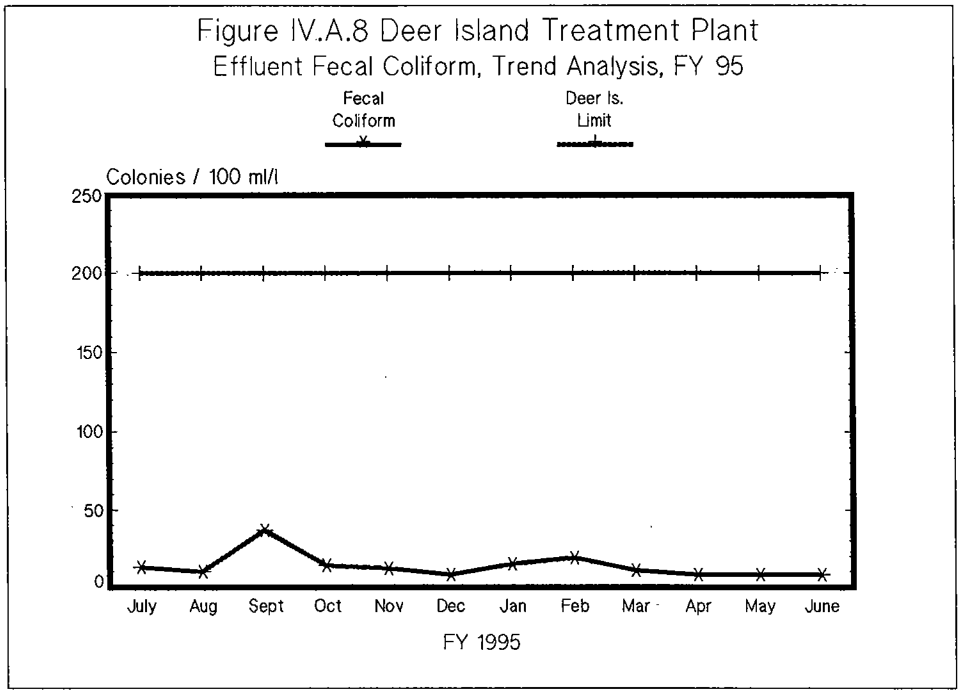


Figure IV.A.8 Deer Island Treatment Plant
Effluent Fecal Coliform, Trend Analysis, FY 95
Fecal Coliform
Deer Is. Limit
Colonies / 100 ml/l
250
200
150
100
50
0
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
FY 1995

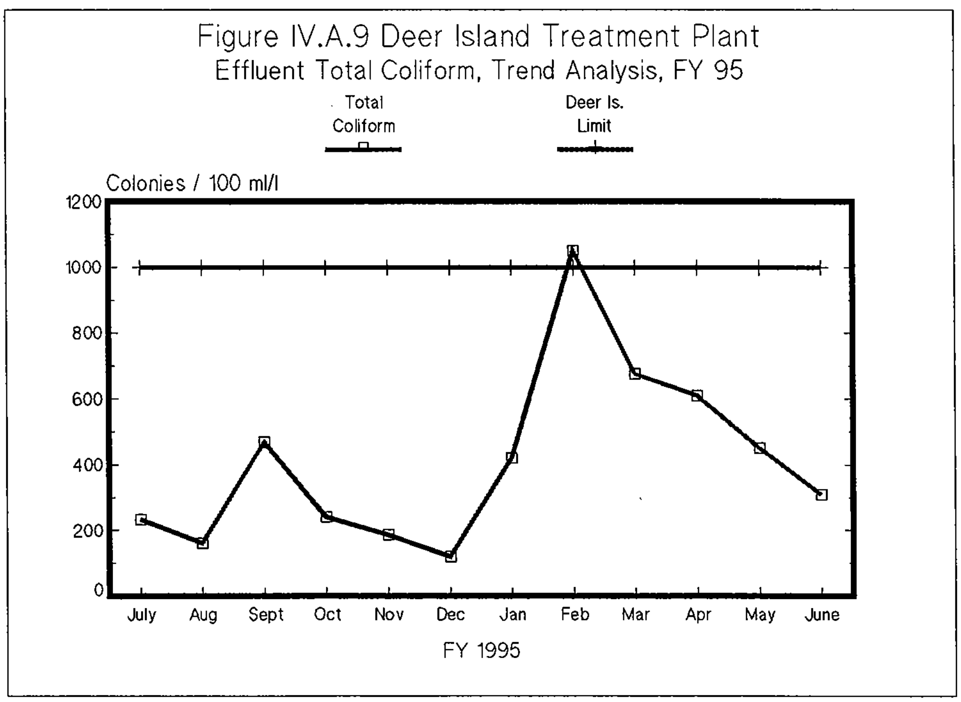


Figure IV.A.9 Deer Island Treatment Plant
Effluent Total Coliform, Trend Analysis, FY 95
Total Coliform
Deer Is. Limit
Colonies / 100 ml/l
1200
1000
800
600
400
200
0
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
FY 1995

Figure IV.A.10 Deer Island Treatmment Plant
Effluent pH, Trend Analysis, FY 95

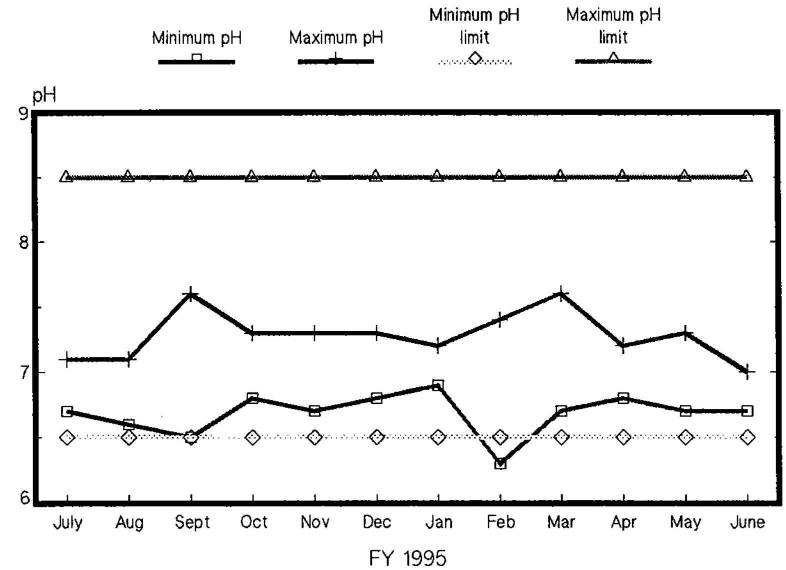


Figure IV.A.11 Deer Island Treatment Plant
Effluent, Settleable Solids, Trend Analysis, FY 95

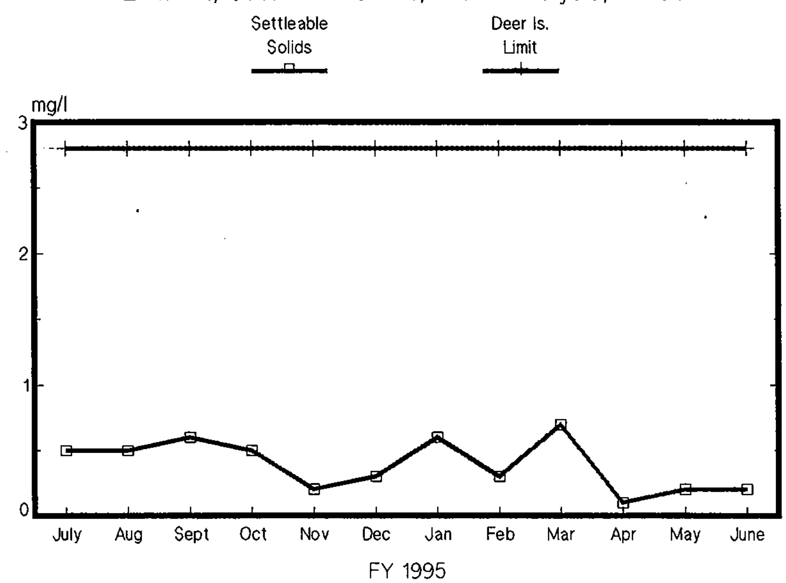


Table IV.A.6 compares the effluent maximum concentration observed, the calculated arithmetic mean concentrations of each pollutant, and the receiving water quality data at the outfall site. The harbor data were collected in the summer of 1987.

Also shown in Table IV.A.6 is the calculated critical dilution ratio required to meet water quality criteria. The acute criterion critical dilution required is estimated as the ratio of the maximum concentration observed to the acute criterion while the chronic criterion critical dilution required is estimated as the ratio of the average concentration to the chronic criterion. Critical dilution calculations are questionable because they do not truly reflect constituent concentrations within the mixing zone, as evidenced by the data collected around the Deer Island outfall. Nonetheless, critical dilution analyses were performed, assuming a very conservative estimate of 10:1 available dilution at the outfall site. Results of the analyses show that copper and heptachlor violate both the acute and chronic criteria, cyanide violates only the acute criterion, and chlordane and DDT violate the chronic criteria.

A.5 Priority Pollutants of Concern

The majority of priority pollutants measured in Deer Island effluent had concentrations well below detection levels except for the following, which violate the water quality criteria:

Copper The copper concentration was high enough to cause concern. The critical dilutions required to meet both acute and chronic water quality criteria were 38 and 21 respectively, well above the assumed available dilution at the outfall pipe. Furthermore, copper was detected 36 out of 36 times. It is believed that most of the copper entering the sewer system comes from households where an acidic water supply leaches copper from copper pipes.

Cyanide The critical dilution required to meet the acute quality criterion was 98. Cyanide was detected in 26 of 37 samples. Because cyanide was not detected in the influent but in the effluent, it is believed that the measurements reported may be false positives due to analytical interferences. This issue is under investigation.

Heptachlor The critical dilution required to meet the acute quality criterion was 12, and the critical dilution required to meet the chronic criterion was 31. Heptachlor was detected 9 out of 33 times.

DDT Out of 33 samples, there were two detects for DDT in the effluent, both detects being estimated values, i.e., detected between the method detection and quantitation limits. There appears to be no problem meeting the acute criteria. However, the chronic critical dilution requirement was 17:1, higher than the calculated available dilution of 10:1. The method used in substituting half the MDL for BDL artificially raised the average concentrations and, as a result, the chronic critical dilution requirement was higher. DDT has been banned for use in the United States since December 1992. Residual DDT and its degradation products are suspected still to be present in the sewer system. Until the contaminant is totally flushed out, DDT and its degradation products may continue to be measured in the effluent for some time.

Chlordane There were two detects of chlordane in the effluent, both reported at or close to quantitation limits. There appears to be no problem meeting the acute criteria. However, the chronic critical dilution requirement was 16:1. Like DDT, this requirement may not be real considering the method used in calculating average concentrations.

B. Nut Island

B.1 Influent Characteristics

B.1.a Flow

In FY95, the average Nut Island flow was 111 MGD while the minimum daily flow was 70 MGD. The maximum daily flow of 211 MGD occurred on December 26. This high flow was the result of a 48-hour rainfall event on December 23 and 24, 0.94 inches on the 23rd and 1.33 inches on the 24th. Figure IV.B.1 graphs the minimum, average, and maximum monthly flows of FY95 and compares them with total monthly precipitation.

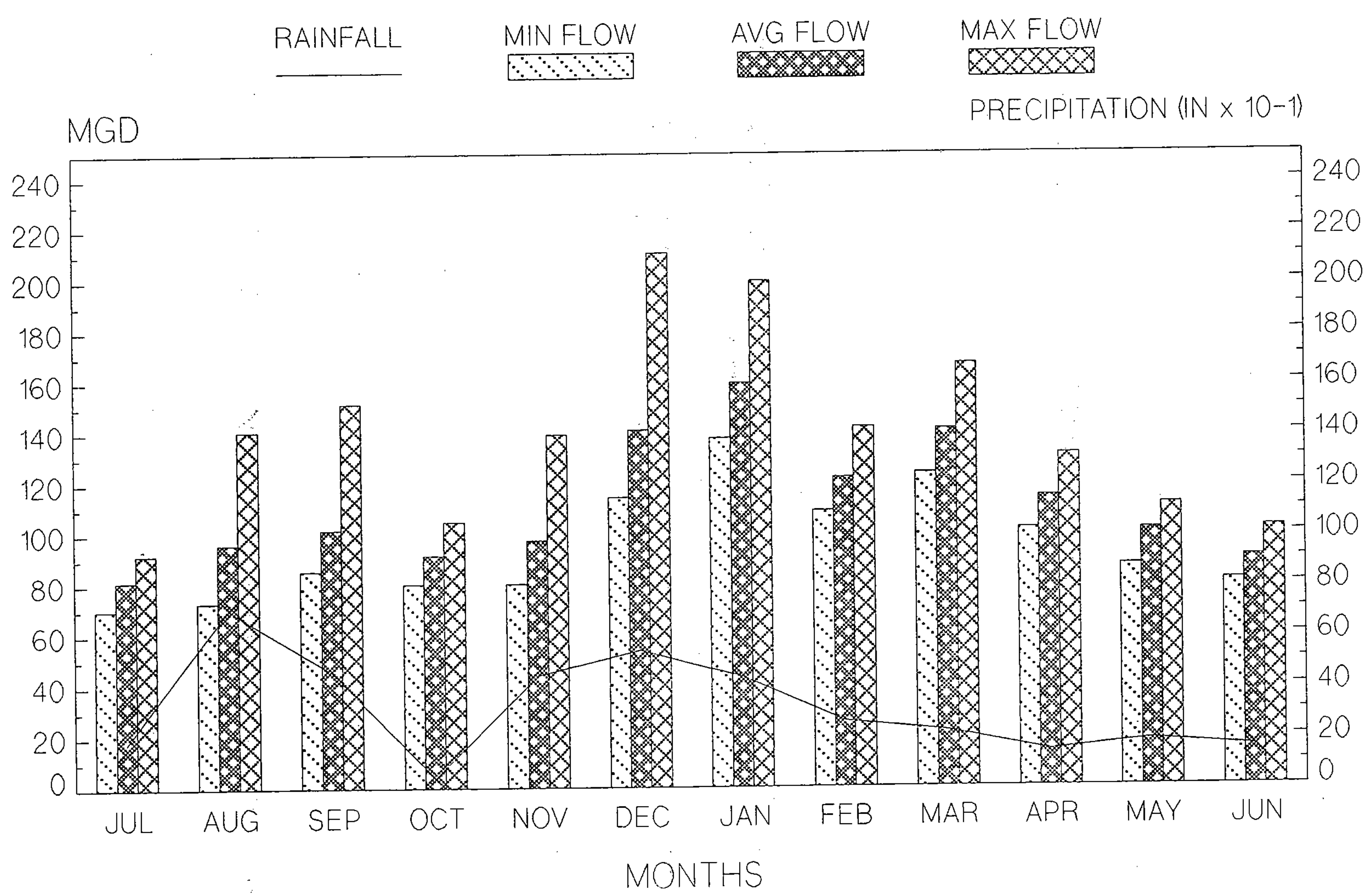
In Figure IV.B.2 compares Nut Island monthly average flows to historical data. In FY95, average monthly flows were noticeably less than the average monthly flows for fiscal years 1990-1994 except for the months of September and December, which were close, and the month of January, which was noticeably higher. Figure IV.B.3 illustrates the relationship for the last eight years between average daily flow and total precipitation. The graph clearly shows the dependency, increased flows with increased precipitation.

Table IV.A.6 Comparison of Deer Island Treatment Plant Effluent with Water Quality Criteria, FY95

Parameter	Boston Harbor (A) (ug/L)	Effluent Max Conc (ug/L)	Effluent Ave Conc (ug/L)	Times Detected	Acute Criteria (ug/L)	Max Conc : Acute Criteria	Chronic Criteria (ug/L)	Ave Conc: Chronic Criteria
Aldrin	0.00005	0.031	0.007	1 of 33	1.3	C		D
Arsenic	B	12.000	2.746	17 of 36	69.0	C	36	C
Cadmium	0.0348	3.000	0.611	2 of 36	43	C	9.3	C
Chlordane	B	0.260	0.065	2 of 33	0.09	3 : 1	0.004	16 : 1
Copper	0.943	109.000	59.876	36 of 36	2.90	38 : 1	2.9	21 : 1
Cyanide	B	98.000	20.830	26 of 37	1.00	98 : 1		D
4,4-DDT	0.00057	0.120	0.017	2 of 33	0.13	1 : 1	0.001	17 : 1
Endosulfan Beta	B	0.062	0.014	2 of 33	0.034	2 : 1	0.0087	2 : 1
Heptachlor	0.000084	0.650	0.112	9 of 33	0.053	12 : 1	0.0036	31 : 1
Heptachlor Epoxide	B	0.088	0.021	13 of 33	0.053	2 : 1	0.0036	6 : 1
Lead	0.0849	39.000	9.953	36 of 36	220.00	C	8.5	1 : 1
Lindane	0.00136	0.060	0.012	5 of 33	0.16	C		C
Mercury	< 0.0071	.4000	0.120	4 of 36	2.10	C	0.025	5 : 1
Nickel	0.53	37.000	10.465	10 of 36	75.00	C	8.3	1 : 1
Silver	B	9.500	2.651	10 of 36	2.30	4 : 1		D
Zinc	1.238	150.000	77.000	36 of 36	95.00	2:1	86	1:1

Notes:
A - data taken from the secondary Treatment Facilities Plan, Volume V, Appendix X
B - no data
C - ratio lower than 1:1
D - no applicable criteria

FIGURE IV.B.1 NUT ISLAND FLOWS VS PRECIPITATION
FY95



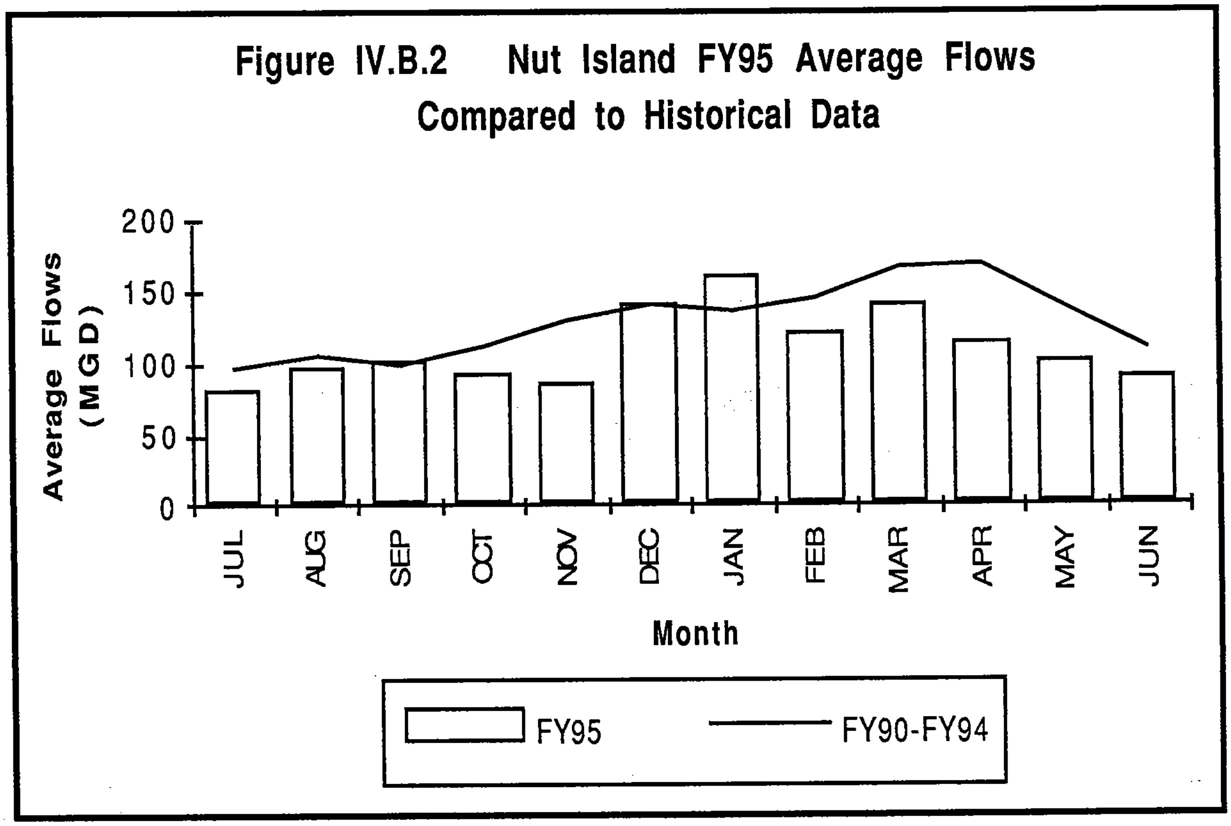


Figure IV.B.2 Nut Island FY95 Average Flows
Compared to Historical Data
Average Flows (MGD)
200
150
100
50
0
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
Month
FY95
FY90-FY94

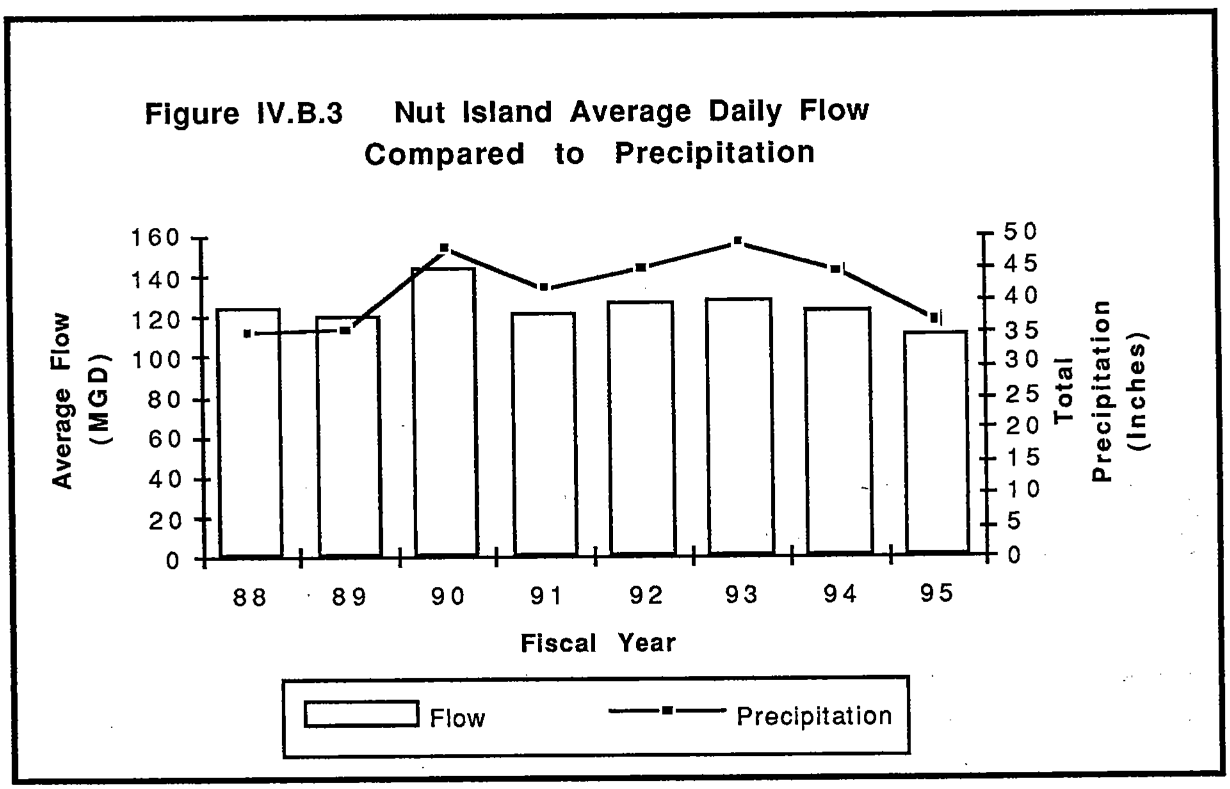


Figure IV.B.3 Nut Island Average Daily Flow
Compared to Precipitation
Average Flow (MGD)
160
140
120
100
80
60
40
20
0
Total Precipitation (Inches)
50
45
40
35
30
25
20
15
10
5
0
88
89
90
91
92
93
94
95
Fiscal Year
Flow
Precipitation

B.1.b Conventional Parameters

Appendix B Table B-1 contains the results of influent monitoring conducted in FY95. Table IV.B.1 provides an overview of the monitoring results. Except for ammonia, conventional parameters concentrations characterize the influent to the Nut Island plant as "weak to medium." Ammonia results, however, reclassify the influent to "medium."

In general, the concentrations of the measured parameters in FY95 were slightly lower than those measurements in FY94. Although there appears to be a reduction in oil and grease from FY92 to FY95, it is suspected that there were no real reductions in the measured concentrations. See Deer Island section A.1.b.

B.1.c Nutrients

Nitrogen in wastewater influent exists mainly in the form of ammonia and organic nitrogen, together called total Kjeldahl nitrogen (TKN). Other forms of nitrogen found in wastewater are nitrites and nitrates. FY95 monitoring results, when compared to FY94 data, show slight increase in ammonia concentrations and loadings. TKN, nitrites and nitrates compared well with last year's results.

Results of monitoring for phosphorus, measured as total phosphorus and orthophosphorus, show a slight increase in the concentrations and loadings in FY95 from FY94.

B.1.d Priority Pollutants

There are two sets of influent priority parameters data during FY95: the Nut Island Plant and the Local Limits data set. The Nut Island Laboratory measured the concentration of select metals. The Local Limits Study conducted a complete priority pollutant scan. Appendix B, Table B-1 and B-2 respectively present the results of these analyses. The following section on influent priority pollutants discusses Local Limits data.

Metals The influent data consistently showed measurable amounts of boron, copper, lead, and zinc. Chromium and mercury were detected more than 60 % of the time while molybdenum, arsenic, and silver were detected more than 40% of the time. Nickel and cadmium were occasionally detected.

Cyanide Cyanide was detected in two of 25 samples.

Pesticides/PCBs Of the pesticides and PCBs measured for, only chlordane and 4,4'-DDD were detected in two of 25 samples.

Organic Compounds A total of ten semi-volatile compounds were detected and/or estimated present. Of the semi-volatiles, benzoic acid, 4-methyl phenol, phenols, benzyl alcohol, naphthalene, and various phthalates were detected in the samples. Other organic compounds estimated present include 1-4,dichlorobenzene and 2-methlylnaphthalene.

A total of twelve volatile compounds were detected and/or estimated present. Of the volatile organic compounds, acetone, 2-butanone, chloroform, tetrachloroethylene, and toluene were consistently detected. Styrene, 1,1,1-trichloroethane, total xylenes, and trichloroethylene were detected about 50% of the time. Other volatile organics, carbon disulfide and trans-1,2-dichloroethylene, were occasionally detected at very low concentrations and reported values were between the method detection and quantitation limits.

B.2 Effluent Characteristics

B.2.a Conventional Parameters

The concentrations of conventional parameters in the effluent are contained in Appendix B, Table B -1 and are summarized and compared with previous year's data in Table IV.B.2. As shown, the FY95 average concentrations of settleable solids, TSS, and BOD were comparable to FY94 data. However, oil and grease measured slightly higher than FY94 measurements.

B.2.b Nutrients

Appendix B, Table B-1, Nut Island Operations Summary Report contains nutrient data and are summarized in Table IV.B.2. Total Kjeldahl nitrogen was comparable to last years' data. However, there was a slight increase in the concentrations of ammonia, nitrites, and nitrates. Phosphorus, expressed as total phosphorus and orthophosphorus concentrations were also comparable to FY94 data, and have shown no trends over the past six years. Figure IV.B.4 compares nutrient concentrations from FY90 to FY95.

Table IV.B.1 Nut Island Influent Characterization, FY 1995

PARAMETER	FY95	FY94	FY93	FY92
Flow (MGD)				
Minimum	70	47	50	73
Average	111	123	129	127
Maximum	211	315	262	254
Total Suspended Solids				
Minimum (mg/L)	111	122	112	162
Average (mg/L)	158	227	174	221
Maximum (mg/L)	209	354	206	437
Loadings (lb/d)	146267	232861	187200	234079
Biochemical Oxygen Demand				
Minimum (mg/L)	100	97	122	141
Average (mg/L)	148	171	177	194
Maximum (mg/L)	212	247	251	259
Loadings (lb/d)	137010	175415	190427	205481
Settleable Solids (mg/L)				
Minimum	3.8	2.7	5.1	5.2
Average	6.2	7.5	8	10.3
Maximum	11.1	19.8	10.5	39.3
Loadings (lb/d)	5740	7694	8607	10910
Oil and Grease (mg/L)				
Minimum	15	5.8	11	23
Average	28	31	35	42
Maximum	38	115	59	119
Loadings (lb/d)	25921	31800	37655	44486
Total Kjeldahl Nitrogen				*
Min Conc (mg/L)	9.80	10.08	10.57	
Ave Conc (mg/L)	24.45	22.84	19.40	
Max Conc (mg/L)	33.80	34.79	25.20	
Average Loading (lbs/d)	22634	23430	20873	

Table IV.B.1 (cont)

PARAMETER	FY95	FY94	FY93	FY92
Ammonia-Nitrogen				*
Min Conc (mg/L)	5.32	2.24	5.01	
Ave Conc (mg/L)	14.52	10.06	13.66	
Max Conc (mg/L)	23.10	20.44	20.07	
Average Loading (lbs/d)	13442	10320	14695	
Nitrates				*
Min Conc (mg/L)	0.03	0.00	0.00	
Ave Conc (mg/L)	0.23	0.20	0.21	
Max Conc (mg/L)	0.91	0.51	0.58	
Average Loading (lbs/d)	213	205	230	
Nitrites			*	*
Min Conc (mg/L)	0.03	0.00		
Ave Conc (mg/L)	0.06	0.05		
Max Conc (mg/L)	0.15	0.09		
Average Loading (lbs/d)	56	51		
Orthophosphorus				*
Min Conc (mg/L)	0.85	0.10	0.00	
Ave Conc (mg/L)	2.16	1.64	#DIV/0!	
Max Conc (mg/L)	3.93	2.70	0.00	
Average Loading (lbs/d)	2000	1682	#DIV/0!	
Total phosphorus				*
Min Conc (mg/L)	2.20	0.90	1.83	
Ave Conc (mg/L)	4.60	2.97	3.22	
Max Conc (mg/L)	13.57	4.60	3.99	
Average Loading (lbs/d)	4258	3047	3467	

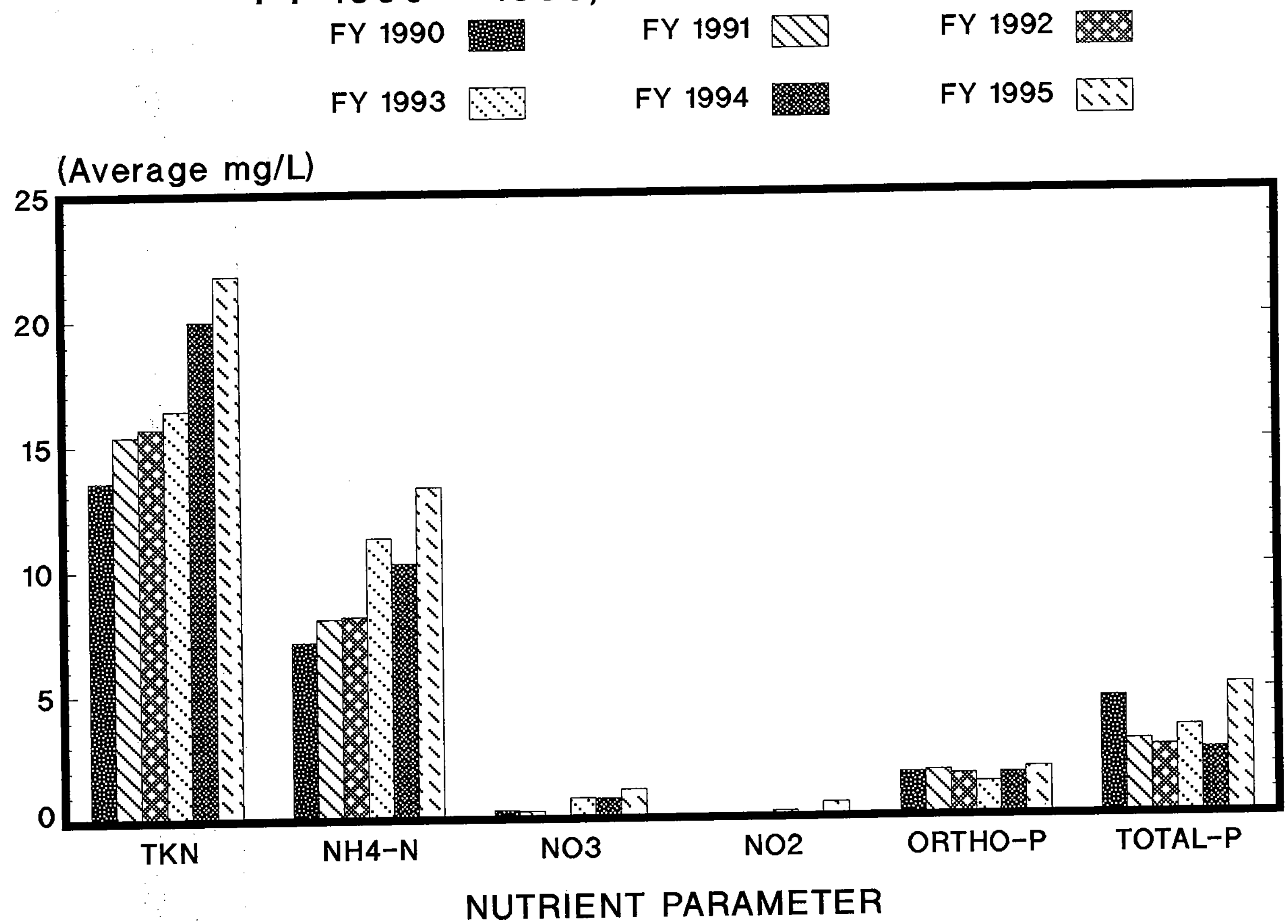
* Not Available

Table IV.B.2 Nut Island Effluent Characterization, FY 1995

Parameter	FY95	FY94	FY93	FY92
Flow (MGD)				
Minimum	70	47	50	73
Average	111	123	129	127
Maximum	211	315	262	254
Total Suspended Solids				
Minimum (mg/L)	48	53	44	48
Average (mg/L)	75	78	66	67
Maximum (mg/L)	94	100	80	79
Loadings (lb/d)	69431	80014	71007	70965
Biochemical Oxygen Demand				
Minimum (mg/L)	65	74	64	62
Average (mg/L)	108	108	103	99
Maximum (mg/L)	143	136	142	122
Loadings (lb/d)	99980	110789	110814	104859
Settleable Solids (mg/L)				
Minimum	0.5	0.5	0.8	0.9
Average	0.7	0.9	1.1	1.2
Maximum	1.1	1.1	1.3	1.7
Loadings (lb/d)	676	923	1183	1271
Oil and Grease (mg/L)				
Minimum	13.9	2.1	8.0	10.8
Average	24.0	16.4	22.7	21.3
Maximum	33.7	25.3	37.2	41.0
Loadings (lb/d)	22218	16823	24422	22561
Total Kjeldahl Nitrogen				
Min Conc (mg/L)	11.20	11.90	7.14	10.22
Ave Conc (mg/L)	21.86	19.97	16.41	15.66
Max Conc (mg/L)	30.30	26.39	24.58	21.56
Average Loading (lbs/d)	20237	20486	17655	16587

PARAMETER	FY94	FY94	FY93	FY92
Ammonia-Nitrogen				
Min Conc (mg/L)	6.09	2.80	2.45	2.80
Ave Conc (mg/L)	13.51	10.24	11.25	8.11
Max Conc (mg/L)	19.60	17.78	17.35	11.10
Average Loading (lbs/d)	12507	10504	12103	8590
Nitrates				
Min Conc (mg/L)	0.03	0.09	0.03	0.01
Ave Conc (mg/L)	1.25	0.80	0.82	0.33
Max Conc (mg/L)	4.62	1.79	1.50	1.06
Average Loading (lbs/d)	1157	821	887	350
Nitrites				
Min Conc (mg/L)	0.07	0.01	0.06	0.02
Ave Conc (mg/L)	0.25	0.07	0.24	0.15
Max Conc (mg/L)	0.52	0.16	0.76	0.37
Average Loading (lbs/d)	231	72	258	162
Orthophosphorus				
Min Conc (mg/L)	0.85	0.49	0.24	0.90
Ave Conc (mg/L)	1.92	1.69	1.32	1.64
Max Conc (mg/L)	3.05	2.50	2.83	2.90
Average Loading (lbs/d)	1777	1734	1424	1737
Total phosphorus				
Min Conc (mg/L)	0.27	0.26	1.50	1.60
Ave Conc (mg/L)	3.38	2.57	3.50	2.70
Max Conc (mg/L)	4.79	3.85	9.13	3.70
Average Loading (lbs/d)	3129	2636	3761	2860

Figure IV.B.4 Nut Island Effluent, Nutrient Concentrations
FY 1990 - 1995, Nut Island Laboratory



B.2.c Priority Pollutants

Testing of Nut Island effluent was performed for NPDES and the Nut Island Plant monitoring programs. The NPDES program conducted full priority pollutant scans, while the Central Lab analyzed for select metals. The results of the Nut Island Laboratory and NPDES monitoring programs are presented in Appendix B, Tables B-1 and B-4 respectively. Results of NPDES Monitoring Program are discussed below.

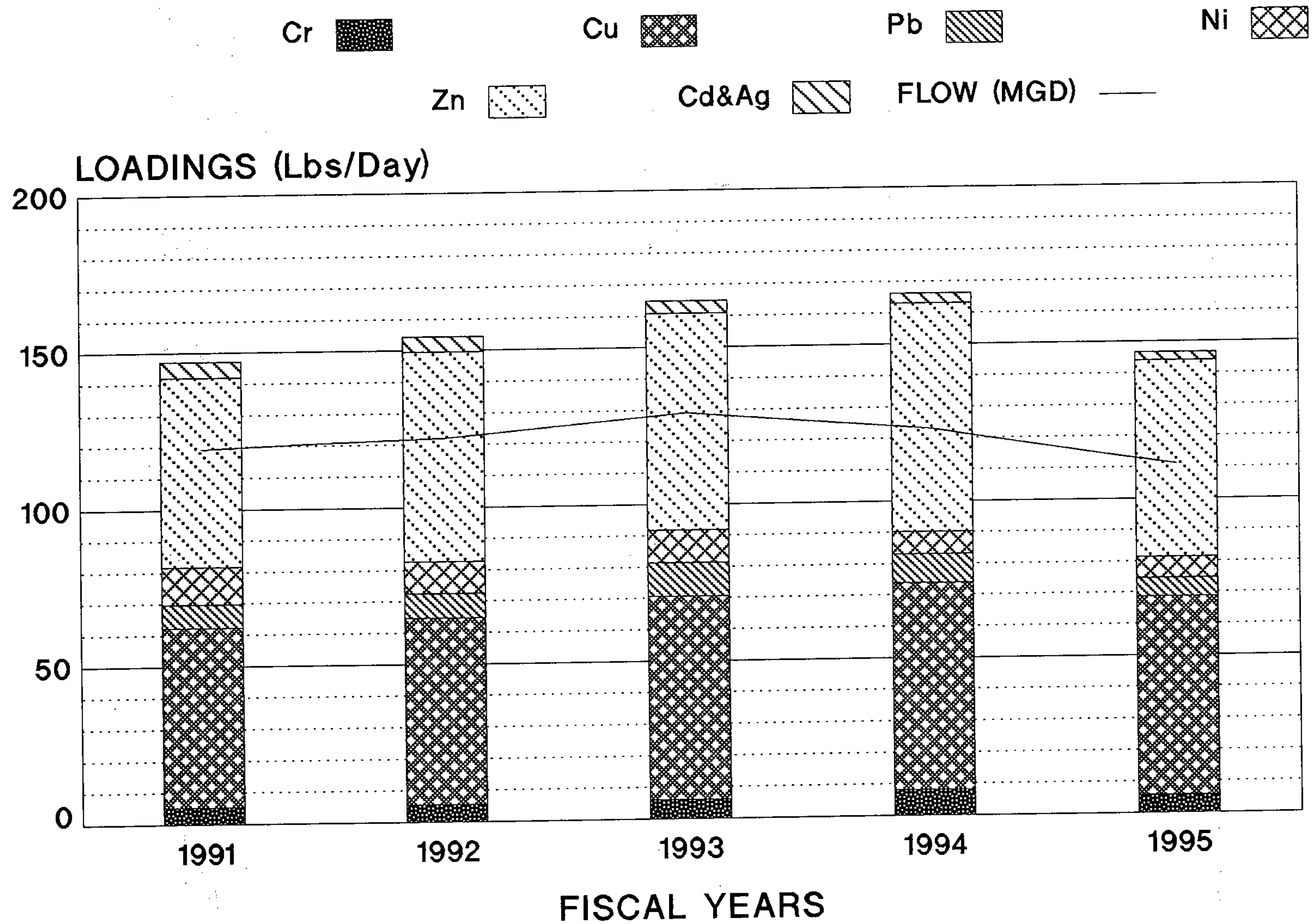
Metals All of the metals detected in the influent were also detected in the effluent, as expected of a primary treatment facility. Boron, copper, lead, and zinc were consistently detected. Arsenic, chromium, and molybdenum were measured more than 50% of the time. Mercury, nickel, selenium, and silver were detected about 15% of the time and registered slightly above detection levels. Figure IV.B.5 graphs the NPDES monitoring data and compares the metal loadings from FY87 to FY95. In general, the figure shows a decreasing trend. However, what we may actually be seeing is not a decreasing concentration but the results of analytical methods using lower detection levels. In general, the metal loadings have levelled off in the past four years.

Cyanide Cyanide was detected in 26 of 38 samples. As with Deer Island, cyanide is not normally present in the influent. Because cyanide was not detected in the influent but in the effluent, it is believed that the measurements reported may be false positives due to analytical interferences. This issue is under investigation.

Pesticides/PCBs Of 36 samples, heptachlor was detected in one and estimated present in two, d-BHC measured in five and estimated present in five, and chlordane present in one and estimated present in one. All other pesticides present in the effluent (Appendix B Table B-4) were close to method detection limits.

Organic Compounds Benzoic acid, 4-methyl phenol, benzyl alcohol, di-n-butylphthalate, phenols, 2-butanone, acetone, chloroform, methylene chloride, tetrachloroethene, and toluene, were measured in detectable amounts. Acenaphthylene, 1,4-dichlorobenzene, 2-methyl naphthalene, bromodichloromethane, 1,1,1-trichloroethane, carbon disulfide, styrene, trichloroethene, and xylene were occasionally detected.

Figure IV.B.5 Nut Island Effluent, Mean Metal Loadings
Contract Lab



B.2.d Whole Effluent Toxicity

Like Deer Island, Nut Island effluent was also tested for acute and chronic toxicity. The results of toxicity testing in FY95 were similar to FY94 results. Table IV.B.3 summarizes the results of toxicity tests conducted during FY95.

Acute Static Toxicity Test The result of the mysid shrimp acute test showed that the NOEC limit of 20% was violated in eight of 12 samples.

Chronic Toxicity Tests The results of the sheepshead minnow chronic tests showed that the NOEC limit of 10% for both the growth and survival endpoint were consistently met. The results of the chronic test using a red alga showed that the NOEC limit of 10% at the sexual reproduction endpoint always failed.

Table IV.B.3 Nut Island Effluent Results of Toxicity Testing, FY95

	Mysid acute		Cyprinodon chronic		Champia chronic
	LC50	NOEC	Survival NOEC	Growth NOEC	NOEC
Limits (%)	**None**	**20**	**10**	**10**	**10.0**
July	30	20	60	60	**2.0**
August	18	**10**	40	40	**0.7**
September	14	**10**	40	40	**2.0**
October	13	**<5**	20	20	**<0.2**
November	22	**10**	20	20	**0.2**
December	60	**10**	60	60	**0.7**
January	56	**<5**	60	60	**2.0**
February	14	**5**	*	*	**2.0**
March	32	20	60	60	**2.0**
April	19	**5**	40	40	*
May	68	50	20	20	**2.0**
June	32	20	40	40	**0.2**
Average	32	14	44	44	1.3
Violations		8			11

Notes:
Test results must be equal or greater than permit limits.
Bold numbers violated permit limits
* Quality control failure, test invalid

B.3 Compliance with Interim Limits

Table IV.B.4 presents the plant performance during FY95 measured against regulatory permit limits while Figures IV.B.6 to 11 chart trend analyses of conventional parameters for the twelve monitoring months in FY95.

BOD The 12-month running average removal requirement was consistently met. However, there were nine BOD-related violations: four average monthly limit violations and five maximum daily limit violations (Figure IV.B.6).

TSS The TSS 12-month running average limit was consistently met. However, there were three TSS daily maximum limit violations (Figure IV.B.7).

Fecal and Total Coliform There were no violations of these permit limits.

pH There were nine pH readings that were lower than the acceptable low pH threshold.

Settleable Solids There were no violations of this permit limit.

PHCs There were four violations of the PHC daily maximum limit during this monitoring period. However, it is believed that the values reported may have included constituents other than PHCs. See Deer Island Section A.3 for further explanation.

Toxicity There were 19 violations of this parameter.

B.4 Effluent Quality Compared to Water Quality Standards

The priority pollutants that were present in the effluent were detected at very low concentrations. Table IV.B.5 compares the effluent maximum concentration observed, the calculated arithmetic mean concentrations of each pollutant, and the receiving water quality data at the outfall site. Also shown in Table IV.B.5 is the calculated critical dilution ratio required to meet water quality criteria. Results of the analyses show that copper violates both the acute and chronic criteria while chlordane violates the chronic criterion. Cyanide and heptachlor violate the acute criteria, however, heptachlor is at or close to the 10:1 dilution requirement.

Figure IV.B.6 Nut Island Treatment Plant
Effluent, BOD, FY 95

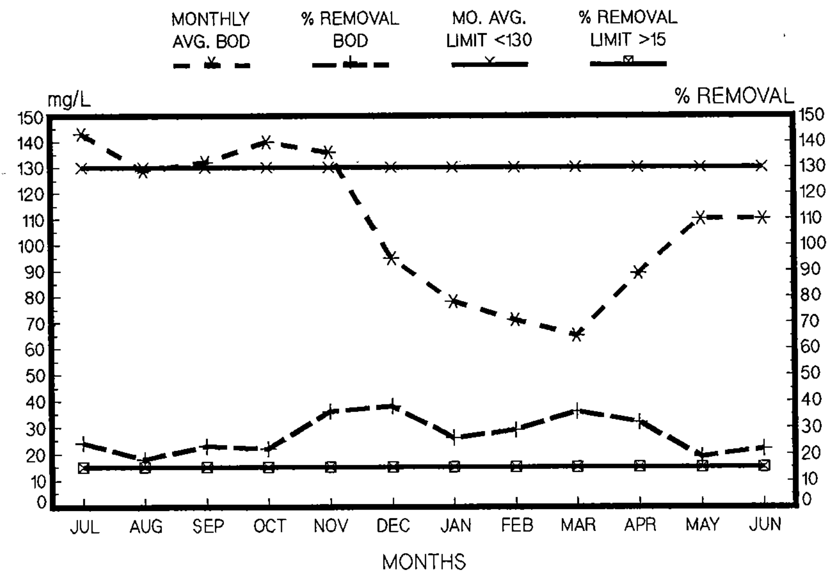


Figure IV.B.7 Nut Island Treatment Plant
Effluent, TSS, FY 95

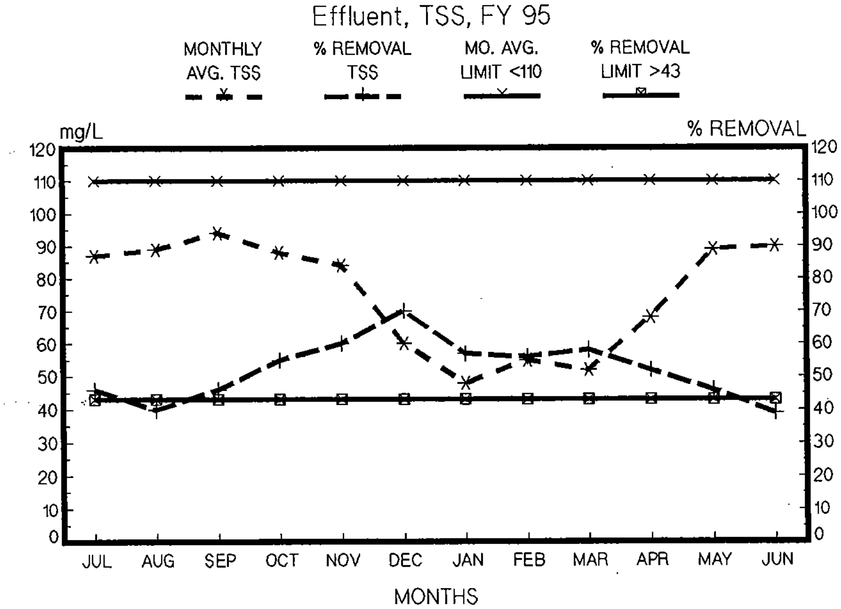


Figure IV.B.8 Nut Island Treatment Plant
Effluent, Fecal Coliform, FY95

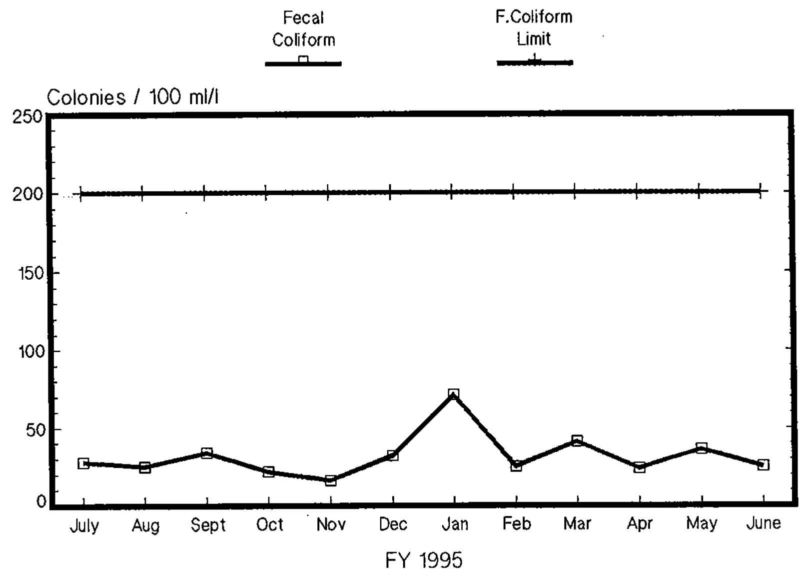


Figure IV.B.9 Nut Island Treatment Plant
Effluent, Total Coliform, FY 95

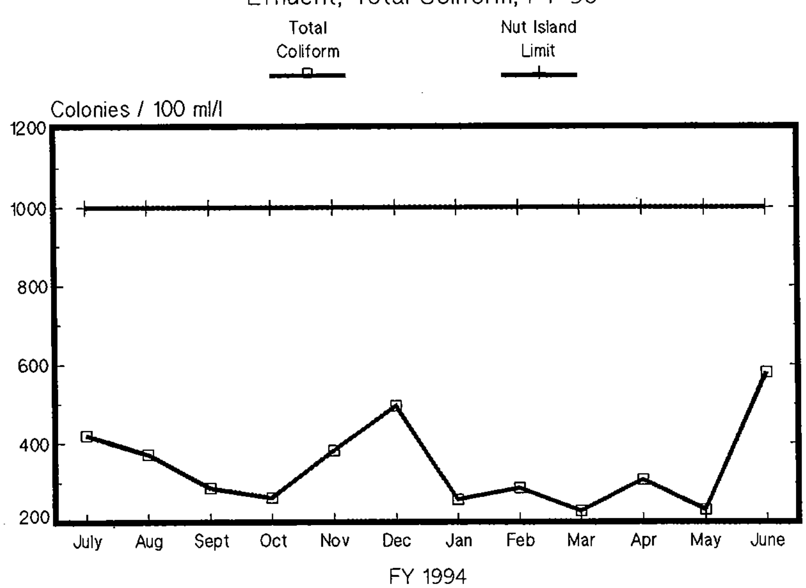


Figure IV.B.10 Nut Island Treatment Plant
Effluent, pH, FY 95

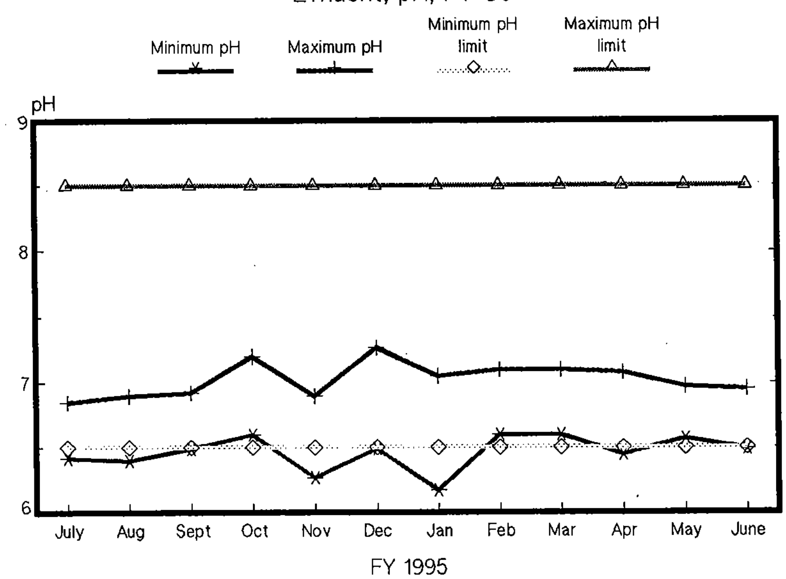


Figure IV.B.11 Nut Island Treatment Plant
Effluent, Settleable Solids, FY95

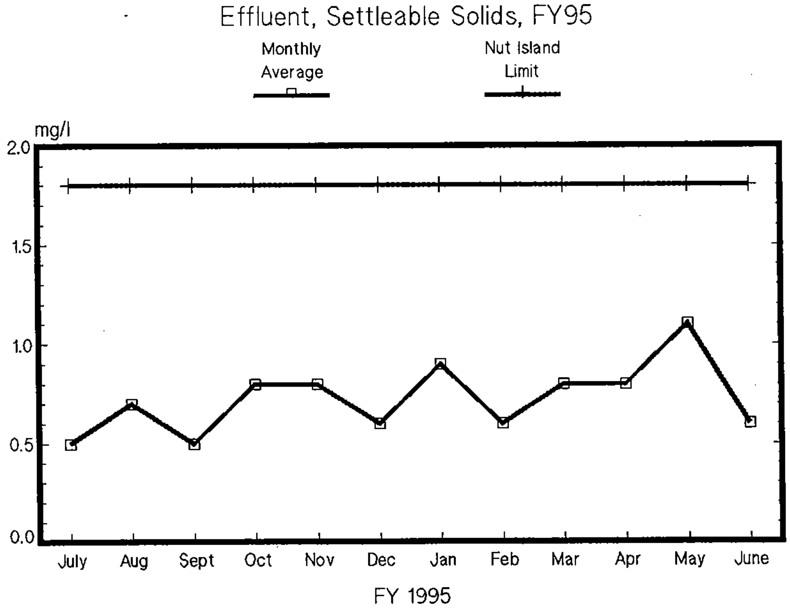


Table IV.B.4 Nut Island Effluent Quality Compared to Interim Limits

Parameter	Interim Limits*	Range of Values Exceeding Limits	No. of Violations
Biochemical Oxygen Demand			
Mo Ave (mg/L)	130	132 - 143	4
Dly Max (mg/L)	185	186 - 222	5
12-mo running removal rate (%)	15		0
Total Suspended Solids			
Mo Ave (mg/L)	110		0
Dly Max (mg/L)	195	222	3
12-mo running removal rate (%)	43		0
Settleable Solids (mg/L)	1.8		0
Fecal Coliform (#/100 mL)	200		0
Total Coliform (#/100 mL)	1000		0
pH	6.5 - 8.5	6.16 - 6.49	9
PHCs Effluent Dly. Max (mg/L)	15	17 - 38	4
Toxicity	@		19
		Total Number of Violations	44

* Except for removal rates and pH, the effluent quality must be less than or equal to limits. Removal rates must be equal to or greater than limits, pH must be within range.

@ See Table IV.B.3

B.5 Priority Pollutants of Concern

Copper The critical dilutions required to meet both acute and chronic water quality criteria are 41: 1 and 23 : 1 respectively, well above the assumed available dilution at the outfall pipe.

Cyanide The critical dilution required to meet the acute quality criterion was 210 : 1. Because cyanide was not detected in the influent but in the effluent, it is believed that the measurements reported may be false positives due to analytical interferences. This issue is under investigation.

Chlordane There were only two detects of chlordane out of 36 samples. One detect was reported in measurable amount while the other was estimated. It is questionable whether the calculated average concentration truly reflects the concentration of this constituent in the effluent. The chronic critical dilution requirement was 24:1

Table IV.B.6 Comparison of Nut Island Treatment Plant Effluent with Water Quality Criteria, FY95

Parameter	Boston Harbor (A) (ug/L)	Effluent Max Conc (ug/L)	Effluent Ave Conc (ug/L)	Times Detected	Acute Criteria (ug/L)	Max Conc : Acute Criteria	Chronic Criteria (ug/L)	Ave Conc: Chronic Criteria
Aroclor 1260	B	0.580	0.173	1 of 36		D	0.03	6 : 1
Arsenic	B	13.000	2.347	14 of 37	69.0	C	36	C
Cadmium	0.0249	1.000	0.512	1 of 37	43	C	9.3	C
Chlordane	B	0.520	0.097	2 of 36	0.09	6 : 1	0.004	24 : 1
Copper	0.818	120.000	67.434	37 of 37	2.90	41 : 1	2.9	23 : 1
Cyanide	B	210.000	21.180	26 of 38	1.00	210 : 1		D
Endosulfan Beta	B	0.084	0.018	2 of 36	0.034	2 : 1	0.0087	2 : 1
Heptachlor	0.00016	0.560	0.035	3 of 36	0.053	11 : 1	0.0036	10 : 1
Heptachlor Epoxide	B	0.044	0.012	5 of 36	0.053	2 : 1	0.0036	3 : 1
Lead	0.1078	19.000	6.191	5 of 37	220.00	C	8.5	1 : 1
Lindane	0.00109	0.027	0.009	1 of 36	0.16	C		D
Mercury	< 0.0064	.9000	0.149	5 of 37	2.10	C	0.025	6 : 1
Nickel	0.454	33.000	7.361	5 of 37	75.00	C	8.3	1 : 1
Silver	B	7.000	2.136	9 of 37	2.30	3 : 1		D
Zinc	1.238	94.000	66.504	37 of 37	95.00	1 : 1	86	1:1

Notes:

A - data taken from the Secondary Treatment Facilities Plan, Volume V, Appendix X
B - no data
C - no applicable criteria
D - ratio lower than 1:1

C. Cottage Farm Combined Sewer Overflow Facility

C.1 Activations

Because FY95 was a very dry year, as expected, there was a decrease in both the number of times the facility activated and the total volume of combined sewage treated and discharged to the Charles River. Appendix C, Table C-1 contains the Cottage Farm FY95 activation data and is summarized in Table IV.C.1. In addition, Table IV.C.1 compares FY95 data with FY94, FY93, and FY92 data. Figure IV.C.1 compares total rainfall and resultant CSO discharge volume in FY95 while Figure IV.C.2 shows the decreasing trend of the total number of activations at Cottage Farm and total rainfall from FY89 to FY95.

Table IV.C.1 Cottage Farm CSO Activations Summary

	FY95	FY94	FY93	FY92
Number of Activations	25	31	33	23
Total Volume Treated (MG)	574	621	677	361
Maximum Flow (MGD)	100	123	145	64
Minimum Flow (MGD)	0.09	0.08	0.69	0.01
Average Flow (MGD)	23	20.0	20.52	15.69
Total Rainfall (in/year)	37.47	45.00	48.82	41.18

Average flow is calculated by dividing the total volume treated by the number of times the facility activated.

Although CSO activations are very much dependent on rainfall events, several factors may have affected this decreasing trend: more inspections and timely maintenance on the system, major system renovations, and reduced infiltration and inflow. In addition, opening Deer Island Outfall 004 in October 1, 1991 alleviated system capacity overload. Opening Outfall 004 made it possible to pump more wet weather flow to Deer Island, taking flows that otherwise would have been discharged to the upper Charles River through Cottage Farm.

In FY95, there was a 73% increase in the hours choking occurred at the headworks relative to FY94. The huge increase however was due to scheduled construction and maintenance activities at Deer Island. Most of these choking hours were scheduled when no rain was predicted and at night when the wastewater flow was at a minimum, ensuring no discharge of dry weather overflow at the Cottage Farm or any other CSO facility. Rain-related choking at the headworks decreased by 25% from FY94.

C.2. Conventional Parameters

CSO effluent quality can vary from activation to activation and from facility to facility. Many factors influence the concentration of wastewater constituents of CSO samples:

- the amount of runoff contributing to dilution of a contaminant
- sampling occurrence with respect to the time sample was obtained, as in "first flush" or tail end of the activation
- quality of sample with respect to sample location (how representative is the sample)
- sample handling
- proper analyses

Both influent and effluent samples were analyzed for conventional parameters. Because of the variability of the characteristics of combined sewage, at times, the effluent concentration of BOD and TSS may be higher than the influent concentration. In addition, the CSO facilities were not designed to remove these contaminants other than to disinfect and to remove grit and large particles.

Analytical results of conventional parameter testing of both the influent and the effluent are included in Appendix C, Table C-1 and are summarized in Table IV.C.2. The wide ranges of BOD and TSS influent and effluent values reported demonstrate the variability of combined sewage strength. The fecal coliform counts are also very much dependent on the wastewater strength and chlorine dose. In addition, the analytical results are subject to the influences of sampling variability. Appendix C Table C-2 quantifies the amount of suspended solids and BOD discharged from Cottage Farm to the Charles River during each activation.

C.3 Priority Pollutants

In addition to the conventional pollutant sampling of each activation, one set of selected priority pollutants was collected. During the first measurable storm event of each month, samples were collected for select metals, cyanide, total phenols, surfactants, ammonia, phosphorus, pesticides/PCBs, and semi-volatile organics. Results of effluent monitoring conducted in 1995 are in Appendix C, Table C-3.

Metals The CSO effluent samples were tested for select priority pollutant metals. Of seven samples, copper, lead, mercury, and zinc were consistently present while cadmium

Figure IV.C.1 Total Rainfall Compared to Cottage Farm CSO Discharge, FY95

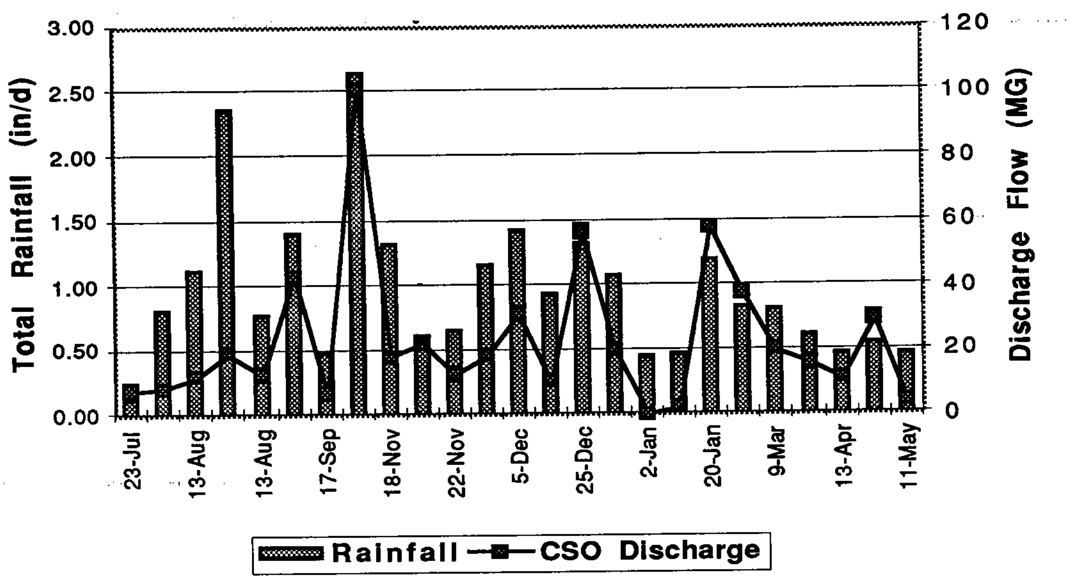


Figure IV.C.2 Cottage Farm CSO Activations, FY89-FY95

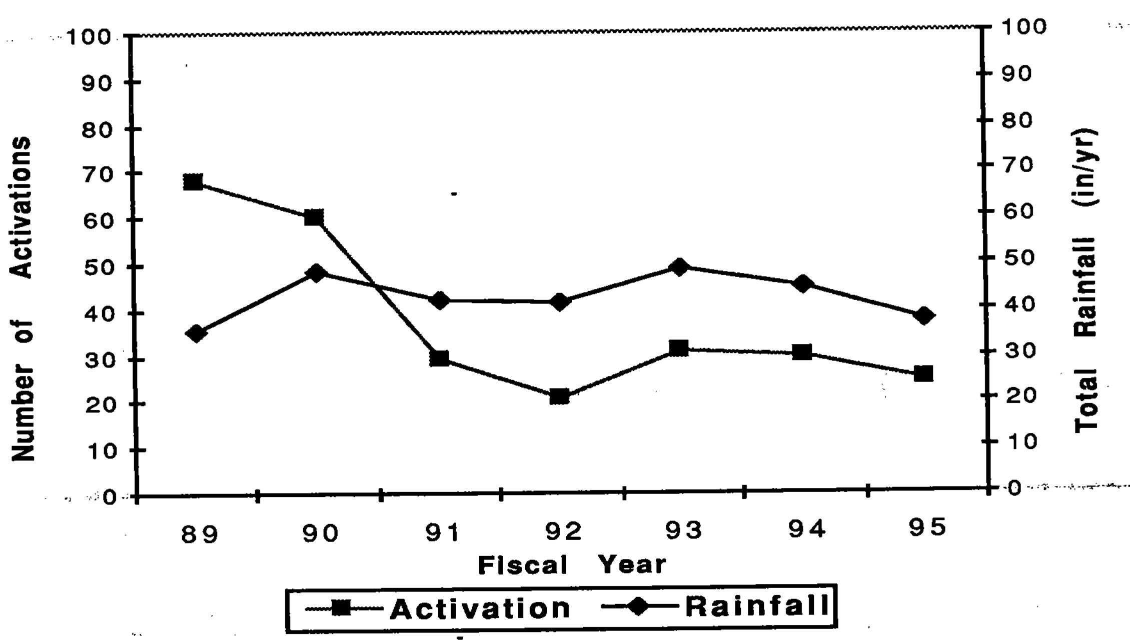


Table IV.C.2 Cottage Farm CSO Influent and Effluent Characteristics, FY95						
	Concentration (1)					
Parameter	**Influent**			**Effluent**		
	Min	**Ave**	**Max**	**Min**	**Ave**	**Max**
TSS	7	95	278	16	77	162
BOD	< 26	78	157	< 11	49	86
Fecal Coliform (#/100 ml)				< 10	46	46000
pH (units)				6.61		7.65

(1) Concentration expressed in mg/l except for pH and Fecal Coliform

was detected 50% of the time. Nickel was detected in two samples while chromium was detected in only one sample.

Cyanide/Total Phenols Cyanide was consistently detected while total phenols was detected 40% of the time.

Pesticides/PCBs Of all pesticides, only G-BHC and methoxychlor were detected present in the effluent. G-BHC was detected in one while methoxychlor was detected in three.

Semi-volatile Organic Compounds Of the semi-volatile organic compounds, of seven samples, various phthalates, benzoic acid, and p-cresol were consistently detected. In addition, naphthalene and fluoranthene were detected slightly above the method detection level. Because these compounds can not be reported present with certainly, they were estimated to be present. These analytical results are commonly flagged with "J." Naphthalene was estimated present in one while fluoranthene was detected in two. While benzoic acid and p-cresol were routinely analyzed for, they are not on EPA's priority pollutant list. Phthalates are generally used as plasticizers and are commonly found in wastewater.

C.4 Priority Pollutants Loadings

The detected and/or estimated concentrations of the pollutants and CSO discharge volume provides the basis for calculating the discharge loadings to the Charles River during each activation. Appendix C, Table C-4 quantifies the amounts of toxic contaminants discharged through the Cottage Farm facility. The loadings were calculated using the flows measured during the time of sampling.

Care should be exercised in using these loadings. The calculated loadings should not be used to project monthly or yearly loadings because only one storm per month was sampled. The varying nature of pollutant concentrations in CSO discharges with regard to "first flush" or timing when sample was taken also lends an extra measure of uncertainty to the results.

C.5 Compliance With Regulatory Requirements

Fecal Coliforms There were a total of three fecal coliform limit violations in FY95. Three high fecal counts of 3,000, 46,000, and > 60,000 colonies per 100mL were measured in August, September, and February respectively. The results exceeded the "no more than 10% of the samples can exceed 2500 colonies/100mL in a month."

pH There were no pH limit violations.

D. Prison Point Combined Sewer Overflow Facility

D.1 Activations

Appendix D, Table D-1 contains the Prison Point FY95 activation data and is summarized in Table IV.D.1. Table IV.D.1 also compares FY95 with FY94, FY93 and FY92 data. FY95 was very comparable to the FY94 even though FY95 was a dry year.

In general, the number of activations, which increased sharply from FY89 to FY90, has since decreased and appears to have leveled off. Both FY89 and FY93 were very wet years. In FY89, the total rainfall of 48.42 inches resulted in 42 activations. In contrast, the total rainfall of 48.82 inches in FY93 resulted only in 26 activations. Part of the reason for this significant decrease in activations at the CSO facilities were improvements in community-owned pipes, removal of storm drains (illegal connections), and reduced infiltration and inflow. In addition, opening 004 at Deer Island provided more wet weather flow to be sent to Deer Island, flows that would have been discharged through any of the CSO outfalls in the system.

Figure IV.D.1 graphs the individual activations and total rainfall during each activation in FY95. Like Cottage Farm data, Prison Point data show the direct relationship of total rainfall to CSO volume; more CSO flow with increasing rainfall intensity. Figure IV.D.2 compares the total number of activations and total rainfall from FY89 to FY95. Again, the impact of opening Deer Island Outfall 004 is shown in the decrease of frequency of activation in FY91. Since that dramatic drop, the number of activations recorded has been fairly stable. With additional system improvements planned, and as segments of the CSO Master Plan get implemented, we can only project a further decrease in the frequency of activations at the CSO facilities.

Table IV.D.1 Prison Point CSO Activations Summary

	FY95	FY94	FY93	FY92
Number of Activations	26	26	26	29
Total Volume Treated (MG)	460	449	269	429
Maximum Flow (MGD)	127	80	28	63
Minimum Flow (MGD)	1.63	3.01	1.63	1
Average Flow (MGD)	17.71	17.92	10.34	14.79
Total Rainfall (in/year)	37.47	45.00	48.82	41.18

Average flow is calculated by dividing the total volume treated by the number of times the facility activated.

D.2 Conventional Parameters

The results of analyses for conventional pollutants in the influent and effluent are contained in Appendix D, Table D-1 and are summarized in Table IV.D.2. The wide ranges of BOD and TSS influent and effluent values demonstrate the variability of wastewater strength. There are no BOD and TSS removed in wastewater at a CSO chlorination facility. Appendix D Table D-2 quantifies the conventional pollutant loadings discharged from the Prison Point facility to the Inner Harbor.

D.3 Priority Pollutants

Results of effluent monitoring performed in FY95 are presented in Appendix D, Table D-3. Effluent characteristics of the Prison Point facility are comparable to those of the Cottage Farm effluent.

Figure IV.D.1 Total Rainfall Compared to Prison Point Discharge, FY95

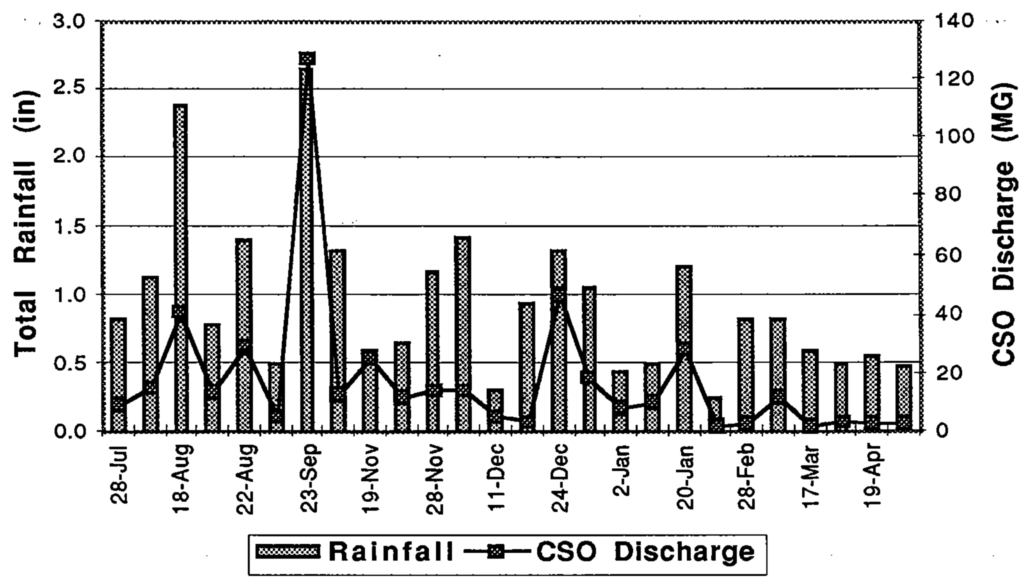


Figure IV.D.2 Prison Point CSO Activations, FY89-FY95

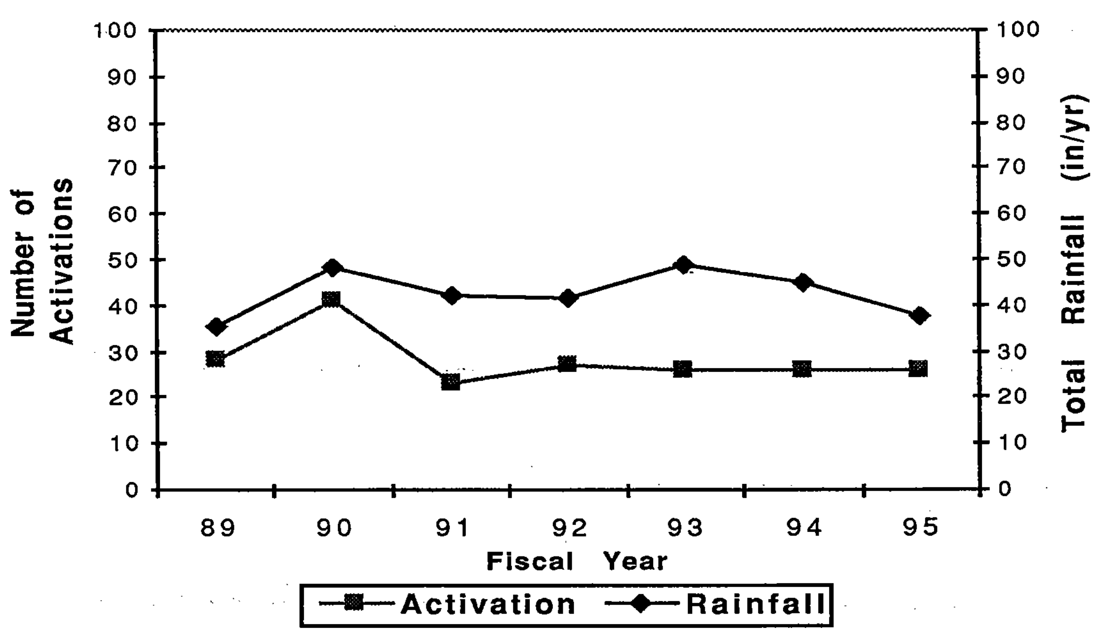


Table IV.D.2 Prison Point CSO Influent and Effluent Characteristics, FY95

Parameter	Influent Min	Influent Ave	Influent Max	Effluent Min	Effluent Ave	Effluent Max
	Concentration (1)					
TSS	46	231	1193	26	104	576
BOD	26	83	288	12	45	114
Fecal Coliform (#/100 ml)				< 10	36	112000
pH (units)				6.63		9.54

(1) Concentration expressed in mg/l except for pH and Fecal Coliform

Metals Of seven samples, of the six priority pollutant metals analyzed for, only copper, lead, and zinc were consistently detected. Cadmium and nickel were detected in four of the seven samples while mercury was only detected in two.

Cyanide/Total Phenols Of seven samples, cyanide was consistently detected. Total phenols was detected only in two of six samples.

Pesticides/PCBs Several pesticides were detected in the effluent. G-BHC, heptachlor, and heptachlor epoxide were measured in detectable amounts in one of seven samples. A-BHC, b-BHC, and endrin aldehyde were suspected present and reported below the quantitation limit in one of seven samples.

Semi-volatile Organic Compounds Of the 16 compounds reported present, only four were detected in measurable amounts while the rest were suspected present. These include: bis(2-ethylhexyl)phthalate, benzoic acid, di-n-butylphthalate, and p-cresol. Of seven samples, di-n-butyl phthalate and benzoic acid were consistently detected, in measurable amounts in three and suspected present in four samples. Di-n-butylphthalate and p-cresol were detected present in two and suspected present in three samples.

D.4 Priority Pollutants Loadings

Appendix D, Table D-4 quantifies the amounts of toxic contaminants discharged to the Inner Harbor through the Prison Point facility during each monthly sampling event. The loadings were calculated using the flows measured during the time of sampling. Care should be taken in using the loadings data as it only reflects one activation. For most constituents, the FY95 loadings appear to have increased from previous years, but these measurements are misleading since they resulted from higher method detection limits used in the analyses.

D.5 Compliance With Regulatory Requirements

Fecal Coliforms There were two high fecal counts of 29,400 and 112,000 colonies/100 mL measured in December and January respectively. These measurements exceeded the NPDES permit monthly limit of "no more than 10% of the samples can exceed 2500 colonies/100mL."

pH There were two high pH measurements in FY95. These high measurements, 8.98 and 9.54, violated the pH upper limit of 8.5. This facility uses sodium hypochlorite for disinfection. Hypochlorite is very alkaline and tends to raise the pH of water. Because the high pH reading was the direct result of the disinfection process, it is not considered a true permit violation. The NPDES permit allows for permit limit violations provided that such violations were due to natural causes or as a result of approved treatment processes.

E. Somerville Marginal Combined Sewer Overflow Facility

E.1 Activations

Appendix E Table E-1 contains the Somerville Marginal FY95 activation data, and it is summarized in Table IV.E.1. Table IV.E.1 also compares FY95 data with FY94, FY93, and FY92 data. As with Cottage Farm and Prison Point, the frequency of activation at this facility and the total volume of wastewater discharged to the Mystic River were lower than previous years primarily because FY95 was a very dry year.

As in the past, flows to this facility were estimated due to malfunctioning flow meters. Flows were estimated based on the amount of hypochlorite used during each activation. In FY95, three flow data were estimated. These estimated flows are usually on the high side and the total volume released to the Mystic River is probably a little less than reported.

Table IV.E.1 Somerville Marginal CSO Activations Summary

	FY95	FY94	FY93	FY92
Number of Activations	28	34	45	48
Total Volume Treated (MG)	49	74	90	89
Maximum Flow (MGD)	14	11	8	8.5
Minimum Flow (MGD)	0.16	0.006	0.101	0.003
Average Flow (MGD)	1.75	2.11	2.1	1.89
Total Rainfall (in/year)	37.47	45.00	48.82	41.18

Average flow is calculated by dividing the total volume treated by the number of times the facility activated.

Figure IV.E.1 graphs the activations in FY95. Somerville Marginal is a gravity facility with no holding capacity. The combined wastewater high flow measured on December 5 shows the combined effect of a high-intensity rainfall event and snowmelt. This combined effect was not as pronounced in the Cottage Farm and Prison Point data because both Cottage Farm and Prison Point have holding capacities and consequently, the discharges from these facilities were regulated.

Figure IV.E.2 graphs the activations from FY89 to FY95. The chart depicts an overall decreasing trend in the frequency the facility activated and in the volume of flow treated and discharged from this facility since 1990.

E.2 Conventional Parameters

The wide range of BOD and TSS influent and effluent values demonstrates the variability of wastewater strength, which is a result of combined sewers. No BOD and TSS removal is realized at a CSO chlorination facility. Appendix E Table E-2 quantifies the conventional pollutant loadings discharged to the Mystic River from the Somerville Marginal facility.

E.3 Priority Pollutants

Results of priority pollutant analyses performed in FY95 are contained in Appendix E, Table E-3. In general, the constituents found in Cottage Farm and Prison Point effluent were also detected in Somerville Marginal effluent.

Figure IV.E.1 Total Rainfall Compared to Somerville Marginal CSO Discharge, FY95

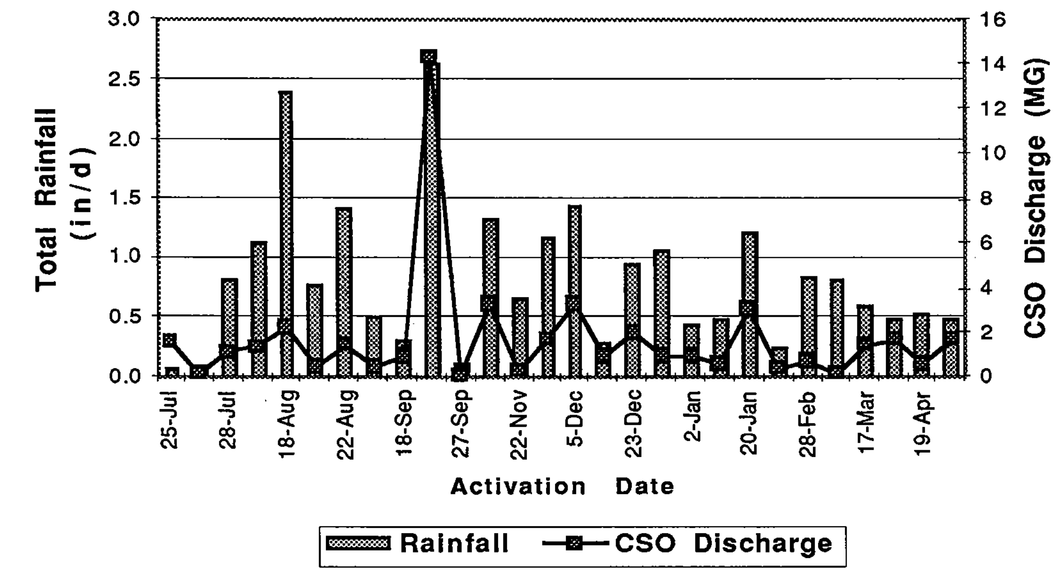


Figure IV.E.2 Somerville Marginal CSO Activations, FY89-FY95

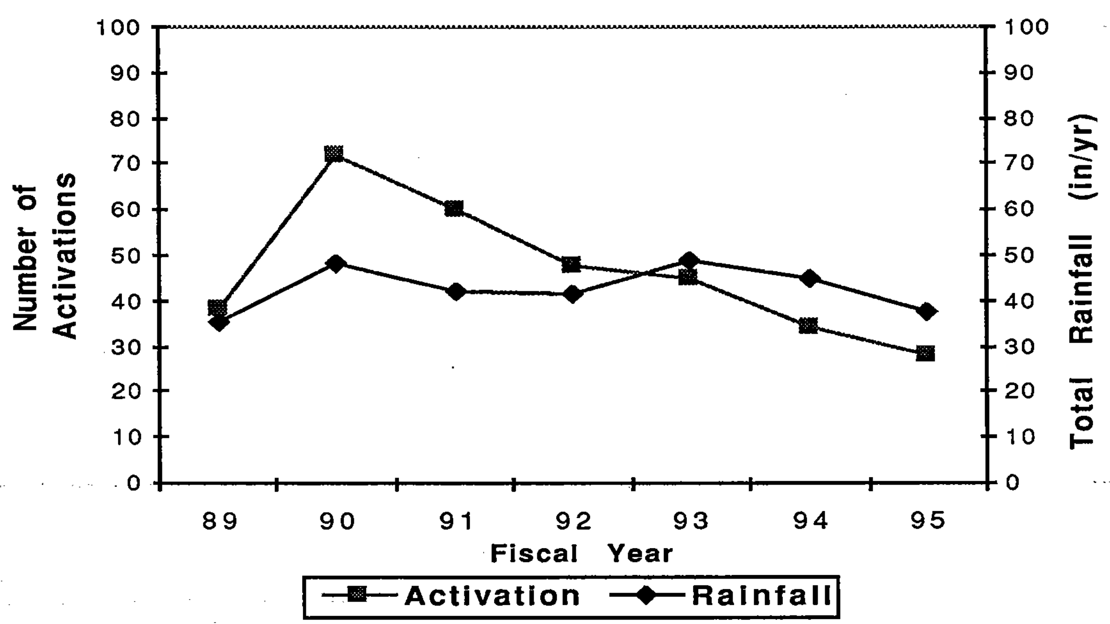


Table IV.E.2 Somerville Marginal Influent and Effluent Characteristics, FY95

Parameter	Influent Min	Influent Ave	Influent Max	Effluent Min	Effluent Ave	Effluent Max
	Concentration (1)					
TSS	13	92	640	13	94	368
BOD	11	48	84	9	33	244
Fecal Coliform (#/100 ml)				< 10	25	115000
pH (units)				6.05		9.25

(1) Concentration expressed in mg/l except for pH and Fecal Coliform.

Metals Of the seven priority metals measured for, only copper, lead, and zinc were consistently present in detectable amounts. Of seven samples, cadmium and nickel were detected in four while mercury was detected in only two.

Cyanide/Total Phenols Cyanide was measured in detectable amounts in five of seven samples while total phenols was only detected in one.

Pesticides/PCBs Several pesticides were detected in the effluent. DDT, a-BHC, g-BHC, b-BHC, endosulfan I, endosulfan II, and heptachlor epoxide were detected in measurable amounts in one of seven samples. B-BHC was detected present in one and estimated present in two of seven samples.

Semi-volatile Organic Compounds A number of compounds were detected. Of the 11 compounds reported present, only two were reported in measurable amounts, benzoic acid, bis(2-ethylhexyl)phthalate, and hexachloroethane. Of seven samples, benzoic acid was reported in measurable amounts in three and suspected present in four while bis(2-ethylhexyl) phthalate was reported present in one and suspected present in six. Hexachloroethane on the other hand was detected in only one sample. Other phthalate compounds, chrysene, fluoranthene, phenanthrene, p-cresol and pyrene were reported below the quantitation limit.

E.4 Priority Pollutant Loadings

Appendix E, Table E-4 quantifies the amounts of toxic contaminants discharged to the Mystic

River through the Somerville Marginal facility during each monthly sampling event. The loadings were calculated using the flows measured during the time of sampling. For most constituents, the FY95 loadings appear to have increased from those of previous years. This is mostly due to differing method detection levels employed by differing laboratories and not necessarily due to less contaminants present in wastewater.

E.5 Compliance With Regulatory Requirements

This facility is in complete compliance with the NPDES permit discharge limits except for four pH violations. Three measurements violated the lower limit of 6.5 and one violated the upper limit of 8.5. Although these measurements appear to be in violation of pH limits, the low pH measurements are indicative of the impact of acid rain on the wastewater. The high pH measurement of 9.25 on the other hand exhibits the effect of chlorination. This facility uses sodium hypochlorite for disinfection. Hypochlorite is very alkaline and tends to raise the pH of water. Since the low and high pH readings were the direct results of acid rain and the disinfection process, they are not considered true permit violations. The NPDES permit allows for permit limit violations provided that such violations were due to natural causes or as a result of approved treatment processes. For these reasons, the facility was in full compliance with permit limits in FY95.

F. Constitution Beach Combined Sewer Overflow Facility

F.1 Activations

Although the Constitution Beach CSO is not currently permitted to the MWRA, the MWRA collects operational data to determine facility performance. Appendix F, Table F-1 contains operations data and is summarized in Table IV.F.1. Table IV.F.1 also compares FY95 activations with previous years' data. In FY95, there were 12 activations that registered a total of 6.648 MG treated and discharged to Boston Harbor. Although the total rainfall in FY95 was 7.53 inches less than in FY94, there were more activations and much more flow treated than in the previous fiscal years.

Constitution Beach came on line in 1987. Since that time, flow measurements were believed to be inaccurate because of malfunctioning flow meters. However, even after new meters were installed in April 1993, flow measurements still appeared to be inaccurate, believed to be caused by tidal influences. This facility and two other facilities located in this drainage area, Fox Point and Commercial Point are significantly affected by tidal inflow.

Tidal inflow, as it enters the outfall pipes, reverses the totalizers resulting in negative flow readings. In those instances when flow measurements were not available, the total flow for a particular activation was estimated based on the total amount of hypochlorite used. Because of the physical structure and location of the effluent channel, these negative flow readings will be incurred for as long as tidal flow has an impact on the flow meters. FY94 data are probably underestimated and in contrast, FY95 data are probably overestimated.

Table VI.F.1 Constitution Beach CSO Activations Summary

	FY95	FY94	FY93	FY92
Number of Activations	12	8	4	12
Total Volume Treated (MG)	6.648	0.685	1.57	11
Maximum Flow (MGD)	0.946	0.2	1.22	1.9
Minimum Flow (MGD)	0.2	0.01	0.1	0.23
Average Flow (MGD)	0.554	0.086	0.39	0.91
Total Rainfall (in/year)	37.47	45.00	48.82	41.18

Average flow is calculated by dividing the total volume treated by the number of times the facility activated.

Figure IV.F.1 graphs FY95 activation data for Constitution Beach. The data show a correlation between precipitation and flow, except for December 23 and January 1. It is assumed that flow measurements during these dates are probably inaccurate. Figure IV.F.2 depicts the facility activations from FY90 to FY95. After that initial drop in the frequency of activations in FY92, the number of activations has basically levelled off.

F.2 Conventional Parameters

Analytical results of conventional parameter testing of both influent and effluent are contained in Appendix F, Table F-1 and are summarized in Table IV.F.2. Typical of combined wastewater characteristics, there was a wide range in the values reported. Appendix F Table F-2 quantifies the amount of suspended solids and BOD discharged into Boston Harbor during each activation.

Figure IV.F.1 Total Rainfall Compared to Constitution Beach CSO Discharge, FY95

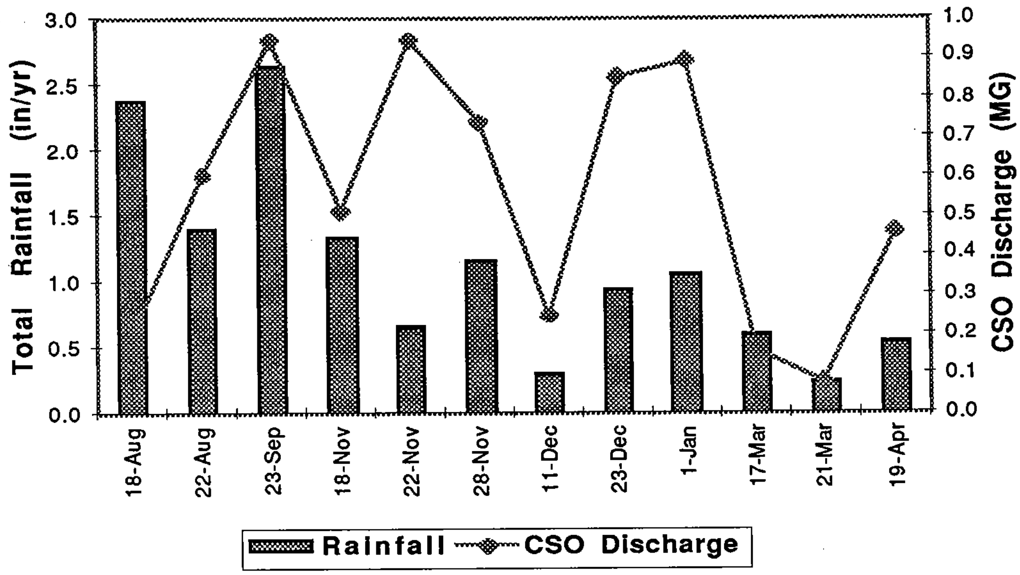


Figure IV.F.2 Constitution Beach CSO Activations, FY90-FY95

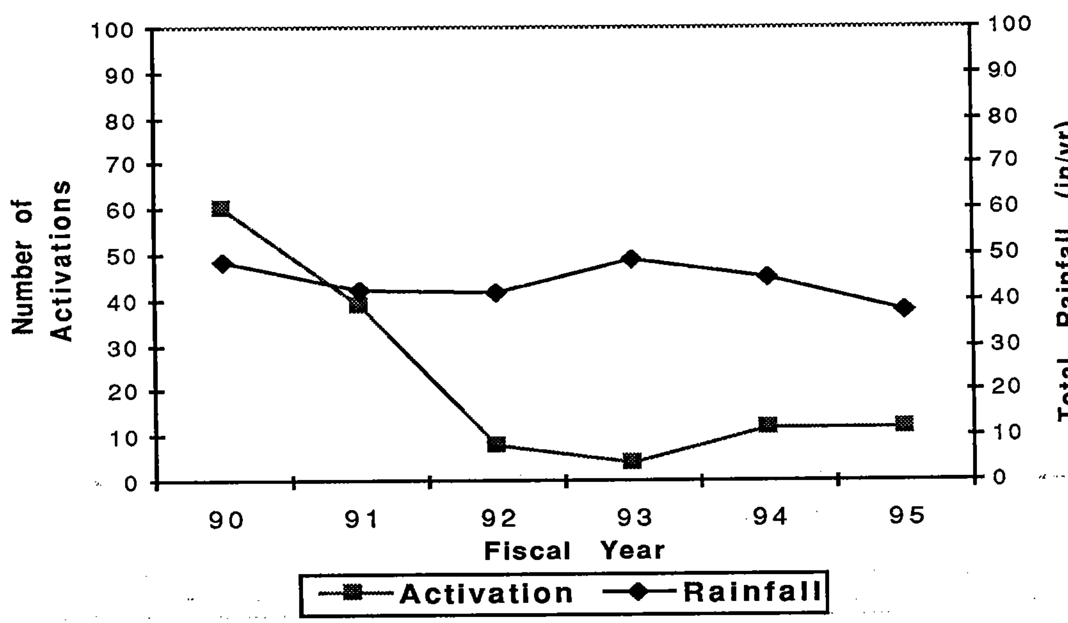


Table IV.F.2 Constitution Beach Influent and Effluent Characteristics, FY95

Parameter	Influent			Effluent		
	Min	Ave	Max	Min	Ave	Max
TSS	15	61	140	< 0.4	49	134
BOD	< 8	23	43	< 11	14	22
Fecal Coliform (#/100 ml)				< 10	26	1000
pH (units)				6.83		9.87

Concentration (1)

(1) Concentration expressed in mg/l except for pH and Fecal Coliform

G. Fox Point Combined Sewer Overflow Facility

G.1 Activations

Like Constitution Beach, Fox Point, although owned and operated by MWRA, is currently permitted to the BWSC. Appendix G Table G-1 contains the operational data for this facility. Table IV.G.1 summarizes the data. There was a dramatic decrease in the number of times this facility activated and a significant decrease in the amount of discharge when compared to the previous three fiscal years. Part of the reason for this apparent decrease, in addition to Fiscal Year 95 being a dry year, was the repair work on the Boston Main Interceptor. This repair necessitated rerouting flows that would normally discharge through the Fox Point facility to Commercial Point.

Fox Point, like Constitution Beach, historically experienced malfunctioning flow meters, and the flows reported may have been overestimated in FY94. During the latter part of FY94, flow data were estimated based on the amount of chlorine used during activations. As a result, the total volume and the average flow of wastewater treated appears to have more than doubled in FY94 when compared with FY92 and FY93 data. The flows are probably comparable to previous years.

Figure IV.G.1 charts the activations in FY95 and shows the strong relationship between total rainfall and discharge volume. Figure IV.G.2 compares the frequency of activation at this facility from FY91 to FY95 and shows the impact of the work on the Boston Main Interceptor line.

Figure IV.G.1 Total Rainfall Compared to Fox Point CSO Discharge, FY95

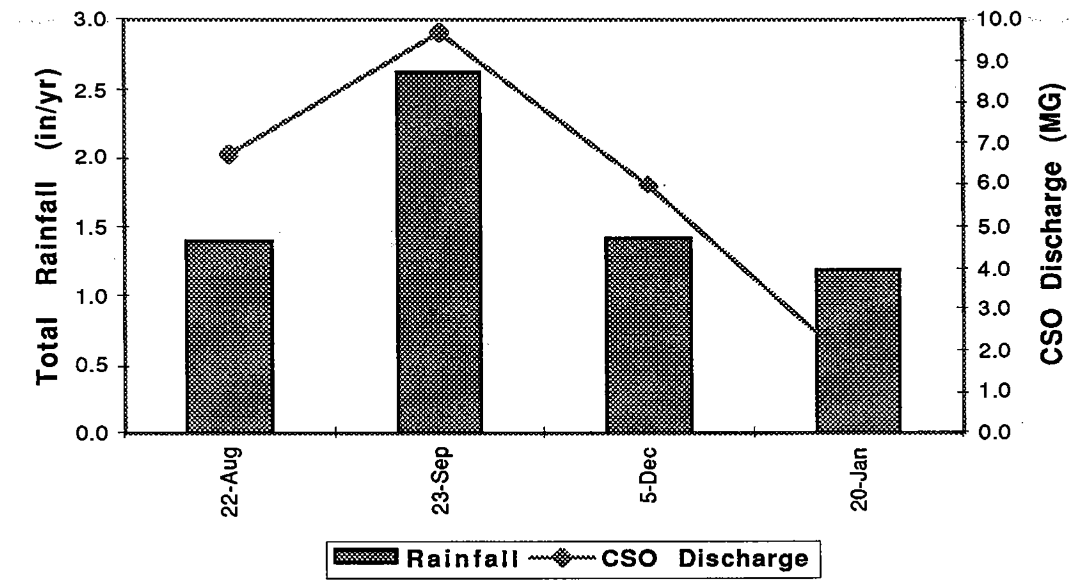


Figure IV.G.2 Fox Point CSO Activations, FY91-FY95

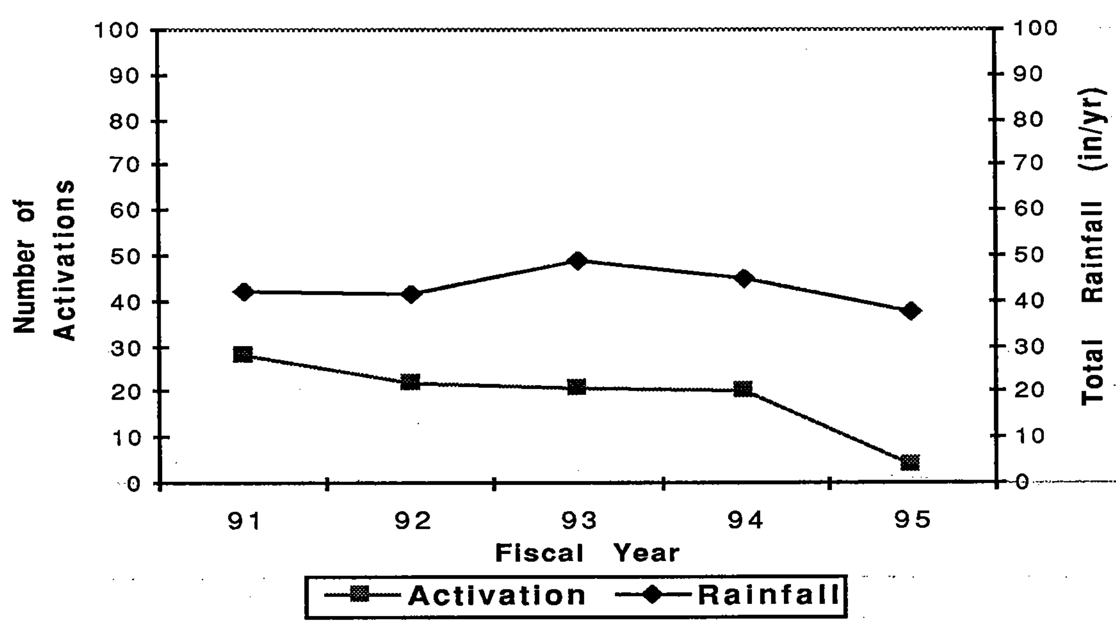


Table IV.G.1 Fox Point CSO Activations Summary				
	FY95	**FY94**	**FY93**	**FY92**
Number of Activations	4	20	21	22
Total Volume Treated (MG)	24	109	37	38
Maximum Flow (MGD)	10	12	8	5
Minimum Flow (MGD)	1.5	0.4	0.4	0.4
Average Flow (MGD)	6.0	5.4	1.8	1.7
Total Rainfall (in/year)	37.47	45.00	48.82	41.18

Average flow is calculated by dividing the total volume treated by the number of times the facility activated.

G.2 Conventional Parameters

Analytical results of conventional parameter testing of both influent and effluent are contained in Appendix G, Table G-1 and are summarized in Table IV.G.2. Typical of combined wastewater characteristics, there was a wide range in the values reported. Appendix G Table G-2 quantifies the amount of TSS and BOD discharged into Boston Harbor during each activation.

Table IV.G.2 Fox Point CSO Influent and Effluent Characteristics, FY95

	Concentration (1)					
Parameter	**Influent**			**Effluent**		
	Min	**Ave**	**Max**	**Min**	**Ave**	**Max**
TSS	74	149	284	20	254	662
BOD	22	50	96	19	42	63
Fecal Coliform (#/100 mlL				< 10	15	50
pH (units)				6.79		7.26

(1) Concentration expressed in mg/L except for pH and Fecal Coliform

H. Commercial Point Combined Sewer Overflow Facility

H.1 Activations

Even with the increased flows from the Fox Point drainage area, this facility experienced a slight reduction in both activation and flow volume. Appendix H, Table H-1 contains the Commercial Point FY94 activation data and is summarized in Table IV.H.1. Table IV.H.1 also compares the activations during this monitoring period with FY94, FY93, and FY92 data. There was a small decrease in the number of activations in the last four years and a slight decrease in the total flow treated in FY95. Figure IV.H.1 charts the activations in FY95 while figure IV.H.2 depicts the activations from FY91 to FY95.

Table IV.H.1 Commercial Point CSO Activations Summary

	FY95	FY94	FY93	FY92
Number of Activations	19	25	28	33
Total Volume Treated (MG)	55.95	96.25	77.24	80
Maximum Flow (MGD)	16.7	16.5	9.8	11.0
Minimum FLow (MGD)	0.15	0.21	0.1	1
Average Flow (MGD)	2.942	3.85	2.97	2.4
Total Rainfall (in/year)	37.47	45.00	48.82	41.18

Average flow is calculated by dividing the total volume treated by the number of times the facility activated.

H.2 Conventional Parameters

The results of analyses for conventional pollutants in the influent and effluent are included in Appendix H, Table H-1, Commercial Point Operations Summary and are summarized in Table IV.H.2. Typical of combined wastewater characteristics, there was a wide range in the values reported. Appendix H Table H-2 quantifies the amount of suspended solids and BOD discharged into Boston Harbor during each activation.

Table IV.H.2 Commercial Point Influent and Effluent Characteristics, FY95

	Concentration (1)					
Parameter	Influent			Effluent		
	Min	Ave	Max	Min	Ave	Max
TSS	10	144	550	10	494	6300
BOD	< 18	39	148	< 11	34	98
Fecal Coliform (#/100 ml)				< 10	66	91000
pH (units)				6.57		7.9

(1) Concentration expressed in mg/l except for pH and Fecal Coliform

Figure IV.H.1 Total Rainfall Compared to Commercial Point CSO Discharge, FY95

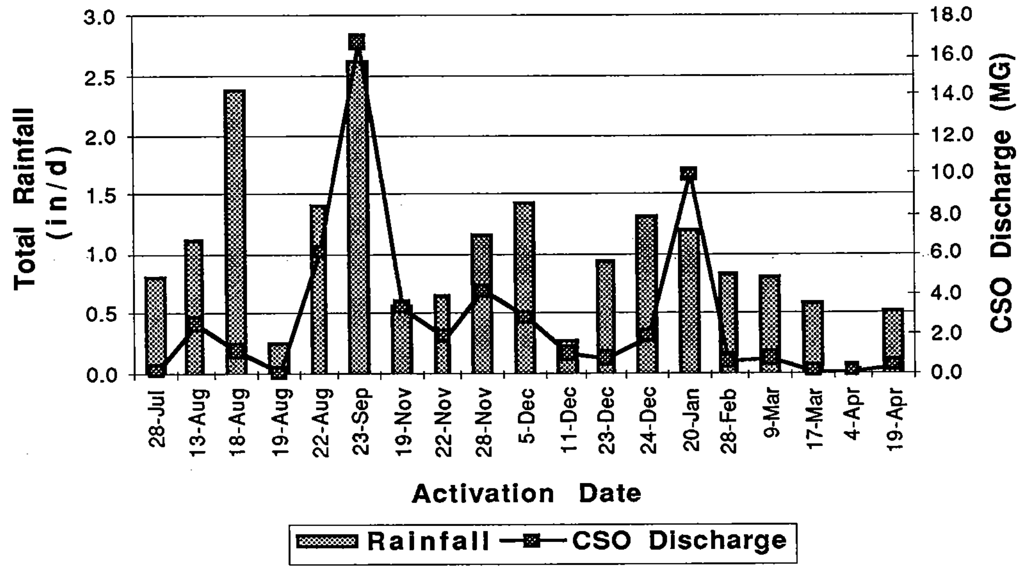
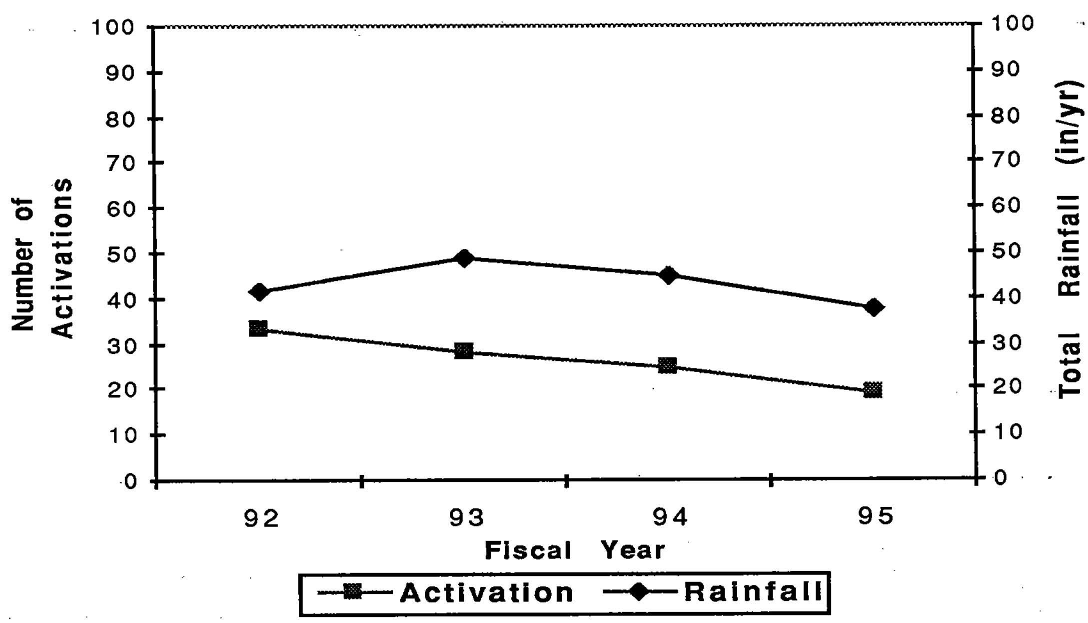


Figure IV.H.2 Commercial Point CSO Activations, FY92-FY95



Appendix A

Appendix A Table A-1 Deer Island Treatment Plant Operations Summary, Fiscal Year 1995

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX
FLOW (MGD)															
AVERAGE	203	231	239	207	217	284	283	245	262	236	222	206		236	
MINIMUM	167	172	186	183	173	217	205	209	225	215	186	175	167		
MAXIMUM	258	447	490	241	380	565	418	316	316	310	276	255			565
PEAK FLOW (a)	271	584	589	334	562	650	NA	502	402	405	NA	420			650
TEMP (DEG F)	68.0	71.0	68.0	66.0	63.0	57.0	54.9	55.3	55.0	60.3	62.7	66.9	54.9	62.3	71.0
EFFLUENT pH															
MINIMUM	6.7	6.6	6.5	6.8	6.7	6.8	6.9	6.3	6.7	6.8	6.7	6.7	6.3		
MAXIMUM	7.1	7.1	7.1	7.3	7.3	7.3	7.2	7.4	7.6	7.2	7.3	7.0			7.6
CONVENTIONAL PARAMETERS (mg/L)															
SETTLEABLE SOLIDS															
INFLUENT	6.4	4.9	5.5	5.8	5.6	4.0	3.5	5.1	5.3	6.0	7.3	7.3	3.5	5.6	7.3
EFFLUENT	0.5	0.5	0.6	0.5	0.2	0.3	0.6	0.3	0.7	0.1	0.2	0.2	0.1	0.39	0.7
BIOCHEMICAL OXYGEN DEMAND															
INFLUENT	136	138	142	160	152	114	99	117	125	161	164	173	99	140	173
EFFLUENT	120	119	122	138	130	99	85	105	108	123	119	124	85	116	138
TOTAL SUSPENDED SOLIDS															
INFLUENT	154	143	149	152	141	116	102	132	117	143	152	160	102	138	160
EFFLUENT	74	73	90	77	73	64	54	57	62	56	52	53	52	65	90
OIL AND GREASE															
INFLUENT	27.8	32.7	31.8	36.8	35.8	21.9	17.2	31.5	NA	35.3	32.9	37.1	17.2	31.0	37.1
EFFLUENT	26.7	29.6	22.0	27.8	29.4	21.6	17.0	25.0	20.6	28.9	26.4	26.5	17	25.1	29.6
TOTAL COLIFORMS															
INFLUENT (E+06)	44.69	38.4	27.49	50.2	37.38	6.72	10.2	32.9	NA	27.7	41	41.3	6.72	32.5	50.2
EFFLUENT	234	160	1095	241	187	120	421	664	677	611	451	310	120	431	1095
FECAL COLIFORM															
INFLUENT (E+06)	5.47	4.14	2.67	4.20	2.68	0.52	0.39	2.70	NA	1.70	2.50	3.80	0.39	2.80	5.47
EFFLUENT	13.00	10.00	37.00	14.00	12.00	8.00	15.00	19.00	10.50	7.50	8.30	8.30	7.50	13.55	37.00
RESIDUAL CHLORINE	2.04	2.39	2.47	2.63	3.19	3.37	3.1	3.2	3.2	3.5	3.4	3.2	2.04	2.97	3.5
CHLORIDES	1170	1026	1069	1284	1086	851	777	783	730	750	765	742	730	919	1284

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX
METALS (mg/L)															
COPPER															
INFLUENT	0.081	0.068	0.071	0.090	0.070	0.063	0.054	0.078	0.056	0.060	0.077	0.079	0.054	0.070	0.090
EFFLUENT	0.088	0.062	0.086	0.073	0.066	0.056	0.049	0.076	0.049	0.055	0.065	0.064	0.049	0.066	0.088
IRON															
INFLUENT	1.669	1.442	1.505	1.624	1.250	1.310	1.145	1.01	1.150	1.190	1.460	2.000	1.010	1.396	2.000
EFFLUENT	1.395	1.276	1.346	1.155	1.075	1.105	0.961	1.180	1.143	1.100	1.180	1.148	0.961	1.172	1.395
LEAD															
INFLUENT	0.024	0.019	0.020	0.011	0.015	0.019	0.008	0.008	0.006	0.007	0.011	0.019	0.006	0.014	0.024
EFFLUENT	0.014	0.013	0.016	0.009	0.011	0.015	0.009	0.004	0.009	0.004	0.006	0.007	0.004	0.010	0.016
ZINC															
INFLUENT	NA	NA	NA	NA	NA	NA	0.086	0.136	0.076	0.079	0.104	0.120	0.076	0.10	0.136
EFFLUENT	NA	NA	NA	NA	NA	NA	0.079	0.062	0.082	0.071	0.078	0.071	0.062	0.07	0.082
NUTRIENTS (mg/L)															
TKN															
INFLUENT	19.60	18.20	19.26	26.60	21.00	21.00	14.00	23.80	21.90	23.50	24.50	29.10	14.00	21.87	29.10
EFFLUENT	20.00	23.60	19.22	23.52	28.00	18.76	13.70	26.40	23.90	28.60	21.80	28.60	13.70	23.01	28.60
AMMONIA															
INFLUENT	14.10	8.42	16.63	13.23	18.00	11.00	7.28	12.90	13.90	15.87	16.20	17.35	7.28	13.74	18.00
EFFLUENT	13.30	10.20	15.70	16.15	18.00	9.40	7.28	15.20	15.00	18.10	15.20	19.60	7.28	14.43	19.60
NITRATES															
INFLUENT	0.59	0.05	0.03	0.24	0.03	0.03	0.33	0.03	0.43	0.03	0.02	0.04	0.02	0.15	0.59
EFFLUENT	0.28	0.04	0.05	0.13	< 0.03	0.03	0.04	0.04	0.12	0.04	0.04	0.05	0.03	0.08	0.28
NITRITE															
INFLUENT	0.05	0.04	0.18	0.03	0.04	0.06	0.19	0.03	0.06	0.03	0.02	0.02	0.02	0.06	0.19
EFFLUENT	0.05	0.04	0.04	0.07	0.15	0.15	0.08	0.03	0.07	0.02	< 0.01	0.22	0.02	0.08	0.22
ORTHOPHOSPHORUS															
INFLUENT	1.86	1.12	NA	3.24	2.80	1.70	5.66	2.05	1.00	1.38	1.56	1.88	1.00	2.20	5.66
EFFLUENT	2.11	1.56	3.12	3.39	2.80	1.70	0.90	2.70	1.69	2.24	1.82	2.56	0.90	2.22	3.39
TOTAL PHOSPHORUS															
INFLUENT	3.30	2.11	3.82	4.79	4.20	3.00	2.88	3.18	3.61	4.41	4.08	4.13	2.11	3.63	4.79
EFFLUENT	3.20	2.11	3.66	4.00	3.60	2.30	2.50	4.35	3.09	4.21	3.30	3.91	2.11	3.35	4.35
PRIMARY SLUDGE															
FLOW (MGD)	0.283	0.322	0.375	0.332	0.368	0.304	0.245	0.222	0.266	NA	0.275	0.271	0.222	0.297	0.375
SCUM (E+03GPD)	5.742	9.355	9.033	2.968	7.333	8.468	6.194	1.554	1.387	0.400	0.000	0.167	0.000	4.383	9.355

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX
PRIMARY SLUDGE (cont)															
pH															
MINIMUM	5.4	5.2	5.4	5.5	5.6	5.4	5.3	5.3	NA	NA	NA	NA	5.2	5.4	5.6
MAXIMUM	6.2	5.9	6.0	6.0	6.3	5.9	5.9	7.4	NA	NA	NA	NA	5.9	6.2	7.4
VOLATILE SOLIDS (%)	80	77	81	84	81	81	83	84	83	83	82	83	77	82	84
GREASE (%)	15.6	8.5	12.0	15.2	11.5	NA	NA	16.5	NA	NA	NA	NA	8.5	13.2	16.5
DIGESTED SLUDGE															
FLOW (MGD)															
METER READING	0.374	0.372	0.272	0.379	0.404	0.363	NA	NA	NA	NA	0.148	NA	0.148	0.330	0.404
ELEVATION	0.294	0.272	0.322	0.273	0.293	0.255	0.254	0.311	0.344	0.344	0.236	0.253	0.236	0.288	0.344
pH															
MINIMUM	6.8	7.1	6.8	7.1	7.0	7.1	7.2	5.7	5.6	5.6	6.8	6.9	5.6	6.64	7.2
MAXIMUM	7.7	7.8	7.6	7.5	7.8	7.6	7.6	7.5	7.5	7.5	7.4	7.5	7.4	7.58	7.8
TOTAL SOLIDS (%)	2.40	3.06	2.88	2.55	2.44	1.96	3.33	2.39	2.70	2.70	2.50	2.80			
VOLATILE SOLIDS (%)	60	57	59	59	57	57	58	62	66	66	64	64	57	61	66
GREASE (%)	3.7	9.8	4.7	2.7	1.7	NA	NA	9.2	6.5	6.5	NA	NA	1.7	5.6	9.8
METALS (mg/L)															
COPPER	16.65	21.56	19.43	18.08	15.90	12.89	28.05	20.58	13.75	17.05	19.84	25.03	12.89	19.07	28.05
IRON	346	481	391	301	399	365	712	399	250	279	414	496	250	403	712
LEAD	6.49	10.97	7.44	6.01	6.03	5.11	11.55	5.82	4.25	4.46	6.48	8.47	4.25	6.92	11.55
NUTRIENTS (mg/L)															
TKN	1770	3800	1557	1932	1700	1428	1506	1506	NA	1140	1660	2170	1140	1833.60	3800
AMMONIA	802	753	1283	606	530	460	801	1100	NA	742	1830	839	460	886.00	1830
ORTHOPHOSPHORUS	17	59	141	63	48	49	366	125	NA	46	67	64	17	95	366
TOTAL PHOSPHORUS	346	455	342	337	120	140	772	223	NA	296	314	461	120	345.96	772
GAS PRODUCED (E+03 cu ft)															
WASTED	186	283	362	385	292	186	138	60	8	403	1329	1372	8	417.00	1372
USED	1053	1091	1052	1279	1474	1059	1151	1191	1427	1168	564	776	564	1107.08	1474
TOTAL	1239	1374	1413	1664	1766	1245	1289	1251	1435	1571	1893	2147	1239	1523.92	2147

NOTES:

Data reduced from Deer Island Treatment Plant Monthly Operation Logs. All chemical analyses were conducted by Deer Island Laboratory.

a Instantaneous peak flow

NA Not available

Appendix A Table A-2 Deer Island Influent Characterization, Fiscal Year 1995

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN	AVG	MAX	TIMES DETECTED
Metals (ug/L)																
Arsenic	7.49	3.06	2.48	3.00	3.00	< 10.00	< 10.00	2.55	4.07	2.58	2.14	2.61	< 10.00	2.92	7.49	13 of 24
Boron	420	313	405	411	365	301	280	231	244	239	267	415	231	324	420	24 of 24
Cadmium	1.25	0.63	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0.57	1.25	2 of 24
Chromium	16.99	11.69	12.48	11.96	8.50	12.11	< 5.00	93.67	9.93	8.55	17.15	7.07	< 5.00	17.72	93.67	21 of 24
Copper	115.9	74.4	95.6	81.0	91.0	62.8	46.0	72.4	53.5	87.3	117.2	78.2	46.0	81.3	117.2	24 of 24
Lead	25.99	26.10	18.60	16.06	10.00	8.68	3.00	26.14	10.56	19.94	53.05	8.28	3.00	18.87	53.05	24 of 24
Mercury	0.40	0.12	0.30	0.20	0.30	< 0.20	< 0.20	0.16	0.30	0.56	0.39	< 0.20	< 0.20	0.25	0.56	13 of 24
Molybdenum	34.00	19.79	16.08	19.52	27.50	14.44	11.00	10.39	17.59	14.05	22.00	24.07	10.39	19.20	34.00	23 of 24
Nickel	32.06	25.28	< 12.00	9.46	< 12.00	< 12.00	< 12.00	< 12.00	11.64	16.43	< 12.00	9.72	< 12.00	11.71	32.06	8 of 24
Selenium	< 7.50	< 10.00	< 10.00	< 10.00	5.00	1.96	4.00	< 10.00	1.51	< 10.00	< 10.00	< 10.00	< 10.00	1.73	4.00	4 of 24
Silver	4.50	< 3.00	6.47	5.52	< 3.00	3.84	< 3.00	< 3.00	< 3.00	7.21	4.24	< 3.00	< 3.00	3.40	7.21	10 of 24
Zinc	140.0	119.1	115.1	105.1	104.5	74.5	53.0	122.5	91.8	139.2	225.8	100.0	53.0	115.9	225.8	24 of 24
Inorganics (mg/L)																
Cyanide	< 0.01	< 0.01	11.59	< 0.01	< 0.01	< 0.01	< 0.01	NA	NA	NA	< 0.01	8.25	< 0.01	4.57	11.59	2 of 18
Oil and Grease	26.53	17.32	32.59	30.48	52.00	19.12	24.09	NA	NA	NA	53.89	38.46	17.32	24.54	53.89	2 of 18
Surfactants	5.07	4.29	4.89	7.49	5.30	3.49	1.80	2.66	3.91	4.71	4.18	4.72	1.80	4.38	7.49	28 of 28
Organochlorine Pesticides and PCBs (ug/L)																
4,4'-DDD	0.05	< 0.02	0.08	0.11	0.05	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.03	< 0.02	0.03	0.11	6 of 24
Heptachlor Epoxide	< 0.05	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.03	< 0.05	0.02	< 0.05	< 0.10	< 0.05	0.01	0.03	2 of 24
Semi-volatile Organics (ug/L)																
2-methylnaphthalene	< 20.0	< 20.0	< 50.0	3.99	3.50	5.00	< 50.0	2.06	2.00	3.05	7.14	11.07	< 20.0	4.32	11.07	9 of 24
4-methylphenol	35.5	27.7	13.9	55.1	56.0	20.4	26.0	24.6	44.5	41.9	65.0	42.1	< 20.0	37.7	65.0	21 of 24
Benzoic Acid	204.9	51.8	129.7	190.1	300.0	93.4	140.0	100.2	160.0	130.8	305.6	119.9	< 20.0	160.5	305.6	22 of 24
Benzyl Alcohol	12.02	5.21	13.88	17.15	18.00	11.75	17.00	5.94	20.90	36.69	19.13	22.64	< 20.0	16.69	36.69	17 of 24
bis(2-ethylhexyl)phthalate	16.50	28.19	6.99	7.03	9.00	6.00	25.00	19.78	19.02	28.90	24.28	41.94	6.00	19.38	41.94	24 of 24
Butylbenzyl phthalate	< 20.0	2.00	< 50.0	< 50.0	4.50	< 50.0	< 50.0	4.78	4.98	3.53	2.86	7.32	< 20.0	4.33	7.32	9 of 24
Di-n-butylphthalate	9.00	2.22	5.99	4.51	51.48	5.00	40.00	6.78	5.51	3.05	3.28	6.79	< 20.0	11.97	51.48	16 of 24
Di-n-octylphthalate	2.00	2.00	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	2.06	< 20.0	< 20.0	< 20.0	5.72	< 20.0	3.59	5.72	2 of 24
Diethylphthalate	10.00	4.94	7.53	10.03	10.50	8.04	9.00	7.94	9.54	9.47	7.86	8.93	< 20.0	8.65	10.50	22 of 24
Naphthalene	< 20.0	< 20.0	< 50.0	3.99	< 50.0	< 50.0	< 50.0	2.06	< 20.0	2.00	4.57	8.93	< 20.0	3.97	8.93	5 of 24
Phenol	9.01	10.57	5.00	11.52	17.00	4.00	6.00	18.73	9.49	22.01	18.26	20.17	< 20.0	12.65	22.01	17 of 24

Volatile Organics (ug/L)	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	SUMMARY AVG	SUMMARY MAX	TIMES DETECTED
1,1,1-Trichloroethane	< 10.0	**1.3**	**1.2**	< 10.0	**1.0**	< 10.0	**1.0**	**1.2**	**1.5**	**1.5**	**1.2**	< 0.05	< 0.05	1.1	1.5	9 of 26
2-Butanone	**89.3**	< 10.0	**16.6**	**3.5**	**8.0**	< 10.0	< 10.0	< 10.0	**2.0**	< 10.0	**2.0**	< 0.05	< 0.05	10.6	89.3	10 of 26
Acetone	**159.9**	**80.2**	**138.6**	**120.0**	**130.0**	**78.7**	**97.5**	**101.0**	**90.2**	**150.3**	**42.9**	**80.9**	42.9	105.8	159.9	26 of 26
Benzene	< 10.0	< 10.0	**1.2**	**1.0**	**1.0**	**1.0**	**1.0**	**2.7**	**1.5**	**1.0**	**0.8**	**1.4**	0.8	1.2	2.7	17 of 26
Carbon Disulfide	**7.0**	**7.6**	**4.2**	**7.9**	**30.5**	**3.0**	**3.5**	**8.7**	**5.2**	**36.4**	**14.4**	**29.7**	3.0	13.2	36.4	24 of 26
Chloroform	**3.0**	**14.0**	**6.0**	**3.0**	**5.0**	**3.0**	**2.5**	**4.8**	**5.0**	**8.1**	**3.6**	**5.4**	2.5	5.3	14.0	26 of 26
Ethylbenzene	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 0.05	**1.4**	< 0.05	1.0	1.4	10 of 26
Methylene Chloride	**4.0**	**5.3**	**10.9**	**6.5**	**7.5**	**2.5**	**3.0**	**2.7**	**3.5**	**9.6**	**1.8**	**3.0**	1.8	5.0	10.9	23 of 26
Tetrachloroethene	**3.5**	**3.8**	**3.2**	**3.5**	**3.0**	**3.0**	**3.0**	**4.0**	**4.5**	**5.0**	**14.1**	**3.0**	3.0	4.5	14.1	26 of 26
Toluene	**6.0**	**4.7**	**4.4**	**5.0**	**6.5**	**4.9**	**3.5**	**4.2**	**4.0**	**6.5**	**6.2**	**6.8**	3.5	5.2	6.8	26 of 26
Total Xylenes	**3.0**	< 10.0	**1.7**	**3.5**	**3.5**	**4.4**	**3.0**	**5.0**	**4.0**	**4.0**	**2.9**	**7.7**	< 10.0	3.6	7.7	21 of 26
trans-1,2-dichloroethene	**2.0**	**2.5**	**2.1**	**3.0**	**1.5**	**2.0**	**2.5**	**1.8**	**2.2**	**3.5**	**2.0**	**2.4**	1.5	2.3	3.5	22 of 26
Trichloroethene	**3.0**	**4.3**	**2.4**	**3.5**	**2.5**	**3.0**	**3.5**	**3.7**	**5.3**	**5.5**	**3.2**	**3.3**	2.4	3.6	5.5	26 of 26

Notes:

1. Full priority pollutant scan conducted (see Appendix J, Table J-3). Only constituents that were detected at least 5% of the time are included in this table.
2. Monthly average concentration is the weighted concentration back-calculated from daily loadings during each sampling day in the month.
3. Daily loadings were calculated by substituting half the method detection limit for those values that were reported below detection levels.
4. Yearly average concentration is the weighted concentration back-calculated from daily loadings during each sampling day in the year.
5. Bold numbers were detected or values that were reported between the method detection limit and reportinglimit, also known as "J" values.

Appendix A Table A-3 Deer Island Influent Loading, Fiscal Year 1995

	Average Monthly Loadings (lbs/d)												SUMMARY		
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN	AVE	MAX
Metals															
Arsenic	12.7	5.9	4.9	5.2	5.4	2.4	2.4	4.5	8.9	5.1	4.0	4.5	2.4	5.5	12.7
Boron	711.0	602.8	807.1	709.6	660.6	713.3	660.9	410.4	533.5	471.6	494.5	715.0	410.4	624.2	807.1
Cadmium	2.1	1.2	1.0	0.9	0.9	1.2	1.2	0.9	1.1	1.0	0.9	0.9	0.9	1.1	2.1
Chromium	28.8	22.5	24.9	20.6	15.4	28.7	5.9	166.4	21.7	16.8	31.8	12.2	5.9	33.0	166.4
Copper	196.3	143.3	190.5	139.8	164.7	148.8	108.6	128.7	116.8	171.8	216.9	134.6	108.6	155.1	216.9
Lead	44.0	50.3	37.1	27.7	18.1	20.6	7.1	46.4	23.1	39.3	98.2	14.3	7.1	35.5	98.2
Mercury	0.7	0.2	0.6	0.3	0.5	0.2	0.2	0.3	0.7	1.1	0.7	0.2	0.2	0.5	1.1
Molybdenum	57.6	38.1	32.1	33.7	49.8	34.2	26.0	18.5	38.4	27.7	40.7	41.4	18.5	36.5	57.6
Nickel	54.3	48.7	12.0	16.3	10.9	14.2	14.2	10.7	25.4	32.4	11.1	16.7	10.7	22.2	54.3
Selenium	6.3	1.9	2.0	1.7	4.5	4.6	9.4	1.8	3.3	2.0	1.9	1.7	1.7	3.4	9.4
Silver	7.6	2.9	12.9	9.5	2.7	9.1	3.5	2.7	3.3	14.2	7.9	2.6	2.6	6.6	14.2
Zinc	237.0	229.5	229.4	181.4	189.1	176.6	125.1	217.6	200.4	274.2	418.1	172.1	125.1	220.9	418.1
Inorganics															
Cyanide	8.5	9.6	23.1	8.6	9.0	11.8	11.8	NA	NA	NA	9.3	14.2	8.5	11.8	23.1
Oil and Grease	44916	33368	64960	52620	94109	45287	56858	NA	NA	NA	99776	66204	33368	62011	99776
Surfactants	8584	8265	9747	12931	9592	8266	4248	4725	8536	9274	7739	8125	4248	8336	12931
Pesticides/PCBs															
4,4'-DDD	0.1	0.0	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.2
Heptachlor Epoxide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Semi-volatile Organics															
2-methylnaphthalene	3.4	3.9	10.0	6.9	6.3	11.8	11.8	3.7	4.4	6.0	13.2	19.1	3.4	8.4	19.1
4-Methylphenol	60.1	53.3	27.7	95.1	101.3	48.4	61.4	43.6	97.2	82.5	120.3	72.4	27.7	71.9	120.3
Benzoic Acid	347.0	99.8	258.6	328.2	542.9	221.2	330.4	178.0	349.3	257.6	565.8	206.4	99.8	307.1	565.8
Benzyl Alcohol	20.4	10.0	27.7	29.6	32.6	27.8	40.1	10.6	45.6	72.2	35.4	39.0	10.0	32.6	72.2
Bis(2-ethylhexyl) phthalate	27.9	54.3	13.9	12.1	16.3	14.2	59.0	35.1	41.5	56.9	45.0	72.2	12.1	37.4	72.2
Butylbenzylphthalate	3.4	3.9	10.0	8.6	8.1	11.8	11.8	8.5	10.9	7.0	5.3	12.6	3.4	8.5	12.6
D-N-Butyl phthalate	15.2	4.3	11.9	7.8	93.2	11.8	94.4	12.0	12.0	6.0	6.1	11.7	4.3	23.9	94.4
Di-N-Octyl phthalate	3.4	3.9	10.0	8.6	9.3	11.8	11.8	3.7	4.4	4.2	3.7	9.8	3.4	7.0	11.8
Diethylphthalate	16.9	9.5	15.0	17.3	19.0	19.0	21.2	14.1	20.8	18.6	14.6	15.4	9.5	16.8	21.2

Average Monthly Loadings (lbs/d)

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX
Semi-volatile Organics (cont)															
Naphthalene	3.4	3.9	10.0	**6.9**	9.3	11.8	11.8	3.7	4.4	**3.9**	**8.5**	**14.1**	3.4	7.6	14.1
Phenol	**15.3**	**20.4**	**10.0**	**19.9**	**30.8**	**9.5**	**14.2**	**33.3**	**20.7**	**43.3**	**33.8**	**34.7**	9.5	23.8	43.3
Volatile Organic Compounds															
1,1,1-Trichloroethane	1.7	**2.4**	**2.3**	1.7	**1.8**	2.4	**2.4**	**2.1**	**3.3**	**3.0**	**2.3**	0.9	0.9	2.2	3.3
2-Butanone	**151.2**	1.9	**33.1**	**6.0**	**14.5**	2.4	2.4	1.8	**4.3**	2.0	**3.6**	0.9	0.9	18.7	151.2
Acetone	**270.7**	**154.5**	**276.3**	**207.2**	**235.3**	**186.4**	**230.2**	**179.5**	**196.8**	**295.9**	**79.3**	**139.2**	79.3	204.3	295.9
Benzene	1.7	1.9	**2.4**	**1.7**	**1.8**	**2.4**	**2.4**	**4.9**	**3.3**	**2.0**	**1.5**	**2.4**	1.5	2.3	4.9
Carbon disulfide	**11.9**	**14.7**	**8.4**	**13.7**	**55.2**	**7.0**	**8.3**	**15.5**	**11.4**	**71.6**	**26.7**	**51.2**	7.0	24.6	71.6
Chloroform	**5.1**	**27.0**	**11.9**	**5.2**	**9.0**	**7.1**	**5.9**	**8.5**	**10.9**	**15.9**	**6.6**	**9.3**	5.1	10.2	27.0
Ethylbenzene	1.7	1.9	2.0	1.7	1.8	2.4	2.4	1.8	2.1	2.0	0.9	**2.3**	0.9	1.9	2.4
Methylene chloride	**6.8**	**10.3**	**21.7**	**11.2**	**13.6**	**6.0**	**7.1**	**4.9**	**7.6**	**18.9**	**3.3**	**5.1**	3.3	9.7	21.7
Tetrachloroethylene	**5.9**	**7.3**	**6.3**	**6.0**	**5.4**	**7.1**	**7.1**	**7.1**	**9.7**	**9.9**	**26.2**	**5.2**	5.2	8.6	26.2
Toluene	**10.2**	**9.0**	**8.8**	**8.6**	**11.8**	**11.7**	**8.3**	**7.4**	**8.7**	**12.8**	**11.4**	**11.8**	7.4	10.0	12.8
Total Xylenes	**5.1**	1.9	**3.3**	**6.0**	**6.3**	**10.5**	**7.1**	**8.9**	**8.7**	**7.9**	**5.3**	**13.3**	1.9	7.0	13.3
Trans-1,2-Dichloroethylene	**3.4**	**4.7**	**4.2**	**5.2**	**2.7**	**4.7**	**5.9**	**3.2**	**4.9**	**6.9**	**3.8**	**4.1**	2.7	4.5	6.9
Trichloroethylene	**5.1**	**8.2**	**4.9**	**6.0**	**4.5**	**7.1**	**8.3**	**6.6**	**11.5**	**10.8**	**5.9**	**5.7**	4.5	7.1	11.5

Notes:

1. Monthly average loading is the calculated average of daily loadings during the monitoring month.
2. Daily loadings were calculated by substituting half the method detection limit for those values that were reported below detection levels.
3. Yearly average loading is the average of daily loadings during the monitoring year.
4. Bold numbers are loadings calculated from detected or values that were reported between the method detection limit and reporting limit, also known as "J" values.

Appendix A Table A-4 Deer Island Effluent Characterization, Fiscal Year 1995

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	SUMMARY AVE	SUMMARY MAX	TIMES DETECTED
METALS (ug/L)																
Arsenic	7.35	2.44	2.54	2.96	1.60	< 2.00	5.33	2.94	2.58	2.37	< 2.00	2.10	< 2.00	2.85	7.35	17 of 36
Beryllium	< 1.00	< 1.00	< 2.32	< 1.00	0.65	< 1.00	< 1.00	< 1.00	< 1.40	3.51	< 1.00	< 1.00	< 1.00	0.83	3.51	4 of 36
Boron	427	304	317	456	346	272	246	266	236	297	338	399	236	325	456	36 of 36
Cadmium	< 1.00	< 1.6	< 1.00	< 1.00	< 1.00	< 1.00	1.32	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	1.10	1.32	2 of 36
Chromium	8.00	7.77	9.23	7.07	11.95	3.28	3.65	77.35	6.07	4.43	5.36	7.78	3.28	12.66	77.35	27 of 36
Copper	68.96	57.05	56.56	60.16	91.44	54.74	45.62	51.22	50.35	62.15	69.87	60.05	45.62	60.68	91.44	36 of 36
Lead	14.32	15.20	9.39	6.39	18.72	6.38	5.01	12.12	9.99	7.79	10.48	3.83	3.83	9.97	18.72	36 of 36
Mercury	< 0.20	< 0.20	< 0.20	< 0.20	0.25	< 0.20	< 0.20	< 0.20	0.27	< 0.20	0.23	< 0.20	< 0.20	0.12	0.25	4 of 36
Molybdenum	28.37	20.65	16.98	15.15	22.84	12.15	11.02	9.61	16.03	11.40	19.82	0.21	9.61	17.01	28.37	36 of 36
Nickel	16.44	18.02	< 12.00	< 12.00	< 12.00	15.73	< 12.00	< 12.00	9.48	15.08	< 12.00	9.18	< 12.00	9.99	18.02	10 of 36
Selenium	< 8.00	< 2.00	< 2.00	1.31	2.00	1.94	3.00	< 2.00	1.32	< 2.00	1.30	< 2.00	< 2.00	1.67	4.16	9 of 36
Silver	< 3.00	< 3.00	3.59	3.07	< 3.00	3.10	< 3.00	< 3.00	2.84	5.96	3.88	< 3.00	< 3.00	2.62	5.96	10 of 36
Thallium	13.28	11.65	103.28	< 2.00	< 2.00	1.63	< 2.00	1.39	< 2.00	< 2.00	< 2.00	1.32	< 2.00	11.54	103.28	3 of 36
Zinc	83.7	74.9	71.5	64.3	104.6	62.5	59.6	84.9	87.2	81.4	90.3	69.1	59.6	77.8	104.6	36 of 36
CYANIDE AND PHENOLS (ug/L)																
Cyanide	10.91	8.28	35.78	19.90	6.97	14.51	14.11	27.05	20.19	42.45	14.62	38.98	6.97	21.15	42.45	26 of 37
Phenols	7.00	0.60	12.00	18.00	26.00	5.00	14.00	NA	6.00	17.00	14.00	71.00	< 1.20	15.88	71.00	10 of 11
OIL AND GREASE, PETROLEUM HYDROCARBONS, AND SURFACTANTS (mg/L)																
Oil and Grease	21.52	15.18	66.64	20.47	37.00	23.71	17.01	37.10	32.73	34.60	27.71	62.13	15.18	32.98	66.64	25 of 26
Petroleum Hydrocarbons	3.10	6.73	9.67	2.25	2.33	1.51	1.86	12.53	2.86	3.36	6.38	3.56	1.51	4.68	12.53	54 of 57
Surfactants	4.90	3.44	3.99	6.51	6.27	3.67	3.00	3.67	4.26	4.68	4.95	3.97	3.00	4.44	6.51	34 of 34
ORGANOCHLORINE PESTICIDES AND PCBs (ug/L)																
4,4'-DDT	< 0.1	< 0.2	< 0.1	< 0.1	0.04	< 0.1	< 0.1	0.05	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	0.02	0.05	2 of 33
a-BHC	< 0.1	< 0.1	< 0.1	< 0.1	0.02	0.06	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.01	0.06	2 of 33
b-BHC	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.11	0.01	0.08	< 0.1	0.08	< 0.1	0.03	0.11	4 of 33
Chlordane	0.10	< 2.2	< 0.2	0.09	< 0.2	< 0.2	< 0.3	< 0.5	< 0.5	< 0.5	< 0.5	< 1.1	< 0.1	0.07	0.22	2 of 33
d-BHC	< 0.1	< 0.1	0.12	0.16	0.15	< 0.1	< 0.1	< 0.1	0.03	< 0.1	< 0.1	< 0.1	< 0.1	0.04	0.16	9 of 33
Endosulfan II	0.04	0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.02	< 0.1	0.01	0.04	2 of 33
g-BHC	< 0.1	< 0.1	< 0.1	0.04	0.03	< 0.1	0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.01	0.04	5 of 33
Heptachlor	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.56	0.12	0.01	0.35	0.34	< 0.1	0.12	0.56	9 of 33
Heptachlor Epoxide	< 0.1	< 0.1	0.02	< 0.1	0.01	< 0.1	0.01	0.06	0.02	0.06	0.03	0.02	< 0.1	0.02	0.06	13 of 33

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX	TIMES DETECTED
SEMIVOLATILE ORGANICS (ug/L)																
2-methylnaphthalene	< 20.0	< 20.0	< 20.0	**3.0**	**2.7**	**1.4**	< 20.0	< 20.0	< 20.0	< 25.0	**5.2**	**8.3**	< 20.00	2.9	8.3	9 of 35
4-methylphenol	**34.7**	**14.6**	**15.6**	**49.5**	**17.1**	**15.5**	**16.0**	**36.0**	**11.7**	**52.6**	**54.9**	**57.6**	11.7	31.3	57.6	32 of 35
Benzoic Acid	**227.0**	**94.7**	**120.4**	**238.7**	**205.6**	**145.6**	**170.0**	**172.7**	**58.9**	**424.9**	**381.5**	**170.6**	58.9	200.9	424.9	33 of 34
Benzyl Alcohol	**19.3**	< 20.0	**8.1**	**15.8**	**14.2**	**9.1**	**15.7**	**26.9**	**3.8**	**49.3**	**6.0**	**19.7**	< 20.00	15.8	49.3	26 of 35
bis(2-ethylhexyl)phthalate	**12.0**	**12.7**	**4.3**	**8.0**	**6.2**	**6.3**	**9.2**	**15.8**	**8.0**	**28.4**	**23.6**	**26.7**	4.3	13.4	28.4	34 of 35
Butylbenzyl phthalate	**3.3**	**2.0**	**2.0**	**3.3**	**9.6**	**2.1**	**2.0**	**3.8**	**3.1**	**3.8**	**3.0**	**4.9**	2.0	3.6	9.6	21 of 35
Di-n-butylphthalate	**4.7**	< 20.0	**3.0**	**4.0**	**34.1**	**3.0**	**6.0**	**3.9**	**2.8**	**4.3**	**4.4**	**5.9**	< 20.00	6.5	34.1	24 of 35
Di-n-octylphthalate	**2.3**	< 20.0	< 20.0	**3.3**	< 30.9	< 20.7	< 20.0	< 21.2	< 20.0	< 25.0	< 20.0	**4.5**	< 20.00	2.5	4.5	2 of 35
Diethylphthalate	**9.3**	**5.4**	**5.2**	**10.7**	**8.1**	**7.0**	**9.7**	**8.6**	**3.8**	**11.5**	**9.8**	**9.5**	3.8	8.2	11.5	33 of 35
Naphthalene	< 20.0	< 20.0	< 20.0	< 30.0	**2.7**	< 20.7	< 20.0	< 21.2	< 20.0	< 25.0	**3.4**	**7.6**	< 20.00	2.8	7.6	6 of 35
Phenol	**9.3**	**2.6**	**3.3**	**14.0**	**9.1**	**2.4**	**8.0**	**4.0**	**3.5**	**12.6**	**5.9**	**13.2**	2.4	7.3	14.0	24 of 35
VOLATILE ORGANICS (ug/L)																
1,1,1-Trichloroethane	**1.7**	< 10.0	**1.1**	< 10.0	**1.0**	< 10.0	**1.0**	< 11.1	**1.0**	**1.4**	**1.3**	< 0.50	< 0.50	1.1	1.7	8 of 38
2-Butanone	**30.0**	**2.5**	**15.1**	**36.5**	**18.5**	**4.8**	**10.1**	**1.7**	**1.9**	**2.3**	**3.7**	< 0.50	< 0.50	10.6	36.5	21 of 38
4-Methyl-2-pentanone	**1.7**	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	**1.1**	< 0.50	< 0.50	1.0	1.7	3 of 38
Acetone	**144**	**121**	**160**	**146**	**116**	**71**	**107**	**189**	**146**	**222**	**53**	**106**	53.2	131.7	222.1	37 of 37
Acrolein	< 20.0	< 10.0	< 18.0	< 20.0	< 20.0	< 20.0	< 17.0	< 11.1	< 10.0	< 10.0	**1.3**	**1.2**	< 10.0	1.5	2.0	2 of 38
Benzene	**1.0**	**1.0**	**1.2**	< 10.0	< 10.0	**1.0**	**1.0**	**1.1**	**1.0**	**1.4**	**1.1**	**1.0**	< 10.0	1.1	1.4	19 of 38
Bromodichloromethane	**1.3**	**1.7**	**4.4**	**2.6**	**4.0**	< 17.0	**1.0**	< 11.1	< 10.0	**3.1**	< 0.50	**1.3**	< 0.50	2.0	4.4	22 of 38
Bromomethane	**1.0**	< 10.0	**1.4**	**2.9**	**1.6**	< 10.0	< 10.0	< 11.1	< 10.0	< 10.0	< 0.50	< 0.50	< 0.50	1.2	2.9	6 of 38
Carbon Disulfide	**4.7**	**8.1**	**3.8**	**6.2**	**7.8**	**1.3**	< 10.0	< 11.1	**1.3**	**5.5**	**4.2**	**8.6**	< 10.0	4.5	8.6	26 of 38
Chloroform	**8.0**	**15.3**	**10.4**	**10.2**	**12.4**	**3.9**	**6.0**	**6.4**	**5.3**	**15.4**	**5.3**	**10.7**	3.9	9.1	15.4	37 of 38
Chloromethane	**5.4**	**4.3**	**2.7**	1.0	**10.5**	< 10.0	< 10.0	< 11.1	< 10.0	< 10.0	< 0.50	< 0.50	< 0.50	2.5	10.5	9 of 38
Dibromochloromethane	< 10.0	< 10.0	**2.2**	**1.0**	**1.4**	< 10.0	< 10.0	< 11.1	< 10.0	< 10.0	< 0.50	< 0.50	< 0.50	1.1	2.2	5 of 38
Ethylbenzene	**1.3**	**1.2**	< 10.0	< 10.0	**1.0**	**1.6**	**1.0**	< 11.1	< 10.0	**1.0**	< 0.50	**1.1**	< 0.50	1.1	1.6	10 of 38
Methylene Chloride	**5.3**	**14.5**	**8.9**	**6.2**	**6.3**	**2.3**	**5.3**	**3.9**	**4.7**	**7.1**	**2.3**	**4.0**	2.3	5.9	14.5	37 of 38
Tetrachloroethene	**5.0**	**4.4**	**3.2**	**4.6**	**4.0**	**2.3**	**3.7**	**3.7**	**2.3**	**3.4**	**32.3**	**3.0**	2.3	6.0	32.3	37 of 38
Toluene	**8.3**	**5.0**	**4.6**	**5.3**	**8.6**	**7.0**	**3.3**	**4.8**	**4.6**	**3.6**	**7.7**	**6.7**	3.3	5.8	8.6	37 of 38
trans-1,2-dichloroethene	**3.0**	**2.2**	**2.6**	**3.0**	**2.0**	**1.7**	**2.3**	**1.4**	**2.0**	**2.4**	**1.7**	**2.1**	1.4	2.2	3.0	34 of 38
Trichloroethene	**3.7**	**4.2**	**2.6**	**3.0**	**1.6**	**2.3**	**3.7**	**2.4**	**3.3**	**3.1**	**2.8**	**2.6**	1.6	2.9	4.2	37 of 38
Trichlorofluoromethane	**3.4**	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 11.1	< 10.0	< 10.0	< 0.50	< 0.50	< 0.50	1.1	3.4	2 of 38
Xylene	**5.7**	**1.4**	**2.0**	**2.3**	**3.0**	**5.8**	**2.7**	< 11.1	**3.7**	**4.4**	**4.7**	**6.8**	< 11.1	3.6	6.8	29 of 38

Notes:
1. Full priority pollutant scan conducted (see Appendix J, Table J-3). Only constituents that were detected at least 5% of the time are included in this table.
2. Monthly average concentration is the weighted concentration back-calculated from daily loadings during each sampling day in the month.
3. Daily loadings were calculated by substituting half the method detection limit for those values that were reported below detection levels.
4. Yearly average concentration is the weighted concentration back-calculated from daily loadings during each sampling day in the year.
5. Bold numbers were detected or values that were reported between the method detection limit and reporting limit, also known as "J" values.

Appendix A Table A-5, Deer Island Effluent Loadings, Fiscal Year 1995

	Average Monthly Loadings (lbs/d)												SUMMARY		
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN	AVG	MAX
METALS															
Arsenic	**11.7**	**5.6**	**5.6**	**5.1**	2.7	**2.4**	**11.4**	**6.4**	**6.0**	4.8	2.0	**3.9**	2.0	5.6	11.7
Beryllium	0.8	1.1	2.6	0.9	**1.1**	1.2	1.1	1.1	1.5	**7.1**	1.0	0.9	0.8	1.7	7.1
Boron	**680.1**	**696.8**	**703.3**	**778.4**	**588.4**	**665.1**	**524.7**	**575.7**	**552.2**	**599.9**	**685.0**	**732.0**	524.7	648.5	778.4
Cadmium	0.8	1.9	1.1	0.9	0.8	1.2	**2.8**	1.1	1.2	1.0	1.0	0.9	0.8	1.2	2.8
Chromium	**12.7**	**17.8**	**20.5**	**12.1**	**20.3**	**8.0**	**7.8**	**167.7**	**14.2**	**9.0**	**10.8**	**14.3**	7.8	26.3	167.7
Copper	**109.9**	**130.7**	**125.6**	**102.8**	**155.4**	**133.8**	**97.1**	**111.1**	**117.9**	**125.5**	**141.4**	**110.2**	97.1	121.8	155.4
Lead	**22.8**	**34.8**	**20.9**	**10.9**	**31.8**	**15.6**	**10.7**	**26.3**	**23.4**	**15.7**	**21.2**	**7.0**	7.0	20.1	34.8
Mercury	0.2	0.2	0.2	0.2	0.4	0.2	0.2	0.2	**0.4**	0.2	**0.3**	0.2	0.2	0.2	0.4
Molybdenum	**45.2**	**47.3**	**37.7**	**25.9**	**38.8**	**29.7**	**23.5**	**20.8**	**37.5**	**23.0**	**40.1**	**36.9**	20.8	33.9	47.3
Nickel	**26.2**	**41.3**	13.3	10.3	10.2	**38.5**	12.8	13.0	**22.2**	**30.4**	12.1	**16.8**	10.2	20.6	41.3
Selenium	6.6	2.3	2.2	**2.2**	**3.4**	**4.7**	**6.4**	2.2	**3.1**	2.0	**2.6**	1.8	1.8	3.3	6.6
Silver	2.4	3.4	**8.0**	**5.3**	2.5	**7.6**	3.2	3.3	**6.6**	**12.0**	**7.9**	2.8	2.4	5.4	12.0
Thallium	**21.2**	**26.7**	**229.4**	1.7	1.7	4.0	2.1	3.0	2.3	2.0	2.0	2.4	1.7	24.9	229.4
Zinc	**133.3**	**171.6**	**158.8**	**109.9**	**177.7**	**152.8**	**126.9**	**184.0**	**204.2**	**164.3**	**182.9**	**126.7**	109.9	157.8	204.2
CYANIDE AND PHENOLS															
Cyanide	**17.4**	**19.0**	**79.5**	**34.0**	**11.8**	**35.5**	**30.1**	**56.4**	**47.3**	**85.7**	**29.6**	**71.5**	11.8	43.1	85.7
Phenols	**11.0**	**1.1**	**38.2**	**28.6**	**52.3**	**12.8**	**30.4**	**NA**	**16.1**	**32.6**	**25.8**	**123.4**	1.1	33.8	123.4
OIL AND GREASE, PETROLEUM HYDROCARBONS, AND SURFACTANTS															
Oil and Grease	**34576**	**34775**	**116028**	**36211**	**57082**	**56726**	**35879**	**80449**	**70997**	**71583**	**58566**	**116966**	34576	64153	116966
Petroleum Hydrocarbons	**4993**	**12452**	**19318**	**3903**	**4464**	**3435**	**4294**	**22882**	**6863**	**6628**	**11597**	**6453**	3435	8940	22882
Surfactants	**7864**	**8413**	**6812**	**11108**	**9672**	**8963**	**6320**	**7961**	**9237**	**9681**	**10068**	**7470**	6320	8631	11108
ORGANOCHLORINE PESTICIDES AND PCBs															
4,4'-DDT	0.02	0.06	0.02	0.02	**0.06**	0.02	0.02	**0.11**	0.02	0.02	0.02	0.04	0.02	0.04	0.11
a-BHC	0.01	0.03	0.01	0.01	**0.04**	**0.15**	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.15
b-BHC	0.01	0.03	0.01	0.01	0.01	0.01	0.01	**0.23**	0.01	**0.15**	0.01	**0.15**	0.01	0.05	0.23
Chlordane	**0.16**	0.59	0.04	**0.15**	0.03	0.05	0.06	0.11	0.12	0.11	0.10	0.21	0.03	0.14	0.59
d-BHC	0.01	0.03	**0.27**	**0.28**	**0.25**	0.01	0.01	0.01	**0.06**	0.01	0.01	0.02	0.01	0.08	0.28
Endosulfan II	**0.06**	0.06	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.02	0.03	0.06
g-BHC	0.01	0.03	0.01	**0.07**	**0.04**	0.01	**0.05**	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.07
Heptachlor	0.01	0.03	0.01	0.01	0.01	0.01	0.01	**1.21**	**0.28**	0.01	**0.71**	**0.63**	0.01	0.24	1.21
Heptachlor Epoxide	0.01	0.03	**0.05**	0.01	**0.03**	0.01	**0.03**	**0.14**	**0.05**	**0.11**	**0.06**	**0.04**	0.01	0.05	0.14

	Average Monthly Loadings (lbs/f)												SUMMARY		
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN	AVG	MAX
SEMIVOLATILE ORGANICS															
2-methylnaphthalene	3.2	4.6	4.4	5.2	**4.6**	**3.4**	4.3	4.6	4.7	4.9	**10.5**	**15.3**	3.2	5.8	15.3
4-methylphenol	**55.3**	**33.6**	**34.7**	**84.6**	**29.1**	**38.0**	**34.0**	**78.1**	**27.3**	**103.2**	**111.1**	**105.7**	27.3	61.2	111.1
Benzoic Acid	**361.7**	**231.4**	**267.4**	**407.8**	**349.4**	**356.0**	**361.9**	**374.4**	**137.9**	**834.5**	**772.2**	**312.9**	137.9	397.3	834.5
Benzyl Alcohol	**30.8**	4.6	**17.9**	**27.0**	**24.1**	**22.1**	**33.3**	**58.4**	**9.0**	**96.8**	**12.0**	**36.2**	4.6	31.0	96.8
bis(2-ethylhexyl)phthalate	**19.1**	**29.1**	9.4	**13.7**	**10.6**	**15.5**	**19.7**	**34.3**	**18.7**	**55.8**	**47.8**	**49.0**	9.4	26.9	55.8
Butylbenzyl phthalate	**5.3**	**4.6**	**4.4**	5.7	**16.2**	**5.1**	**4.3**	**8.2**	**7.4**	**7.5**	**6.1**	**8.9**	4.3	7.0	16.2
Di-n-butylphthalate	**7.4**	4.6	**6.7**	**6.9**	**58.0**	**7.3**	**12.8**	**8.5**	**6.5**	**8.5**	**8.9**	**10.7**	4.6	12.2	58.0
Di-n-octylphthalate	**3.7**	4.6	4.4	**5.7**	5.2	5.1	4.3	4.6	4.7	4.9	4.0	**8.3**	3.7	5.0	8.3
Diethylphthalate	**14.9**	**12.3**	**11.5**	**18.2**	**13.8**	**17.1**	**20.6**	**18.5**	**9.0**	**22.6**	**19.8**	**17.5**	9.0	16.3	22.6
Naphthalene	3.2	4.6	4.4	5.2	**4.6**	5.1	4.3	4.6	4.7	4.9	**6.9**	**13.9**	3.2	5.5	13.9
Phenol	**14.9**	**6.0**	**7.3**	**24.0**	**15.5**	**5.9**	**16.9**	**8.6**	**8.3**	**24.7**	**11.9**	**24.2**	5.9	14.0	24.7
VOLATILE ORGANICS															
1,1,1-Trichloroethane	**2.6**	2.3	**2.3**	1.7	**1.7**	2.4	**2.1**	2.3	**2.3**	**2.7**	2.7	0.9	0.9	2.2	2.7
2-Butanone	**47.9**	**5.7**	**31.5**	62.4	**31.4**	**11.6**	**21.4**	**3.6**	**4.5**	**4.6**	**7.5**	0.9	0.9	19.4	62.4
4-Methyl-2-pentanone	**2.6**	2.3	2.1	1.7	1.7	2.4	2.1	2.3	2.3	2.0	**2.2**	0.9	0.9	2.1	2.6
Acetone	**228.8**	**276.8**	**331.8**	**250.0**	**196.3**	**174.1**	**228.4**	**409.3**	**342.4**	**448.4**	**107.6**	**194.3**	107.6	265.7	448.4
Acrolein	3.2	2.3	3.7	3.4	3.4	4.9	3.6	2.3	2.3	2.0	**2.6**	**2.3**	2.0	3.0	4.9
Benzene	**1.6**	**2.3**	**2.5**	1.7	1.7	**2.4**	**2.1**	**2.3**	**2.3**	**2.7**	**2.2**	**1.8**	1.6	2.1	2.7
Bromodichloromethane	**2.1**	**4.0**	**9.0**	**4.5**	**6.8**	4.0	**2.1**	2.3	2.3	**6.3**	1.0	**2.4**	1.0	3.9	9.0
Bromomethane	**1.6**	2.3	**2.9**	**5.0**	**2.7**	2.4	2.1	2.3	2.3	2.0	1.0	0.9	0.9	2.3	5.0
Carbon Disulfide	**7.4**	**18.6**	**7.9**	**10.6**	**13.2**	3.3	2.1	**2.3**	**3.0**	**11.1**	**8.5**	15.8	2.1	8.6	18.6
Chloroform	**12.7**	**35.1**	**21.7**	**17.4**	**21.1**	**9.6**	**12.8**	**13.3**	**12.4**	**31.2**	**10.7**	19.6	9.6	18.1	35.1
Chloromethane	**8.5**	**9.8**	**5.5**	1.7	**17.8**	2.4	2.1	2.3	2.3	2.0	1.0	0.9	0.9	4.7	17.8
Dibromochloromethane	1.6	2.3	**4.5**	**1.7**	**2.4**	2.4	2.1	2.3	2.3	2.0	1.0	0.9	0.9	2.1	4.5
Ethylbenzene	**2.1**	**2.8**	2.1	1.7	**1.7**	**4.0**	**2.1**	2.3	2.3	**2.0**	1.0	**1.9**	1.0	2.2	4.0
Methylene Chloride	**8.5**	33.2	**18.5**	10.6	**10.8**	**5.6**	**11.3**	**8.1**	**11.1**	**14.4**	4.7	**7.3**	4.7	12.0	33.2
Tetrachloroethene	**8.0**	**10.2**	6.6	7.9	6.8	5.6	**7.8**	7.7	5.4	6.8	**65.3**	5.4	5.4	12.0	65.3
Toluene	**13.2**	**11.4**	**9.5**	**9.0**	**14.6**	**17.1**	**7.1**	**9.9**	**10.8**	7.4	**15.5**	**12.3**	7.1	11.5	17.1
trans-1,2-dichloroethene	**4.8**	**5.0**	**5.5**	**5.1**	3.4	**4.0**	**5.0**	**2.9**	4.7	**4.7**	3.4	**3.8**	2.9	4.4	5.5
Trichloroethene	**5.8**	**9.7**	**5.3**	**5.1**	**2.7**	**5.6**	7.8	**5.1**	7.7	6.2	**5.7**	**4.9**	2.7	6.0	9.7
Trichlorofluoromethane	**5.3**	2.3	2.1	1.7	1.7	2.4	2.1	2.3	2.3	2.0	1.0	0.9	0.9	2.2	5.3
Xylene	**9.1**	**3.3**	**4.2**	3.9	**5.1**	**14.1**	**5.7**	2.3	**8.6**	**8.9**	**9.6**	**12.5**	2.3	7.3	14.1

Notes:

1. Monthly average loading is the calculated average of daily loadings during the monitoring month.
2. Daily loadings were calculated by substituting half the method detection limit for those values that were reported below detection levels.
3. Yearly average loading is the average of daily loadings during the monitoring year.
4. Bold numbers are loadings calculated from detected or values that were reported between the method detection limit and reporting limit, also known as "J" values.

Appendix A Table A-6 Deer Island Effluent Characterization, Harbor Studies Monitoring Program, FY 1995

	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX	TIMES DETECTE
METALS (ug/L)																
Silver	6.00	5.32	4.82	5.47	5.98	**N**	5.10	4.59	4.68	10.15	4.71	3.24	2.40	4.97	7.50	21 of 21
Cadmium	0.98	0.67	0.47	0.71	0.51	**O**	1.01	0.48	0.38	0.73	0.51	0.44	0.31	0.59	1.50	21 of 21
Chromium	8.10	4.36	3.51	4.60	4.20		33.05	81.25	5.70	11.13	5.35	7.29	3.07	17.11	185.00	21 of 21
Copper	91.12	81.88	108.60	76.39	93.70	**S**	55.90	53.94	52.58	123.47	71.61	65.10	51.20	70.61	108.60	21 of 21
Mercury	0.13	0.20	0.14	0.15	0.13	**A**	0.04	0.04	0.06	0.16	0.21	0.09	0.03	0.11	0.26	21 of 21
Molybdedum	24.01	19.48	24.10	17.85	22.79	**M**	9.84	9.88	10.74	22.94	16.35	18.33	9.61	15.93	25.70	21 of 21
Nickel	27.08	6.43	8.28	7.60	6.50	**P**	6.01	6.49	6.04	28.22	5.22	5.15	4.56	8.97	43.30	21 of 21
lead	20.65	10.35	11.80	10.17	10.80	**L**	6.33	10.31	9.20	27.05	18.14	13.15	4.30	12.18	25.70	21 of 21
Zinc	108.28	82.76	85.40	73.72	77.19	**E**	66.99	74.59	78.14	179.08	94.34	79.71	59.40	82.33	120.00	21 of 21
						S										
ORGANOCHLORINE PESTICIDES (ug/L)																
Aldrin	< 0.0100	< 0.0100	0.0021	0.0032	< 0.0100	**C**	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.001	0.005	3 of 20
cis-Chlordane	0.0020	0.0048	0.0014	0.0012	< 0.0100	**O**	0.0015	0.0010	0.0019	0.0220	0.0015	0.0033	< 0.01	0.003	0.022	13 of 20
2,4-DDD	0.0015	0.0104	< 0.0100	0.0011	< 0.0100	**L**	0.0007	0.0010	0.0010	0.0010	0.0015	0.0010	< 0.01	0.002	0.017	10 of 20
2,4-DDE	0.0050	0.0076	< 0.0100	< 0.0100	< 0.0100	**L**	0.0010	0.0069	0.0010	0.0010	0.0010	0.0010	< 0.01	0.003	0.015	5 of 20
2,4-DDT	< 0.0100	< 0.0100	0.0849	0.0441	< 0.0100	**E**	0.0010	0.0010	0.0010	0.0010	0.0010	0.0024	< 0.01	0.008	0.085	4 of 20
4,4-DDD	0.0509	0.0539	0.0282	0.0631	< 0.0100	**C**	0.0009	0.0010	0.0010	0.0010	0.0013	0.0036	< 0.01	0.016	0.069	12 of 20
4,4-DDE	0.0120	0.0158	0.0024	0.0026	0.0105	**T**	0.0014	0.0027	0.0053	0.0010	0.0017	0.0010	< 0.01	0.005	0.024	16 of 20
4,4-DDT	0.0057	0.0106	0.0447	0.0256	0.0010	**E**	0.0064	0.0047	0.0081	0.0010	0.0041	0.0178	< 0.01	0.010	0.045	17 of 20
Dieldrin	I	I	0.0012	0.0013	0.0010	**D**	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.001	0.004	5 of 20
Endrin	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100		0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.001	0.000	0 of 20
Heptachlor	0.0035	< 0.0100	< 0.0100	0.0088	0.0010		0.0071	0.0010	0.0150	0.0010	0.0010	0.0010	< 0.01	0.004	0.017	8 of 20
Heptachlor epoxide	0.0043	< 0.0100	< 0.0100	0.0007	0.0010		0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.001	0.006	3 of 20
hexachlorobenzene	0.0023	0.0011	0.0309	0.0312	0.0010		0.0115	0.0333	0.0265	0.0013	0.0016	0.0011	< 0.01	0.012	0.043	17 of 20
Lindane	0.0093	0.0115	0.0681	0.0155	0.0010		0.0224	0.0186	0.0164	0.0096	0.0045	0.0219	< 0.01	0.015	0.068	18 of 20
Mirex	< 0.0100	< 0.0100	0.0104	0.0095	0.0010		0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.002	0.010	3 of 20
Trans-nonachlor	< 0.0100	0.0050	0.0035	0.0031	0.0010		0.0025	0.0010	0.0010	0.0010	0.0010	0.0034	< 0.01	0.002	0.005	8 of 20
CL2(08)	< 0.0100	< 0.0100	0.0086	0.0044	0.0010		0.0010	0.0204	0.0010	0.0010	0.0010	0.0010	< 0.01	0.004	0.047	4 of 20
CL3(18)	0.0103	< 0.0100	0.0062	0.0028	I		I	I	0.0010	0.0016	0.0010	I	< 0.01	0.002	0.013	6 of 20
CL3(28)	0.0222	< 0.0100	0.0161	0.0122	0.0405		0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.008	0.042	7 of 20
CL4(44)	0.0098	0.0077	0.0046	0.0027	0.0086		0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.003	0.011	9 of 20
CL4(52)	0.0052	0.0037	0.0028	0.0020	0.0052		0.0010	0.0010	0.0114	0.0010	0.0010	0.0010	< 0.01	0.003	0.021	11 of 20

	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX	TIMES DETECTE
ORGANOCHLORINE PESTICIDES (cont)																
CL4(66)	0.0023	< 0.0100	0.0045	0.0016	< 0.0100	N	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.001	0.004	4 of 20
CL4(77)	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	O	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.001	0.000	0 of 20
CL5(101)	0.0103	0.0046	0.0034	0.0025	0.0268		0.0010	0.0010	0.0010	0.0011	0.0016	0.0028	< 0.01	0.005	0.037	14 of 20
CL5(105)	< 0.0100	< 0.0100	0.0044	0.0014	< 0.0100	S	0.0006	0.0008	0.0010	0.0010	0.0010	0.0010	< 0.01	0.001	0.004	5 of 20
CL5(118)	0.0013	0.0020	0.0056	0.0050	< 0.0100	A	0.0010	0.0018	0.0027	0.0024	0.0023	0.0049	< 0.01	0.002	0.006	15 of 20
CL5(126)	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	M	0.0010	0.0010	0.0010	0.0010	0.0010	0.0009	< 0.01	0.001	0.001	1 of 20
CL6(128)	< 0.0100	< 0.0100	0.0012	0.0008	< 0.0100	P	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.001	0.001	3 of 20
CL6(138)	< 0.0100	0.0068	0.0023	< 0.0100	0.0115	L	0.0020	0.0033	0.0031	0.0009	0.0014	0.0022	< 0.01	0.003	0.017	15 of 20
CL6(153)	0.0018	0.0024	0.0017	0.0050	0.0137	E	0.0017	0.0029	0.0028	0.0005	0.0029	0.0034	< 0.01	0.003	0.015	16 of 20
CL7(170)	< 0.0100	< 0.0100	0.0023	0.0097	< 0.0100	S	0.0008	0.0009	0.0006	0.0010	0.0009	0.0010	< 0.01	0.002	0.014	9 of 20
CL7(180)	< 0.0100	< 0.0100	< 0.0100	0.0128	< 0.0100		0.0420	0.0010	0.0010	0.0010	0.0013	0.0010	< 0.01	0.006	0.044	5 of 20
CL7(187)	0.0009	0.0012	0.0052	< 0.0100	< 0.0100	C	0.0010	0.0010	0.0010	0.0010	0.0040	0.0029	< 0.01	0.002	0.005	6 of 20
CL8(195)	< 0.0100	< 0.0100	0.0022	0.0079	< 0.0100	O	0.0010	0.0010	0.0010	0.0010	0.0008	0.0006	< 0.01	0.002	0.008	6 of 20
CL9(206)	< 0.0100	< 0.0100	0.0015	0.0050	< 0.0100	L	0.0012	0.0022	0.0016	0.0010	0.0007	0.0005	< 0.01	0.001	0.006	11 of 20
CL10(209)	< 0.0100	< 0.0100	< 0.0100	0.0060	< 0.0100	L	0.0010	0.0007	0.0014	0.0010	0.0010	0.0003	< 0.01	0.001	0.006	6 of 20
						E										
POLYCYCLIC AROMATIC HYDROCARBONS (ug/L)						C										
Naphthalenes	1.2450	1.0316	1.2650	1.3344	0.8821	T	0.4298	1.1395	1.0418	5.4000	2.9432	4.2000	0.430	1.671	5.400	20 of 20
C1-naphthalenes	1.9577	1.6839	1.7600	1.6646	0.9171	E	0.4797	1.7622	1.3529	6.7000	5.8704	8.5400	0.480	2.707	8.700	20 of 20
C2-naphthalenes	3.7758	3.0020	2.5040	2.2220	1.8271	D	1.4000	2.4355	1.9588	9.5000	7.1000	10.5333	1.400	3.818	11.000	20 of 20
C3-naphthalenes	3.9041	2.8120	1.9760	1.7118	5.2813		1.1488	1.5466	1.3646	10.0000	4.0568	5.3667	1.149	3.089	10.000	20 of 20
C4-naphthalenes	1.9788	1.4949	0.9820	0.8473	0.7029		0.7591	1.1142	0.9399	4.7000	1.7136	1.9133	0.703	1.363	4.700	20 of 20
Biphenyl	0.3134	0.2378	0.2880	0.2451	0.1214		0.1114	0.2151	0.1806	0.3000	0.4627	0.9047	0.111	0.290	0.910	20 of 20
Acenaphthylene	0.0189	0.0189	0.0010	0.0010	0.8894		0.3149	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.110	1.120	8 of 20
Acenaphthene	0.1897	0.1682	0.1380	0.0952	0.1289		0.1000	0.1231	0.1159	0.0010	0.0010	0.2427	< 0.01	0.114	0.280	17 of 20
Dibenzoffuram	0.1179	0.1051	0.1310	0.0947	0.2337		0.1950	0.0914	0.0728	0.2700	0.1157	0.1913	0.073	0.133	0.270	20 of 20
Fluorene	0.2913	0.2316	0.2920	0.1790	0.1370		0.0919	0.1862	0.1559	0.6500	0.2341	0.3480	0.092	0.219	0.650	20 of 20
C1-fluorenes	0.8542	0.6526	0.5040	0.5553	0.2439		0.4047	0.4167	0.3347	2.0000	0.3970	0.5620	0.244	0.537	2.000	20 of 20
C2-fluorenes	1.0688	0.8738	0.9660	0.6857	0.1151		I	0.4498	0.2900	2.1000	0.5054	0.5727	< 0.01	0.568	2.100	17 of 20
C3-fluorenes	1.2509	1.0598	0.7280	0.6621	< 0.0100		0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.288	2.300	18 of 20
Phenantrrene	0.5005	0.5625	0.4980	0.3539	0.3091		0.2899	0.5788	0.3529	0.9700	0.4427	0.5847	0.290	0.448	0.970	20 of 20
Anthracene	0.0655	0.0526	0.0250	0.0295	0.0357		0.0250	0.0491	0.0489	0.1300	0.0654	0.0793	0.025	0.050	0.130	20 of 20
C1-phenanthrenes/anthrac	1.1756	1.1155	0.7690	0.5725	0.2501		0.5446	0.6164	0.4588	1.6000	0.5470	0.7227	< 0.01	0.677	1.600	19 of 20

	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX	TIMES DETECTE
POLYCYCLIC AROMATIC HYDROCARBONS (cont)																
C2-phenanthrenes/anthrac	1.4490	1.4140	0.8780	0.7357	< 0.0100	N	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.348	1.755	18 of 20
C3-phenanthrenes/anthrac	0.8996	0.9697	0.4920	0.4278	< 0.0100	O	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.219	1.200	12 of 20
C4-phenanthrenes/anthrac	0.3899	0.5679	0.2560	0.2130	< 0.0100		0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.111	0.617	18 of 20
Dibenzothiophene	0.1091	0.0883	0.1220	0.0315	0.0572	S	0.0530	0.0872	0.0617	0.1800	0.0744	0.0957	0.031	0.077	0.180	20 of 20
C1-dibenzothiophenes	0.4221	0.3462	0.2370	0.1751	0.0808	A	0.1749	0.2035	0.1670	0.5200	0.1757	0.2087	< 0.01	0.220	0.520	19 of 20
C2-dibenzothiophenes	0.5415	0.3962	0.3930	0.2936	< 0.0100	M	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.124	0.840	18 of 20
C3-dibenzothiophenes	0.3942	0.3073	0.2730	0.2770	< 0.0100	P	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.097	0.710	18 of 20
Fluoranthene	0.2505	0.2555	0.1510	0.1707	0.1496	L	0.0945	0.4797	0.1965	0.4500	0.3009	0.3033	0.095	0.243	0.750	20 of 20
Pyrene	0.2873	0.2864	0.1810	0.1601	0.1750	E	0.1150	0.3641	0.1712	0.4600	0.2738	0.2727	0.115	0.232	0.560	20 of 20
C1-fluoranthenes/pyrenes	0.3351	0.3907	0.2050	0.1729	< 0.0100	S	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.086	0.478	18 of 20
Benz(a)anthracene	0.0577	0.0806	0.0400	0.0295	0.0506		0.0360	0.1158	0.0613	0.1400	0.0931	0.0919	0.030	0.068	0.180	20 of 20
Chrysene	0.0802	0.1163	0.0600	0.0395	0.0587	C	0.0371	0.2091	0.0818	0.2000	0.1267	0.1035	0.037	0.096	0.340	20 of 20
C1-chrysenes	0.1046	0.2178	0.0640	0.0474	0.0460	O	0.0466	0.0919	0.0623	0.1500	0.0805	0.0747	< 0.01	0.082	0.249	19 of 20
C2-chrysenes	0.1240	0.2952	0.0830	0.0537	< 0.0100	L	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.044	0.328	16 of 20
C3-chrysenes	0.0195	0.1876	< 0.0100	< 0.0100	< 0.0100	L	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.018	0.241	12 of 20
C4-chrysenes	< 0.0100	0.0010	< 0.0100	< 0.0100	< 0.0100	E	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.001	0.051	6 of 20
Benzo(b)fluoranthene	0.0521	0.0858	0.0460	0.0275	0.0633	C	0.0601	1.0100	0.1198	0.1200	0.1115	0.0925	0.028	0.181	1.700	20 of 20
Benzo(k)fluoranthene	0.0226	0.0256	0.0150	0.0090	0.0205	T	0.0150	0.2977	0.0349	0.0440	0.0373	0.0311	0.009	0.055	0.500	20 of 20
Benzo(e)pyrene	0.0376	0.0545	0.0270	0.0170	0.0416	E	0.0346	0.5471	0.0682	0.0740	0.0630	0.0523	0.017	0.102	0.920	20 of 20
Benzo(a)pyrene	0.0398	0.0458	0.0270	0.0155	0.0410	D	0.0155	0.1467	0.0485	0.0660	0.0596	0.0512	< 0.010	0.051	0.240	20 of 20
Perylene	0.0096	0.0546	0.0070	0.0055	0.0107		0.0064	0.0783	0.0151	0.0130	0.0135	0.0110	< 0.01	0.021	0.130	19 of 20
Indeno(1,2,3-c,d)pyrene	0.0306	0.0416	0.0720	0.0675	0.0260		0.0275	0.4451	0.0545	0.0590	0.0517	0.0447	0.026	0.089	0.750	20 of 20
Dibenz(a,h)pyrene	0.0069	0.0065	< 0.0100	< 0.0100	0.0034		0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	< 0.01	0.002	0.140	11 of 20
Benzo(g,h,i)perylene	0.0495	0.0587	0.0270	0.0185	0.0384		0.0265	0.4938	0.0667	0.0600	0.0522	0.0462	0.019	0.094	0.830	20 of 20

Notes:

1. I - matrix or analytical interference
2. Reporting limit is 10 ng/L, values converted to ug/L.
3. The average concentration in calculated by substituting one-half (metals) and one-tenth (organics) the reporting limit for values that were reported below the detection levels.

Appendix A Table A-7 Deer Island Effluent Loadings, Harbor Studies Monitoring Program, FY 1995

Loadings (lbs/d)	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX
METALS															
Silver	10.16	10.25	9.61	9.44	10.82	N	12.04	9.37	10.23	19.97	8.73	5.56	5.56	10.56	19.969
Cadmium	1.66	1.29	0.93	1.23	0.91	O	2.37	0.98	0.83	1.44	0.95	0.75	0.75	1.21	2.375
Chromium	13.72	8.40	7.00	7.95	7.60		78.01	166.02	12.45	21.91	9.90	12.53	7.00	31.41	166.021
Copper	154.27	157.74	216.47	131.88	169.57	S	131.95	110.22	114.88	243.01	132.59	111.84	110.22	152.22	243.011
Mercury	0.22	0.38	0.28	0.25	0.24	A	0.11	0.08	0.13	0.32	0.39	0.16	0.08	0.23	0.388
Molybdedum	40.65	37.53	48.04	30.81	41.25	M	23.22	20.19	23.46	45.15	30.27	31.50	20.19	33.82	48.038
Nickel	45.85	12.38	16.50	13.12	11.77	P	14.20	13.25	13.21	55.55	9.66	8.85	8.85	19.49	55.546
lead	34.96	19.93	23.52	17.55	19.55	L	14.93	21.06	20.11	53.24	33.58	22.60	14.93	25.55	53.243
Zinc	183.31	159.43	170.22	127.27	139.70	E	158.10	152.42	170.74	352.47	174.67	136.95	127.27	175.03	352.468
						S									
ORGANOCHLORINE PESTICIDES															
Aldrin	0.002	0.002	0.004	0.005	0.002	C	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.00	0.005
cis-Chlordane	0.003	0.009	0.003	0.002	0.002	O	0.003	0.002	0.004	0.043	0.003	0.006	0.002	0.01	0.043
2,4-DDD	0.003	0.020	0.002	0.002	0.002	L	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.00	0.020
2,4-DDE	0.008	0.015	0.002	0.002	0.002	L	0.002	0.014	0.002	0.002	0.002	0.002	0.002	0.00	0.015
2,4-DDT	0.002	0.002	0.169	0.076	0.002	E	0.002	0.002	0.002	0.002	0.002	0.004	0.002	0.02	0.169
4,4-DDD	0.086	0.104	0.056	0.109	0.002	C	0.002	0.002	0.002	0.002	0.002	0.006	0.002	0.03	0.109
4,4-DDE	0.020	0.030	0.005	0.004	0.019	T	0.003	0.005	0.012	0.002	0.003	0.002	0.002	0.01	0.030
4,4-DDT	0.010	0.020	0.089	0.044	0.002	E	0.015	0.010	0.018	0.002	0.008	0.031	0.002	0.02	0.089
Dieldrin	I	I	0.002	0.002	0.002	D	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.00	0.002
Endrin	0.002	0.002	0.002	0.002	0.002		0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.00	0.002
Heptachlor	0.006	0.002	0.002	0.015	0.002		0.017	0.002	0.033	0.002	0.002	0.002	0.002	0.01	0.033
Heptachlor epoxide	0.007	0.002	0.002	0.001	0.002		0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.00	0.007
hexachlorobenzene	0.004	0.002	0.062	0.054	0.002		0.027	0.068	0.058	0.003	0.003	0.002	0.002	0.03	0.068
Lindane	0.016	0.022	0.136	0.027	0.002		0.053	0.038	0.036	0.019	0.008	0.038	0.002	0.04	0.136
Mirex	0.002	0.002	0.021	0.016	0.002		0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.00	0.021
Trans-nonachlor	0.002	0.010	0.007	0.005	0.002		0.006	0.002	0.002	0.002	0.002	0.006	0.002	0.00	0.010
CL2(08)	0.002	0.002	0.017	0.008	0.002		0.002	0.042	0.002	0.002	0.002	0.002	0.002	0.01	0.042
CL3(18)	0.017	0.002	0.012	0.005	I		I	I	0.002	0.003	0.002	I	0.002	0.01	0.017
CL3(28)	0.038	0.002	0.032	0.021	0.073		0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.02	0.073
CL4(44)	0.017	0.015	0.009	0.005	0.016		0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.01	0.017
CL4(52)	0.009	0.007	0.006	0.003	0.009		0.002	0.002	0.025	0.002	0.002	0.002	0.002	0.01	0.025

	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX
ORGANOCHLORINE PESTICIDES (cont)															
CL4(66)	0.004	0.002	0.009	0.003	0.002	N	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.00	0.009
CL4(77)	0.002	0.002	0.002	0.002	0.002	O	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.00	0.002
CL5(101)	0.017	0.009	0.007	0.004	0.049		0.002	0.002	0.002	0.002	0.003	0.005	0.002	0.01	0.049
CL5(105)	0.002	0.002	0.009	0.002	0.002	S	0.001	0.002	0.002	0.002	0.002	0.002	0.001	0.00	0.009
CL5(118)	0.002	0.004	0.011	0.009	0.002	A	0.002	0.004	0.006	0.005	0.004	0.008	0.002	0.01	0.011
CL5(126)	0.002	0.002	0.002	0.002	0.002	M	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.00	0.002
CL6(128)	0.002	0.002	0.002	0.001	0.002	P	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.00	0.002
CL6(138)	0.002	0.013	0.005	0.002	0.021	L	0.005	0.007	0.007	0.002	0.003	0.004	0.002	0.01	0.021
CL6(153)	0.003	0.005	0.003	0.009	0.025	E	0.004	0.006	0.006	0.001	0.005	0.006	0.001	0.01	0.025
CL7(170)	0.002	0.002	0.005	0.017	0.002	S	0.002	0.002	0.001	0.002	0.002	0.002	0.001	0.00	0.017
CL7(180)	0.002	0.002	0.002	0.022	0.002		0.099	0.002	0.002	0.002	0.002	0.002	0.002	0.01	0.099
CL7(187)	0.002	0.002	0.010	0.002	0.002	C	0.002	0.002	0.002	0.002	0.007	0.005	0.002	0.00	0.010
CL8(195)	0.002	0.002	0.004	0.014	0.002	O	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.00	0.014
CL9(206)	0.002	0.002	0.003	0.009	0.002	L	0.003	0.004	0.003	0.002	0.001	0.001	0.001	0.00	0.009
CL10(209)	0.002	0.002	0.002	0.010	0.002	L	0.002	0.001	0.003	0.002	0.002	0.000	0.000	0.00	0.010
POLYCYCLIC AROMATIC HYDROCARBONS						E									
Naphthalenes	2.108	1.987	2.521	2.304	1.596	C	1.014	2.328	2.276	10.628	5.449	7.216	1.014	3.58	10.628
C1-naphthalenes	3.314	3.244	3.508	2.874	1.660	T	1.132	3.601	2.956	13.187	10.869	14.672	1.132	5.55	14.672
C2-naphthalenes	6.392	5.783	4.991	3.836	3.307	E	3.304	4.976	4.280	18.698	13.146	18.097	3.304	7.89	18.698
C3-naphthalenes	6.610	5.417	3.939	2.955	9.558	D	2.711	3.160	2.982	19.682	7.511	9.220	2.711	6.70	19.682
C4-naphthalenes	3.350	2.880	1.957	1.463	1.272		1.792	2.277	2.054	9.251	3.173	3.287	1.272	2.98	9.251
Biphenyl	0.531	0.458	0.574	0.423	0.220		0.263	0.440	0.395	0.590	0.857	1.554	0.220	0.57	1.554
Acenaphthylene	0.032	0.036	0.002	0.002	1.610		0.743	0.002	0.002	0.002	0.002	0.002	0.002	0.22	1.610
Acenaphthene	0.321	0.324	0.275	0.164	0.233		0.236	0.252	0.253	0.002	0.002	0.417	0.002	0.23	0.417
Dibenzoffuram	0.200	0.202	0.261	0.164	0.423		0.460	0.187	0.159	0.531	0.214	0.329	0.159	0.28	0.531
Fluorene	0.493	0.446	0.582	0.309	0.248		0.217	0.380	0.341	1.279	0.433	0.598	0.217	0.48	1.279
C1-fluorenes	1.446	1.257	1.005	0.959	0.441		0.955	0.851	0.731	3.936	0.735	0.966	0.441	1.21	3.936
C2-fluorenes	1.809	1.683	1.925	1.184	0.208		I	0.919	0.634	4.133	0.936	0.984	0.208	1.44	4.133
C3-fluorenes	2.118	2.042	1.451	1.143	1.810		0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.78	2.118
Phenantrrene	0.847	1.084	0.993	0.611	0.559		0.684	1.183	0.771	1.909	0.820	1.004	0.559	0.95	1.909
Anthracene	0.111	0.101	0.050	0.051	0.065		0.059	0.100	0.107	0.256	0.121	0.136	0.050	0.11	0.256
C1-phenanthrenes/anthracenes	1.990	2.149	1.533	0.988	0.453		1.285	1.260	1.002	3.149	1.013	1.242	0.453	1.46	3.149

	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX
POLYCYCLIC AROMATIC HYDROCARBONS (cont)															
C2-phenanthrenes/anthracenes	2.453	2.724	1.750	1.270	0.002	N	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.75	2.724
C3-phenanthrenes/anthracenes	1.523	1.868	0.981	0.738	0.002	O	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.47	1.868
C4-phenanthrenes/anthracenes	0.660	1.094	0.510	0.368	0.002		0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.24	1.094
Dibenzothiophene	0.185	0.170	0.243	0.054	0.103	S	0.125	0.178	0.135	0.354	0.138	0.164	0.054	0.17	0.354
C1-dibenzothiophenes	0.715	0.667	0.472	0.302	0.146	A	0.413	0.416	0.365	1.023	0.325	0.358	0.146	0.47	1.023
C2-dibenzothiophenes	0.917	0.763	0.783	0.507	0.002	M	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.27	0.917
C3-dibenzothiophenes	0.667	0.592	0.544	0.478	0.002	P	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.21	0.667
Fluoranthene	0.424	0.492	0.301	0.295	0.271	L	0.223	0.980	0.429	0.886	0.557	0.521	0.223	0.49	0.980
Pyrene	0.486	0.552	0.361	0.276	0.317	E	0.272	0.744	0.374	0.905	0.507	0.468	0.272	0.48	0.905
C1-fluoranthenes/pyrenes	0.567	0.753	0.409	0.298	0.002	S	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.19	0.753
Benz(a)anthracene	0.098	0.155	0.080	0.051	0.092		0.085	0.237	0.134	0.276	0.172	0.158	0.051	0.14	0.276
Chrysene	0.136	0.224	0.120	0.068	0.106	C	0.087	0.427	0.179	0.394	0.235	0.178	0.068	0.20	0.427
C1-chrysenes	0.177	0.420	0.128	0.082	0.083	O	0.110	0.188	0.136	0.295	0.149	0.128	0.082	0.17	0.420
C2-chrysenes	0.210	0.569	0.165	0.093	0.002	L	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.10	0.569
C3-chrysenes	0.033	0.361	0.002	0.002	0.002	L	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.04	0.361
C4-chrysenes	0.002	0.002	0.002	0.002	0.002	E	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.00	0.002
Benzo(b)fluoranthene	0.088	0.165	0.092	0.048	0.115	C	0.142	2.064	0.262	0.236	0.206	0.159	0.048	0.33	2.064
Benzo(k)fluoranthene	0.038	0.049	0.030	0.016	0.037	T	0.035	0.608	0.076	0.087	0.069	0.053	0.016	0.10	0.608
Benzo(e)pyrene	0.064	0.105	0.054	0.029	0.075	E	0.082	1.118	0.149	0.146	0.117	0.090	0.029	0.18	1.118
Benzo(a)pyrene	0.067	0.088	0.054	0.027	0.074	D	0.037	0.300	0.106	0.130	0.110	0.088	0.027	0.10	0.300
Perylene	0.016	0.105	0.014	0.009	0.019		0.015	0.160	0.033	0.026	0.025	0.019	0.009	0.04	0.160
Indeno(1,2,3-c,d)pyrene	0.052	0.080	0.144	0.117	0.047		0.065	0.909	0.119	0.116	0.096	0.077	0.047	0.17	0.909
Dibenz(a,h)pyrene	0.012	0.013	0.002	0.002	0.006		0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.00	0.013
Benzo(g,h,i)perylene	0.084	0.113	0.054	0.032	0.070		0.063	1.009	0.146	0.118	0.097	0.079	0.032	0.17	1.009
Average Flow	**203**	**231**	**239**	**207**	**217**	**284**	**283**	**245**	**262**	**236**	**222**	**206**			

Notes:

1. I - matrix or analytical interference
2. Loadings calculated by multiplying the average monthly concentration (mg/L) by the average monthly flow (MGD) and conversion factor of 8.34.

Appendix B

Appendix B Table B-1 Nut Island Treatment Plant, Operations Summary, Fiscal Year 1995

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	SUMMARY AVE	SUMMARY MAX
DAILY FLOW (MGD)															
AVERAGE	81.4	96.0	101.6	91.6	97.3	141.0	159.4	121.9	141.0	114.3	101.0	89.9		111.4	
MINIMUM	70.3	73.0	85.4	80.1	80.1	114.3	137.8	108.6	123.6	101.4	86.9	80.9	70.3		
MAXIMUM	91.9	140.7	151.6	104.7	139.3	210.7	199.6	141.9	166.9	130.9	110.9	101.6			210.7
PEAK FLOW (a)	131.0	200.0	199.0	130.0	174.0	230.0	225.0	177.0	187.0	153.0	140.0	NA			230.0
TEMP (DEG F)	67.7	67.6	66.2	63.2	61.8	56.9	54.0	52.6	54.2	55.6	58.3	62.4	52.6	60.0	67.7
EFFLUENT pH															
MINIMUM	6.42	6.40	6.49	6.60	6.27	6.49	6.16	6.61	6.63	6.45	6.57	6.46	6.16		
MAXIMUM	6.85	6.85	6.92	7.17	6.93	7.27	7.05	7.07	7.06	7.08	6.97	6.95			7.27
CONVENTIONAL PARAMETERS (mg/L)															
SETTLEABLE SOLIDS															
INFLUENT	6.5	6.0	5.2	5.9	5.5	3.8	4.9	4.5	5.0	7.1	8.5	11.1	3.8	6.2	11.1
EFFLUENT	0.5	0.7	0.5	0.8	0.8	0.6	0.9	0.6	0.8	0.8	1.1	0.6	0.50	0.73	1.10
BIOCHEMICAL OXYGEN DEMAND															
INFLUENT	188	158	171	180	212	153	105	100	101	131	135	142	100	148	212
EFFLUENT	143	129	132	140	136	95	78	71	65	89	110	111	65	108	143
TOTAL SUSPENDED SOLIDS															
INFLUENT	162	149	173	194	209	203	111	124	123	141	165	147	111	158	209
EFFLUENT	87	89	94	88	84	60	48	55	52	68	89	90	48	75	94
OIL AND GREASE															
INFLUENT	31.1	28.3	26.1	26.9	33.9	19.4	15.0	22.9	22.9	38.4	36.1	36.5	15.00	28.13	38.40
EFFLUENT	25.0	21.8	21.5	32.2	26.5	13.9	13.9	19.8	19.9	32.2	33.7	28.3	13.90	24.06	33.70
TOTAL COLIFORMS															
INFLUENT (E+06)	61	41	65	73	55	25	14	13	16	28	33	34	13	38	73
EFFLUENT	142	288	585	450	332	672	777	511	536	453	666	692	142	509	777
FECAL COLIFORM															
INFLUENT (E+06)	4.4	6.1	5.7	3.5	2.1	0.9	0.7	0.9	1.0	1.7	1.9	3.0	0.7	2.7	6.1
EFFLUENT	28	25	34	22	16	32	71	25	41	24	36	25	16	32	71
RESIDUAL CHLORINE	1.9	2	1.5	2	2.5	2.4	2.2	2.3	2.5	2.4	2.6	1.6	1.5	2.2	2.6
CHLORIDES	628	565	582	615	518	362	326	374	346	460	571	601	326	496	628
METALS (mg/L)															
COPPER															
INFLUENT	ND	ND	0.091	0.099	0.101	0.098	0.060	0.068	0.054	0.064	0.076	0.087	0.054	0.080	0.101
EFFLUENT	0.095	0.090	0.065	0.079	0.073	0.054	0.075	0.067	0.046	0.073	0.007	0.071	0.007	0.066	0.095

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX
METALS (mg/L) (cont)															
IRON															
INFLUENT	5.61	4.49	3.47	3.21	1.72	2.32	1.13	1.82	1.09	1.40	1.29	3.13	1.09	2.56	5.61
EFFLUENT	3.52	3.91	2.92	1.90	1.23	1.12	0.89	1.15	0.87	1.45	1.13	2.73	0.87	1.90	3.91
LEAD															
INFLUENT	0.013	0.008	0.013	0.014	0.014	0.022	0.013	0.004	0.003	0.004	0.004	0.007	0.003	0.010	0.022
EFFLUENT	0.007	0.009	0.007	0.010	0.007	0.034	0.007	0.003	0.002	0.002	0.003	0.005	0.002	0.008	0.034
ZINC															
INFLUENT	NA	NA	NA	NA	NA	NA	0.060	0.066	0.062	0.081	0.083	0.084	0.060	0.073	0.084
EFFLUENT	NA	NA	NA	NA	NA	NA	0.050	0.059	0.051	0.093	0.065	0.066	0.050	0.064	0.093
NUTRIENTS (mg/L)															
TKN															
INFLUENT	31.10	23.00	17.44	27.40	23.80	25.20	9.80	26.70	21.30	33.80	25.60	28.30	9.80	24.45	33.80
EFFLUENT	26.05	19.80	16.15	22.96	19.32	26.32	11.20	25.30	14.20	23.30	30.30	27.40	11.20	21.86	30.30
AMMONIA															
INFLUENT	23.10	7.12	17.24	12.91	12.00	14.00	5.32	18.40	12.60	18.30	15.70	17.50	5.32	14.52	23.10
EFFLUENT	19.60	6.09	13.09	14.24	10.00	13.00	6.16	17.80	8.62	18.60	16.70	18.20	6.09	13.51	19.60
NITRATES															
INFLUENT	0.130	0.090	0.030	< 0.05	< 0.04	< 0.03	0.912	< 0.03	< 0.02	0.026	0.363	0.030	0.03	0.23	0.91
EFFLUENT	4.620	0.557	3.260	< 0.05	2.500	0.820	0.695	0.343	0.213	0.346	0.343	0.026	0.03	1.25	4.62
NITRITE															
INFLUENT	0.069	0.025	0.030	< 0.05	0.040	0.032	0.150	< 0.03	< 0.02	< 0.01	0.076	< 0.005	0.03	0.06	0.15
EFFLUENT	0.071	0.442	0.148	< 0.05	0.310	0.168	0.521	0.290	0.145	0.066	0.29	< 0.005	0.07	0.25	0.52
ORTHOPHOSPHORUS															
INFLUENT	2.043	1.694	3.214	3.925	3.878	2.001	0.850	1.840	1.090	1.920	1.82	1.65	0.85	2.16	3.93
EFFLUENT	2.288	1.763	2.783	3.053	2.376	1.899	1.200	1.960	0.851	2.050	1.91	0.91	0.85	1.92	3.05
TOTAL PHOSPHORUS															
INFLUENT	3.809	2.390	13.574	4.787	4.983	4.350	2.200	4.320	3.02	3.420	4.19	4.17	2.20	4.60	13.57
EFFLUENT	0.269	3.394	4.234	3.719	2.591	4.205	4.500	3.060	2.1	4.790	3.76	3.98	0.27	3.38	4.79
SLUDGE															
PRIMARY SLUDGE															
FLOW (MGD)	0.1638	0.1596	0.1769	0.1764	0.1903	0.1935	0.1792	0.1874	0.2027	0.1991	0.1401	0.0381	0.0381	0.1673	0.2027
pH	5.36	5.29	5.35	5.47	5.58	5.57	5.53	5.54	5.54	5.55	5.49	5.45	5.29	5.48	5.58
SOLIDS (%)	5.27	5.65	4.84	5.12	5.18	5.51	4.55	3.94	4.2	4.48	4.81	5.17	3.94	4.89	5.65
VOLATILE SOLIDS (%)	83.32	81.43	79.67	84.76	79.68	79.38	81.84	83.68	83.59	82.05	84.39	86.05	79.38	82.49	86.05
GREASE (%)	8.25	15.09	11.06	11.57	11.85	16.23	ND	11.87	15.55	11.85	14.52	10.87	8.25	12.61	16.23

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX
DIGESTED SLUDGE															
FLOW (KGD)	0.137	0.111	0.139	0.11	0.14	0.138	0.176	0.150	0.160	0.187	0.221204	0.148	0.11	0.15	0.22
pH	7.15	7.25	7.25	7.14	7.20	7.20	7.04	7.22	7.28	7.32	7.54	ND	7.04	7.24	7.54
TOTAL SOLIDS (%)	2.74	2.44	2.67	2.25	2.42	2.16	2.32	1.81	2.01	2.28	1.59	2.59	1.59	2.27	2.74
VOLATILE SOLIDS (%)	68	66	66	66	62.50	64.05	62.7	65	64	63	59.1	55.6	55.60	63.48	67.72
GREASE (%)	3.60	3.68	5.91	3.70	4.10	3.97	ND	8.38	5.27	2.50	2.4	3.54	2.40	4.28	8.38
METALS (mg/L)															
COPPER	24.41	16.96	23.10	19.78	26.71	23.48	26.00	14.95	13.48	14.05	11.67	28.98	11.67	20.30	28.98
IRON	458	339	640	329	2698	489	631	259	272	277	232	342	232	580	2698
LEAD	4.6	3.3	4.6	3.3	6.3	5.6	5.4	2.5	2.4	2.4	2.2	3.6	2.2	3.8	6.3
ZINC	NA	NA	NA	NA	NA	NA	21.04	15.25	15.75	17.43	15.73	20.05	15.25	17.54	21.04
NUTRIENTS (mg/L)															
TKN	1380	1490	1180	2912	1680	1512	1400	1450	2570	1710	910	1250	910	1620	2912
AMMONIA	841	787	1455	692	700	500	707	711	862	806	535	452	452	754	1455
ORTHOPHOSPHORUS	327	229	400	267	271	214	780	266	633	346	165	200	165	341	780
TOTAL PHOSPHORUS	74	36	194	102	86	87	210	62	101	68	71	68	36	97	210
GAS PROD (E+06cu. ft./d)	0.604	0.680	0.678	0.637	0.648	0.622	0.643	0.621	0.666	0.701	0.405	0.179	0.18	0.59	0.70

Data reduced from Nut Island Monthly Operation Logs. Analyses were conducted by Deer and Nut Island Laboratories.

a Instantaneous peak flow

NA Not analyzed

ND No data

Appendix B Table B-2 Nut Island Influent Characterization, Fiscal Year 1995

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	SUMMARY MIN	SUMMARY AVE	SUMMARY MAX	TIMES DETECTED
Metals (ug/L)																
Arsenic	< 5.00	< 5.00	6.18	< 5.00	< 5.00	< 5.00	< 5.00	4.38	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	2.96	6.18	10 of 25
Antimony	6.00	5.18	2.47	2.33	2.03	< 2.00	1.95	2.07	< 2.00	1.52	< 2.00	2.02	< 2.00	2.38	6.00	2 of 25
Beryllium	< 1.00	< 1.00	2.64	1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0.72	2.64	2 of 25
Boron	329.09	347.49	334.73	313.39	295.13	218.21	180.00	180.00	164.61	204.78	300.19	399.38	164.61	272.25	399.38	25 of 25
Cadmium	0.73	< 1.00	< 1.00	< 1.00	0.76	< 1.00	< 1.00	0.77	< 1.00	< 1.00	0.75	< 1.00	< 1.00	0.58	0.77	4 of 25
Chromium	12.09	14.68	17.62	8.00	9.54	< 5.00	6.43	7.93	7.49	4.85	4.74	4.29	< 5.00	8.35	17.62	19 of 25
Copper	124.55	141.42	140.00	95.67	148.44	67.68	58.15	81.36	59.07	76.96	71.49	104.90	58.15	97.47	148.44	25 of 25
Lead	15.91	20.89	21.46	8.66	21.20	8.86	7.52	13.36	10.11	7.91	10.01	4.53	4.53	12.54	21.46	25 of 25
Mercury	0.38	0.15	0.25	0.30	0.85	0.19	0.34	0.30	< 0.20	< 0.20	0.20	< 0.20	< 0.2	0.27	0.85	15 of 25
Molybdenum	14.09	12.14	9.53	5.66	< 8.00	< 8.00	21.60	< 8.00	6.43	< 8.00	< 8.00	8.49	< 8.22	8.16	21.60	11 of 25
Nickel	10.09	19.92	13.12	9.32	< 12.00	15.11	< 12.00	< 12.00	< 12.00	10.18	13.96	< 12.00	< 12.00	10.14	19.92	7 of 25
Silver	3.91	< 3.00	7.51	5.51	3.81	2.30	< 3.00	< 3.00	< 3.00	4.04	3.26	2.27	< 3.00	3.22	7.51	12 of 25
Zinc	114.55	160.00	125.09	91.33	149.46	79.39	68.15	96.54	76.84	93.39	76.92	114.90	68.15	103.88	160.00	25 of 25
Inorganics (mg/L)																
Total Cyanide (ug/L)	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	7.32	< 10.00	44.15	< 10.00	< 10.00	< 10.00	12.62	55.00	2 of 25
Oil and Grease	47.00	34.53	40.96	28.67	37.13	25.82	17.48	35.25	36.68	26.48	32.49	33.98	17.48	33.04	47.00	25 of 25
Surfactants	5.99	6.08	7.42	6.10	5.94	3.08	2.28	3.56	3.40	4.93	4.90	5.88	2.28	4.96	7.42	25 of 25
Pesticides/PCBs (ug/L)																
Chlordane	0.12	< 5.00	< 2.00	< 2.00	< 2.00	0.10	< 0.40	< 0.50	< 0.50	< 0.50	< 0.50	< 2.70	< 0.40	0.19	0.50	2 of 25
4,4'-DDD	< 0.10	< 0.50	< 0.10	0.04	< 0.30	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.02	0.05	2 of 25
Semi-volatile Organic Compounds (ug/L)																
Benzoic Acid	258.18	6.64	205.98	243.48	285.63	35.21	54.15	160.72	20.79	145.84	209.49	269.58	6.64	157.97	285.63	21 of 25
4-Methylphenol	47.82	44.93	46.63	59.03	58.80	11.11	15.72	40.61	3.56	64.34	42.06	98.95	3.56	44.46	98.95	23 of 25
1,4-Dichlorobenzene	3.00	< 20.00	6.44	< 40.00	4.49	< 36.00	< 36.00	< 20.00	3.51	3.04	< 24.50	< 59.20	< 20.00	3.67	6.44	7 of 25
2-methylnaphthalene	< 20.00	< 20.00	5.93	< 40.00	< 50.00	< 36.00	< 36.00	< 20.00	< 20.00	< 20.00	< 24.50	6.43	< 20.00	3.42	6.43	2 of 25
Benzyl alcohol	28.27	7.11	15.98	21.01	12.95	< 36.00	7.95	19.93	4.05	23.48	15.50	16.00	< 20.00	14.65	28.27	21 of 25
Bis(2-ethylhexyl)phthalate	11.00	18.14	7.46	6.67	7.05	4.07	16.15	13.39	23.80	22.69	19.96	42.81	4.07	16.10	42.81	21 of 25
Butylbenzyl phthalate	3.00	< 20.00	6.44	3.33	< 50.00	< 36.00	< 36.00	< 20.00	4.00	2.96	< 24.50	6.43	< 20.00	3.73	6.44	8 of 25
Di-N-butyl phthalate	8.18	2.93	8.98	20.10	24.64	4.07	18.17	< 20.00	5.54	3.00	2.95	6.43	< 20.00	8.92	24.64	16 of 25
Diethyl phthalate	11.45	9.93	10.98	12.67	11.00	6.54	8.00	10.00	8.03	11.04	9.50	9.49	6.54	9.89	12.67	25 of 25
Phenol	24.55	< 20.00	18.65	23.34	22.44	4.68	11.15	24.18	< 20.00	45.86	28.03	52.30	< 20.00	21.61	52.30	19 of 25

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	SUMMARY MIN	SUMMARY AVE	SUMMARY MAX	TIMES DETECTED
Volatile Organic Compounds (ug/L)																
1,1,1-Trichloroethane	1.00	< 10.00	1.20	2.00	1.00	2.00	< 10.00	1.00	1.00	1.00	< 5.00	< 5.00	< 5.00	1.10	2.00	11 of 25
2-Butanone	117.10	148.95	125.44	157.79	205.20	75.32	56.46	104.01	48.71	170.00	93.72	98.39	48.71	116.76	205.20	24 of 25
Acetone	152.73	136.09	192.80	138.84	154.13	87.39	177.23	91.07	43.98	120.00	74.99	86.51	43.98	121.31	192.80	25 of 25
Carbon Disulfide	3.73	2.07	< 10.00	< 10.00	< 10.00	< 10.00	3.38	< 10.00	1.49	1.48	0.80	21.45	< 10.00	3.28	21.45	8 of 25
Chloroform	3.00	4.00	3.02	3.00	3.00	2.46	2.48	2.46	1.49	4.00	3.20	4.25	1.49	3.03	4.25	24 of 25
Methylene Chloride	1.55	2.00	8.33	11.63	3.46	3.07	1.48	1.00	1.00	2.04	0.80	1.35	0.80	3.14	11.63	24 of 25
Styrene	< 10.00	< 10.00	< 10.00	< 10.00	2.00	5.39	1.00	1.93	< 10.00	1.48	50.57	7.32	< 10.00	6.22	50.57	12 of 25
Tetrachloroethylene	2.00	< 10.00	2.51	3.34	3.95	4.86	5.43	2.93	7.82	10.30	2.90	2.45	< 10.00	4.12	10.30	22 of 25
Toluene	5.00	7.00	5.70	6.99	4.49	3.00	2.48	2.00	1.49	5.57	4.65	5.17	1.49	4.46	7.00	25 of 25
Total Xylenes	1.55	3.32	1.61	1.34	1.51	1.00	1.48	< 10.00	1.49	1.00	< 5.00	1.20	< 5.00	1.42	3.32	15 of 25
Trans-1,2-Dichloroethylene	< 10.00	< 10.00	< 10.00	1.00	1.00	1.00	1.48	1.00	< 10.00	2.00	0.90	< 5.00	< 5.00	1.07	2.00	8 of 25
Trichloroethylene	1.00	3.46	< 10.00	1.33	1.49	1.00	1.48	1.00	1.00	2.96	1.40	0.86	< 10.00	1.50	3.46	16 of 25

Notes:

1. Full priority pollutant scan conducted (see Appendix J, Table J-3). Only constituents that were detected at least 5% of the time are included in this table.
2. Monthly average concentration is the weighted concentration back-calculated from daily loadings during each sampling day in the month.
3. Daily loadings were calculated by substituting half the method detection limit for those values that were reported below detection levels.
4. Yearly average concentration is the weighted concentration back-calculated from daily loadings during each sampling day in the year.
5. Bold numbers were detected or values that were reported between the method detection limit and reporting limit, also known as "J" values.

Appendix B Table B-3 Nut Island Influent Loading, Fiscal Year 1995

	Average Monthly Loadings (lbs/d)												SUMMARY		
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN	AVE	MAX
Metals (ug/L)															
Arsenic	1.70	2.00	5.24	1.91	2.03	2.94	3.32	4.45	2.94	2.38	2.11	1.87	1.70	2.74	5.24
Antimony	4.07	4.15	2.10	1.78	1.64	1.18	2.59	2.11	1.18	1.45	0.84	1.52	0.84	2.05	4.15
Beryllium	0.34	0.40	2.24	0.77	0.41	0.59	0.66	0.51	0.59	0.48	0.42	0.37	0.34	0.65	2.24
Boron	223	278	284	239	239	257	239	183	194	195	253	299	183.01	240.33	299.47
Cadmium	0.49	0.40	0.42	0.38	0.61	0.59	0.66	0.78	0.59	0.48	0.63	0.37	0.37	0.53	0.78
Chromium	8.21	11.75	14.93	6.11	7.74	2.94	8.55	8.06	8.81	4.62	3.99	3.21	2.94	7.41	14.93
Copper	85	113	119	73	120	80	77	83	69	73	60	79	60.21	85.93	120.40
Lead	10.80	16.73	18.18	6.62	17.20	10.41	10.00	13.58	11.89	7.54	8.43	3.40	3.40	11.23	18.18
Mercury	0.26	0.12	0.21	0.23	0.69	0.23	0.45	0.31	0.12	0.10	0.17	0.07	0.07	0.25	0.69
Molybdenum	9.57	9.72	8.07	4.32	3.24	4.70	28.71	4.07	7.57	3.81	3.37	6.37	3.24	7.79	28.71
Nickel	6.85	15.95	11.12	7.11	4.87	17.76	7.97	6.10	7.06	9.70	11.76	4.50	4.50	9.23	17.76
Silver	2.65	1.20	6.36	4.21	3.09	2.71	1.99	1.53	1.76	3.86	2.74	1.70	1.20	2.82	6.36
Zinc	78	128	106	70	121	93	91	98	90	89	65	86	64.79	92.94	128.10
Inorganics (mg/L)															
Total Cyanide (ug/L)	3.40	4.00	4.24	3.82	4.06	5.88	73.10	7.44	5.88	42.09	4.21	3.75	3.40	13.49	73.10
Oil and Grease	31912	27646	34718	21890	30114	30357	23226	35838	43151	25243	27368	25479	21890	29745	43151
Surfactants	4071	4867	6286	4656	4817	3619	3026	3624	4002	4704	4129	4410	3026	4351	6286
Pesticides/PCBs (ug/L)															
Chlordane	0.08	0.40	0.17	0.15	0.16	0.11	0.05	0.05	0.06	0.05	0.42	0.20	0.05	0.16	0.42
4,4'-DDD	0.01	0.04	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.04
Semi-volatile Organic Compounds (ug/L)															
1,4-Dichlorobenzene	2.04	1.60	5.46	3.06	3.64	4.24	4.74	2.03	4.13	2.90	2.06	4.44	1.60	3.36	5.46
2-methylnaphthalene	1.36	1.60	5.02	3.06	4.06	4.24	4.74	2.03	2.47	1.91	2.06	4.82	1.36	3.11	5.02
4-Methylphenol	32.47	35.97	39.52	45.07	47.70	13.06	20.89	41.29	4.19	61.34	35.43	74.20	4.19	37.59	74.20
Benzoic Acid	175	5	175	186	232	41	72	163	24	139	176	202	5.32	132.64	231.68
Benzyl Alcohol	19.20	5.69	13.55	16.04	10.50	4.24	10.57	20.26	4.76	22.38	13.05	12.00	4.24	12.69	22.38
Bis(2-ethylhexyl)phthalate	7.47	14.53	6.32	5.09	5.72	4.79	21.47	13.62	28.00	21.63	16.81	32.10	4.79	14.80	32.10
Butylbenzyl phthalate	2.04	1.60	5.46	2.55	4.06	4.24	4.74	2.03	4.71	2.82	2.06	4.82	1.60	3.43	5.46
Di-N-butyl phthalate	5.56	2.34	7.61	15.34	19.98	4.79	24.15	2.03	6.52	2.86	2.48	4.82	2.03	8.21	24.15
Diethyl phthalate	7.78	7.95	9.31	9.67	8.92	7.68	10.63	10.17	9.44	10.53	8.00	7.12	7.12	8.93	10.63
Phenol	16.67	1.60	15.81	17.82	18.20	5.50	14.81	24.58	2.47	43.72	23.61	39.22	1.60	18.67	43.72

	Average Monthly Loadings (lbs/d)												SUMMARY		
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN	AVE	MAX
Volatile Organic Compounds (ug/L)															
1,1,1-Trichloroethane	**0.68**	0.80	**1.02**	**1.53**	**0.81**	2.35	1.33	**1.02**	**1.18**	**0.95**	0.42	0.37	0.37	1.04	2.35
2-Butanone	**80**	**119**	**106**	**120**	**166**	**89**	75	**106**	**57**	**162**	**79**	**74**	57.30	102.79	166.45
Acetone	**104**	**109**	**163**	**106**	**125**	**103**	**236**	**93**	**52**	**114**	**63**	**65**	51.73	111.01	235.55
Carbon Disulfide	**2.53**	**1.66**	0.85	0.76	0.81	1.18	**4.49**	1.02	**1.75**	**1.41**	**0.67**	**16.08**	0.67	2.77	16.08
Chloroform	**2.04**	**3.20**	**2.56**	**2.29**	**2.43**	**2.90**	**3.29**	**2.51**	**1.75**	**3.81**	**2.70**	**3.18**	1.75	2.72	3.81
Methylene chloride	**1.05**	**1.60**	**7.06**	**8.88**	**2.81**	**3.61**	**1.96**	**1.02**	**1.18**	**1.95**	**0.67**	**1.01**	0.67	2.73	8.88
Styrene	0.68	0.80	0.85	0.76	**1.62**	**6.34**	**1.33**	**1.96**	1.18	**1.41**	**42.59**	**5.49**	0.68	5.42	42.59
Tetrachloroethylene	**1.36**	0.80	**2.12**	**2.55**	**3.20**	**5.71**	**7.21**	**2.98**	**9.19**	**9.82**	**2.44**	**1.84**	0.80	4.10	9.82
Toluene	**3.40**	**5.60**	**4.83**	**5.34**	**3.64**	**3.53**	**3.29**	**2.03**	**1.75**	**5.31**	**3.92**	**3.87**	1.75	3.88	5.60
Total Xylenes	**1.05**	**2.66**	**1.37**	**1.02**	**1.23**	**1.18**	**1.96**	1.02	**1.75**	**0.95**	0.42	**0.90**	0.42	1.29	2.66
Trans-1,2-Dichloroethylene	0.68	0.80	0.85	**0.76**	**0.81**	**1.18**	**1.96**	**1.02**	1.18	**1.91**	**0.76**	0.37	0.37	1.02	1.96
Trichloroethylene	**0.68**	**2.77**	0.85	**1.02**	**1.21**	**1.18**	**1.96**	**1.02**	**1.18**	**2.82**	**1.18**	**0.64**	0.64	1.37	2.82
AVERAGE FLOWS (MGD)	**81.42**	**96.00**	**101.62**	**91.55**	**97.26**	**140.97**	**159.36**	**121.91**	**141.04**	**114.31**	**100.99**	**89.91**	**81.42**	**111.36**	**159.36**

Notes:

1. Monthly average loading is the calculated average of daily loadings during the monitoring month.
2. Daily loadings were calculated by substituting half the method detection limit for those values that were reported below detection levels.
3. Yearly average loading is the average of daily loadings during the monitoring year.
4. Bold numbers are loadings calculated from detected or values that were reported between the method detection limit and reporting limit, also known as "J" values.

Appendix B Table B-4 Nut Island Effluent Characterization, Fiscal Year 1995

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVG	MAX	TIMES DETECTED
METALS (ug/L)																
Arsenic	3.66	6.74	2.98	2.99	< 2.00	< 2.00	3.31	1.92	1.35	1.35	1.00	2.04	< 2.00	2.45	6.74	14 of 37
Boron	349	351	327	313	284	217	190	210	196	247	277	377	189.68	278.10	376.52	37 of 37
Chromium	8.28	9.05	7.65	5.50	4.66	< 5.00	3.71	14.89	3.30	3.71	4.87	4.81	2.50	6.08	14.89	22 of 37
Copper	83.74	75.79	93.76	76.67	85.34	55.84	46.35	54.30	56.07	62.70	67.96	79.89	46.35	69.87	93.76	37 of 37
Lead	9.44	9.23	11.60	6.66	8.05	5.95	5.68	4.94	4.00	4.29	4.71	2.28	2.28	6.40	11.60	36 of 37
Mercury	< 0.20	< 0.20	0.13	< 0.20	0.13	< 0.20	< 0.20	< 0.20	0.44	< 0.20	0.20	< 0.20	0.10	0.14	0.44	5 of 37
Molybdenum	9.42	8.14	5.36	6.00	< 8.00	< 8.00	< 8.00	< 8.00	6.24	< 8.00	< 8.00	8.33	4.00	5.62	9.42	11 of 37
Nickel	7.77	15.74	7.96	< 12.00	< 12.00	< 12.00	< 12.00	< 12.00	8.79	< 12.00	< 12.00	8.00	6.00	7.52	15.74	5 of 37
Selenium	< 2.00	1.94	< 2.00	< 2.00	< 2.00	1.91	< 2.00	< 2.00	1.35	< 2.00	1.36	1.64	1.00	1.27	1.94	5 of 37
Silver	< 3.00	< 3.00	5.65	3.50	< 3.00	< 3.00	< 3.00	< 3.00	< 3.00	2.81	1.98	2.37	1.50	2.23	5.65	9 of 37
Zinc	70.84	81.96	68.88	66.01	74.25	53.30	51.81	62.71	69.70	66.29	73.32	74.13	51.81	67.77	81.96	37 of 37
CYANIDE AND PHENOLS (ug/L)																
Cyanide	12.41	11.08	27.54	10.72	11.33	13.56	14.81	19.79	4.20	86.22	5.00	41.60	4.20	21.52	86.22	26 of 38
Phenols	10.03	10.00	0.60	28.00	20.00	18.00	19.00	17.00	10.00	18.00	21.00	18.00	0.60	15.80	28.00	12 of 13
OIL AND GREASE, PETROLEUM HYDROCARBONS, AND SURFACTANTS (mg/L)																
Oil and Grease	21.55	19.89	31.53	22.02	32.84	34.82	17.43	35.93	18.97	23.21	157.89	35.96	17.43	37.67	157.89	23 of 24
Petroleum Hydrocarbons	2.72	6.27	5.59	2.72	3.55	1.87	1.45	7.60	2.07	11.50	8.85	2.35	1.45	4.71	11.50	47 of 51
Surfactants	6.66	5.72	6.85	6.85	6.57	3.90	2.78	4.13	3.82	5.34	4.45	5.51	2.78	5.21	6.85	25 of 25
ORGANOCHLORINE PESTICIDES AND PCBs (ug/L)																
4,4'-DDD	0.021	< 0.50	0.047	< 0.10	0.027	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.50	< 0.10	0.02	0.05	3 of 36
a-BHC	< 0.05	< 0.25	< 0.05	< 0.05	< 0.05	0.067	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.23	< 0.05	0.01	0.07	2 of 36
b-BHC	< 0.05	< 0.25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.050	< 0.05	< 0.05	< 0.05	0.039	< 0.05	0.01	0.05	2 of 36
Chlordane	0.049	< 5.00	< 0.20	< 0.20	< 0.20	< 0.20	< 0.30	< 0.50	< 0.50	0.214	< 0.50	< 2.27	< 0.20	0.10	0.50	2 of 36
d-BHC	0.175	< 0.25	0.119	0.076	0.184	0.081	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.23	< 0.05	0.06	0.18	10 of 36
Endosulfan II	0.042	< 0.50	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.50	< 0.10	0.02	0.05	2 of 36
Heptachlor	< 0.05	< 0.25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.439	< 0.05	< 0.05	< 0.05	0.038	< 0.05	0.05	0.44	3 of 36
Heptachlor Epoxide	< 0.05	< 0.25	0.012	< 0.05	< 0.05	< 0.05	< 0.05	0.040	< 0.05	0.022	< 0.05	< 0.23	< 0.05	0.01	0.04	5 of 36
SEMIVOLATILE ORGANICS (ug/L)																
1,4-dichlorobenzene	< 20.00	< 20.63	1.66	2.67	< 30.26	< 53.51	< 20.63	< 21.86	2.00	< 22.28	< 20.00	< 58.12	< 20.00	2.76	5.81	3 of 36
2-methylnaphthalene	< 20.00	< 20.63	1.34	< 30.00	< 30.26	< 53.51	< 20.63	< 21.86	< 20.00	< 22.28	< 20.00	6.16	< 20.00	2.78	6.16	4 of 36
4-methylphenol	43.01	26.76	42.76	49.33	31.81	16.69	9.62	21.75	8.34	39.22	60.05	45.97	8.34	32.94	60.05	32 of 36
Acenaphthylene	< 20.00	< 20.63	< 20.00	3.00	< 30.26	< 53.51	< 20.63	< 21.86	< 20.00	< 22.28	< 20.00	< 58.12	< 20.00	2.81	5.81	2 of 36
Benzoic Acid	246.49	110.63	213.54	249.93	237.86	114.12	29.99	100.17	33.35	226.20	462.96	262.63	29.99	190.66	462.96	32 of 36
Benzyl Alcohol	20.18	< 20.63	15.96	16.01	11.05	8.54	4.59	20.14	7.16	19.67	11.63	17.31	< 20.63	12.86	20.18	30 of 36

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	SUMMARY AVG	SUMMARY MAX	TIMES DETECTED
SEMIVOLATILE ORGANICS (cont)																
bis(2-ethylhexyl)phthalate	11.36	12.04	9.03	7.67	6.35	7.52	10.98	15.18	14.66	38.37	14.97	32.30	6.35	15.04	38.37	35 of 36
Butylbenzyl phthalate	2.93	2.75	6.06	3.33	5.65	5.35	< 20.63	2.72	3.31	3.14	2.00	6.16	< 20.00	3.79	6.16	19 of 36
Di-n-butylphthalate	4.86	2.97	54.74	5.01	60.29	28.39	4.27	4.33	4.35	4.29	2.65	6.51	2.65	15.22	60.29	27 of 36
Di-n-octylphthalate	< 20.00	< 20.63	2.34	3.00	< 30.26	< 53.51	< 20.63	< 21.86	< 20.00	< 22.28	< 20.00	< 58.12	< 20.00	2.84	5.81	3 of 36
Diethylphthalate	11.94	9.33	12.00	13.00	10.06	8.79	7.65	10.86	7.70	11.65	9.72	10.64	7.65	10.28	13.00	34 of 36
Phenol	21.06	< 20.63	15.81	18.99	21.38	11.57	4.25	12.46	2.99	22.40	28.45	17.94	< 20.63	14.95	28.45	27 of 36
VOLATILE ORGANICS (ug/L)																
1,1,1-Trichloroethane	1.27	< 10.00	1.10	1.33	1.00	1.00	1.34	< 18.40	< 10.00	< 14.60	< 5.00	< 5.00	< 5.00	1.11	1.84	10 of 36
2-Butanone	238	117	418	195	97	82	96	206	88	199	55	101	55.17	157.81	418.46	34 of 36
Acetone	255	184	227	167	117	106	98	183	79	127	83	126	78.72	145.96	255.40	33 of 36
Bromodichloromethane	1.80	1.63	1.36	1.33	1.99	1.68	< 10.00	1.84	< 10.00	2.13	< 5.00	1.63	< 5.00	1.49	2.13	16 of 36
Carbon Disulfide	1.76	1.72	< 10.00	1.66	1.00	< 10.00	1.63	< 18.40	1.33	< 14.60	< 5.00	4.43	< 5.00	1.61	4.43	11 of 36
Chloroform	6.35	5.67	6.39	4.99	6.33	4.07	2.65	5.29	1.97	5.31	3.03	6.79	1.97	4.90	6.79	33 of 36
Chloromethane	< 10.00	< 10.00	< 10.00	< 10.00	1.00	2.05	< 10.00	< 18.40	< 10.00	< 14.60	< 5.00	< 5.00	< 5.00	1.11	2.05	3 of 36
Dibromochloromethane	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 18.40	< 10.00	< 14.60	< 5.00	< 5.00	< 5.00	1.02	1.84	5 of 36
Ethylbenzene	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 18.40	< 10.00	< 14.60	< 5.00	< 7.00	< 5.00	1.04	1.84	3 of 36
Methylene Chloride	3.70	1.67	10.56	6.99	3.64	2.73	2.33	< 18.40	1.98	2.33	1.18	3.21	1.18	3.51	10.56	28 of 36
Styrene	< 10.00	< 10.00	< 10.00	< 10.00	2.67	4.31	1.00	2.14	4.85	< 14.60	32.96	3.94	< 10.00	4.78	32.96	16 of 36
Tetrachloroethene	2.72	1.67	2.62	2.00	3.67	3.63	3.65	2.82	2.95	6.88	2.73	2.81	1.67	3.18	6.88	32 of 36
Toluene	5.03	4.01	4.16	3.33	3.67	2.32	2.00	2.86	1.98	4.30	4.06	3.58	1.98	3.44	5.03	32 of 36
trans-1,2-dichloroethene	1.00	< 10.00	< 10.00	1.00	1.00	1.00	1.00	< 18.40	< 10.00	< 14.60	< 5.00	< 5.00	0.50	1.02	1.84	7 of 36
Trichloroethene	1.25	< 10.00	< 10.00	< 10.00	1.00	1.00	1.00	< 18.40	< 10.00	1.46	1.10	< 10.00	0.50	1.10	1.84	10 of 36
Xylene	1.00	3.19	1.61	1.00	1.00	1.37	1.65	< 18.40	1.32	< 14.60	1.01	0.99	< 10.00	1.45	3.19	13 of 36

Notes:
1. Full priority pollutant scan conducted (see Appendix J, Table J-3). Only constituents that were detected at least 5% of the time are included in this table.
2. Monthly average concentration is the weighted concentration back-calculated from daily loadings during each sampling day in the month.
3. Daily loadings were calculated by substituting half the method detection limit for those values that were reported below detection levels.
4. Yearly average concentration is the weighted concentration back-calculated from daily loadings during each sampling day in the year.
5. Bold numbers were detected or values that were reported between the method detection limit and reporting limit, also known as "J" values.

Appendix B Table B-5 Nut Island Effluent Loadings, Fiscal Year 1995

Average Monthly Loadings (lbs/d)

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVG	MAX
METALS															
Arsenic	2.51	4.84	2.26	2.21	0.70	1.18	4.04	1.90	1.60	1.32	0.84	1.60	0.70	2.08	4.84
Boron	239.37	252.13	247.51	231.53	199.21	255.87	231.04	207.73	232.02	241.72	232.55	294.38	199.21	238.75	294.38
Chromium	5.67	6.50	5.80	4.07	3.28	2.94	4.52	14.74	3.91	3.64	4.09	3.76	2.94	5.24	14.74
Copper	57.37	54.44	71.06	56.65	59.93	65.76	56.46	53.75	66.42	61.42	57.01	62.46	53.75	60.23	71.06
Lead	6.47	6.63	8.79	4.92	5.65	7.01	6.92	4.89	4.74	4.20	3.95	1.78	1.78	5.50	8.79
Mercury	0.07	0.07	0.10	0.07	0.09	0.12	0.12	0.10	0.52	0.10	0.16	0.08	0.07	0.13	0.52
Molybdenum	6.45	5.84	4.06	4.43	2.81	4.71	4.87	3.96	7.40	3.92	3.36	6.52	2.81	4.86	7.40
Nickel	5.32	11.31	6.04	4.43	4.21	7.07	7.31	5.94	10.41	5.88	5.03	6.25	4.21	6.60	11.31
Selenium	0.69	1.39	0.76	0.74	0.70	2.25	1.22	0.99	1.60	0.98	1.14	1.28	0.69	1.14	2.25
Silver	1.03	1.08	4.29	2.58	1.05	1.77	1.83	1.48	1.78	2.75	1.66	1.85	1.03	1.93	4.29
Zinc	48.53	58.87	52.21	48.77	52.14	62.77	63.11	62.07	82.58	64.93	61.50	57.95	48.53	59.62	82.58
CYANIDE AND PHENOLS															
Cyanide	8.50	7.96	20.88	8.05	7.95	15.97	18.04	19.58	4.97	84.46	4.19	32.52	4.19	19.42	84.46
Phenols	7.05	7.03	0.46	20.58	14.03	19.39	23.51	17.20	11.39	17.83	18.91	13.48	0.46	14.24	23.51
OIL AND GREASE, PETROLEUM HYDROCARBONS, AND SURFACTANTS															
Oil and Grease	14377	14435	23873	16312	23075	42758	21060	35162	22908	22604	127584	28707	14377	32738	127584
Petroleum Hydrocarbons	1707	4716	4703	2099	2615	2241	1942	7773	2399	10565	7612	1837	1707	4184	10565
Surfactants	4472	4148	5183	5077	4619	4789	3362	4044	4607	5200	3597	4396	3362	4458	5200
ORGANOCHLORINE PESTICIDES AND PCBs															
4,4'-DDD	0.01	0.04	0.04	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.04
a-BHC	0.00	0.02	0.00	0.00	0.00	0.08	0.01	0.00	0.01	0.01	0.00	0.02	0.00	0.01	0.08
b-BHC	0.00	0.02	0.00	0.00	0.00	0.01	0.01	0.05	0.01	0.01	0.00	0.03	0.00	0.01	0.05
Chlordane	0.03	0.36	0.02	0.02	0.01	0.02	0.04	0.05	0.06	0.21	0.04	0.18	0.01	0.09	0.36
d-BHC	0.12	0.02	0.09	0.06	0.13	0.10	0.01	0.00	0.01	0.01	0.00	0.02	0.00	0.05	0.13
Endosulfan II	0.03	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.04
Heptachlor	0.00	0.02	0.00	0.00	0.00	0.01	0.01	0.43	0.01	0.01	0.00	0.03	0.00	0.04	0.43
Heptachlor Epoxide	0.00	0.02	0.01	0.00	0.00	0.01	0.01	0.04	0.01	0.02	0.00	0.02	0.00	0.01	0.04
SEMIVOLATILE ORGANICS															
1,4-dichlorobenzene	1.37	1.48	1.26	1.97	2.12	6.30	2.52	2.14	2.37	2.18	1.68	4.54	1.26	2.50	6.30
2-methylnaphthalene	1.37	1.48	1.01	2.22	2.12	6.30	2.52	2.14	2.37	2.18	1.68	4.82	1.01	2.52	6.30
4-methylphenol	29.46	19.22	32.41	36.45	22.34	19.65	11.72	21.29	9.88	38.42	50.38	35.94	9.88	27.26	50.38
Acenaphthylene	1.37	1.48	1.52	2.21	2.12	6.30	2.52	2.14	2.37	2.18	1.68	4.54	1.37	2.54	6.30
Benzoic Acid	168.87	79.46	161.85	184.67	167.04	134.39	36.53	98.03	39.50	221.57	388.35	205.33	36.53	157.13	388.35

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVG	MAX
SEMIVOLATILE ORGANICS (cont)															
Benzyl Alcohol	**13.83**	1.48	**12.10**	**11.83**	**7.76**	**10.06**	**5.59**	**19.71**	**8.48**	**19.27**	**9.76**	**13.53**	1.48	11.12	19.71
bis(2-ethylhexyl)phthalate	**7.78**	**8.65**	**6.84**	**5.67**	**4.46**	**8.86**	**13.38**	**14.85**	**17.37**	**37.59**	**12.56**	**25.26**	4.46	13.60	37.59
Butylbenzyl phthalate	**2.01**	**1.98**	**4.59**	**2.46**	**3.97**	**6.30**	**2.52**	**2.66**	**3.92**	**3.07**	**1.68**	**4.82**	1.68	3.33	6.30
Di-n-butylphthalate	**3.33**	**2.13**	**41.49**	**3.70**	**42.34**	**33.43**	**5.20**	**4.24**	**5.15**	**4.20**	**2.22**	**5.09**	2.13	12.71	42.34
Di-n-octylphthalate	1.37	1.48	**1.77**	**2.22**	2.12	6.30	2.52	2.14	2.37	2.18	1.68	4.54	1.37	2.56	6.30
Diethylphthalate	**8.18**	**6.70**	**9.09**	**9.60**	**7.06**	**10.36**	**9.32**	**10.62**	**9.12**	**11.42**	**8.15**	**8.32**	6.70	9.00	11.42
Phenol	**14.43**	1.48	**11.98**	**14.03**	**15.01**	**13.63**	**5.17**	**12.20**	**3.55**	**21.94**	**23.87**	**14.03**	1.48	12.61	23.87
VOLATILE ORGANICS															
1,1,1-Trichloroethane	**0.87**	0.72	**0.83**	0.99	**0.70**	**1.18**	**1.63**	1.82	1.18	1.43	0.42	0.39	0.39	1.01	1.82
2-Butanone	**162.87**	**84.38**	**316.87**	144.17	**67.77**	**96.97**	**117.39**	**204.02**	**104.77**	**195.33**	**46.28**	**78.62**	46.28	134.95	316.87
Acetone	**174.97**	**132.05**	**171.79**	123.07	**82.42**	**125.38**	**119.06**	**181.19**	**93.25**	**124.24**	**69.31**	**98.59**	69.31	124.61	181.19
Bromodichloromethane	**1.23**	**1.17**	**1.03**	0.99	**1.40**	**1.98**	1.22	**1.82**	1.18	**2.09**	0.42	**1.27**	0.42	1.32	2.09
Carbon Disulfide	**1.21**	**1.24**	0.76	1.23	**0.70**	1.18	**1.98**	1.82	**1.58**	1.43	0.42	**3.47**	0.42	1.42	3.47
Chloroform	**4.35**	**4.07**	**4.84**	3.69	**4.44**	**4.79**	**3.23**	**5.24**	**2.34**	**5.20**	**2.54**	**5.31**	2.34	4.17	5.31
Chloromethane	0.69	0.72	0.76	0.74	0.70	**2.41**	1.22	1.82	1.18	1.43	0.42	0.39	0.39	1.04	2.41
Dibromochloromethane	0.69	0.72	0.76	0.74	0.70	1.18	1.22	1.82	1.18	1.43	0.42	0.39	0.39	0.94	1.82
Ethylbenzene	0.69	0.72	0.76	0.74	0.70	1.18	1.22	1.82	1.18	1.43	0.42	0.55	0.42	0.95	1.82
Methylene Chloride	**2.53**	**1.20**	8.00	**5.16**	**2.56**	**3.21**	**2.84**	1.82	**2.35**	**2.28**	**0.99**	**2.51**	0.99	2.95	8.00
Styrene	0.69	0.72	0.76	0.74	**1.87**	**5.07**	**1.22**	**2.12**	**5.74**	1.43	**27.65**	**3.08**	0.69	4.26	27.65
Tetrachloroethene	**1.86**	**1.20**	1.98	**1.48**	**2.58**	**4.27**	**4.45**	**2.79**	**3.50**	**6.74**	**2.29**	**2.19**	1.20	2.94	6.74
Toluene	**3.44**	**2.88**	3.15	**2.46**	**2.58**	**2.74**	**2.44**	**2.83**	**2.35**	**4.21**	**3.41**	**2.80**	2.35	2.94	4.21
trans-1,2-dichloroethene	**0.69**	0.72	0.76	0.74	0.70	**1.18**	**1.22**	1.82	1.18	1.43	0.42	0.39	0.39	0.94	1.82
Trichloroethene	**0.85**	0.72	0.76	0.74	0.70	**1.18**	**1.22**	1.82	1.18	**1.43**	**0.93**	0.39	0.39	0.99	1.82
Xylene	**0.69**	**2.29**	**1.22**	**0.74**	**0.70**	**1.62**	**2.01**	**1.82**	**1.56**	1.43	**0.85**	**0.77**	0.69	1.31	2.29

Notes:

1. Monthly average loading is the calculated average of daily loadings during the monitoring month.
2. Daily loadings were calculated by substituting half the method detection limit for those values that were reported below detection levels.
3. Yearly average loading is the average of daily loadings during the monitoring year.
4. Bold numbers are loadings calculated from detected or values that were reported between the method detection limit and reporting limit, also known as "J" values.

Appendix C

Appendix C Table C-1 Cottage Farm Facility Operations Summary, Fiscal Year 1995

DATE	RAINFALL (INCHES)	DISCHARGE DURATION (HOURS)	TOTAL FLOW (MG)	PH (SU)	BOD INFLUENT (MG/L)	BOD EFFLUENT (MG/L)	TSS INFLUENT (MG/L)	TSS EFFLUENT (MG/L)	SETTLEABLE. SOLIDS (MG/L)	FECAL COLIFORM (#/100 ml)	CHLORINE RESIDUAL (MG/L)
JULY											
23	0.13	4.00	7.62	*	131	42	140	57	*	460	1.60
28	0.82	3.75	7.93	6.93	*	*	78	115	< 1.60	460	1.87
AUGUST											
13	1.13	5.25	11.80	6.61	157	31	118	162	< 2.00	10	2.07
18	2.37	8.50	19.32	6.62	25	< 30	72	81	0.80	50	1.97
21	0.78	5.00	12.53	7.15	140	< 31	266	122	2.00	3000	1.53
22	1.40	11.50	43.02	7.01	71	39	50	45	0.80	< 10	1.33
SEPTEMBER											
17	0.50	5.00	6.75	7.05	52	30	80	47	0.40	46000	1.63
23	2.64	19.25	100.44	7.39	41	37	79	70	< 0.40	< 10	1.54
NOVEMBER											
18	1.33	3.50	17.70	6.96	56	81	66	111	2.40	< 10	1.50
19	0.59	6.00	21.90	6.91	63	41	76	60	< 2.00	< 10	1.88
22	0.66	5.00	12.40	6.99	84	62	84	96	< 0.40	10	2.00
28	1.17	7.50	18.47	6.86	< 26	32	7	50	< 0.40	20	1.66
DECEMBER											
5	1.42	11.50	31.24	7.65	99	81	124	75	0.40	< 10	1.88
23	0.94	3.00	10.05	6.91	104	80	95	77	2.40	*	2.15
24	1.33	19.00	55.19	6.78	91	62	81	88	4.00	*	1.75
25**	0.01	1.00	1.04	7.22	82	70	54	49	2.00	< 10	1.20
JANUARY											
1	1.07	8.50	19.71	6.79	24	31	23	53	< 0.40	10	1.71
2	0.44	2.00	0.09	***	***	***	***	***	***	***	***
7	0.49	5.00	2.03	7.07	11	< 11	30	16	< 0.40	< 10	1.90
20	1.2	6.00	57.42	6.90	69	69	278	89	1.60	< 10	1.63
FEBRUARY											
28****	0.84	11.75	38.13	6.93	76	86	96	127	6.80	< 10	2.25
				7.32	95	36	130	28	0.80	> 60000	1.64
MARCH											
9	0.82	7.00	19.93	7.61	58	17	98	61	1.40	140	1.60
17	0.61	4.50	15.76	6.60	75	57	122	104	0.60	10	2.20

DATE	RAINFALL (INCHES)	DISCHARGE DURATION (HOURS)	TOTAL FLOW (MG)	PH (SU)	BOD INFLUENT (MG/L)	BOD EFFLUENT (MG/L)	TSS INFLUENT (MG/L)	TSS EFFLUENT (MG/L)	SETTLEABLE. SOLIDS (MG/L)	FECAL COLIFORM (#/100 ml)	CHLORINE RESIDUAL (MG/L)
APRIL											
13	0.49	4.25	10.76	7.42	35	34	98	62	0.80	< 10	1.67
19	0.55	6.00	29.73	7.44	163	68	226	86	1.20	< 10	2.00
MAY											
11	0.48	5.00	3.41	7.36	> 128	57	80	116	3.20	40	2.00
TOTAL		**178.75**	**574.37**								
AVERAGE		**7.38**	**22.97**		**78**	**49**	**95**	**77**	**1.57**	**46**	**1.75**
MINIMUM		**1.00**	**0.09**	**6.61**	**< 26**	**< 11**	**7**	**16**	**< 0.40**	**< 10**	**1.20**
MAXIMUM		**19.25**	**100.44**	**7.65**	**157**	**86**	**278**	**162**	**6.80**	**46000**	**2.25**
NO. OF ACTIVATIONS		**25**									

Notes:

- * Holding time exceeded, sample discarded.
- ** Continued from previous day's activation.
- *** Very short activation, no samples taken.
- **** Two sets of samples taken.

Appendix C Table C-2 Cottage Farm CSO BOD and TSS Loadings, Fiscal Year 1995

DATE	Total Flow (MG)	Biochemical Oxygen Demand Influent (lbs/d)	Biochemical Oxygen Demand Effluent (lbs/d)	Removal (%)	Total Suspended Solids Influent (lbs/d)	Total Suspended Solids Effluent (lbs/d)	Removal (%)
JULY							
23	7.62	8325	2656	68	8897	3622	59
28	7.93	*	*	*	5159	7606	-47
AUGUST							
13	11.80	15451	3061	80	11613	15943	-37
18	19.32	4028	4834	-20	11601	13051	-13
21	12.53	14630	3240	78	27797	12749	54
22	43.02	25330	14136	44	17939	16145	10
SEPTEMBER							
17	6.75	2950	1694	43	4504	2646	41
23	100.44	34596	30994	10	66176	58637	11
NOVEMBER							
18	17.70	8208	11987	-46	9743	16386	-68
19	21.90	11525	7543	35	13881	10959	21
22	12.40	8697	6412	26	8687	9928	-14
28	18.47	4005	4945	-23	1078	7702	-614
DECEMBER							
5	31.24	25715	20974	18	32307	19541	40
23	10.05	8717	6697	23	7963	6454	19
24	55.19	39930	30517	24	31069	31529	-1
25	1.04	*	*	*	*	*	*
JANUARY							
1	19.71	3879	5096	-31	3830	8712	-127
2	0.09	*	*	*	*	*	*
7	2.03	191	186	3	508	271	47
20	57.42	32947	32803	0	133129	42621	68
FEBRUARY							
28	38.13	24105	27253	-13	30528	40387	-32

DATE	Total Flow (MG)	Biochemical Oxygen Demand Influent (lbs/d)	Effluent (lbs/d)	Removal (%)	Total Suspended Solids Influent (lbs/d)	Effluent (lbs/d)	Removal (%)
MARCH							
9	19.93	9657	2759	71	16289	10139	38
17	15.76	9910	7479	25	16035	13670	15
APRIL							
13	10.76	3114	3060	2	8794	5564	37
19	29.73	40416	16860	58	56036	21324	62
MAY							
11	3.41	3640	1632	55	2275	3299	-45
TOTAL	**574**	**339967**	**246818**		**525840**	**378883**	
AVERAGE	**22.97**	**14781.17**	**10731.22**	**23.03**	**21910.00**	**15786.79**	**-19.95**
MINIMUM	**0.09**	**191.31**	**186.23**	**-46.04**	**507.91**	**270.88**	**-614.29**
MAXIMUM	**100.44**	**40415.56**	**32803.47**	**80.19**	**133129.42**	**58636.87**	**67.99**
NO. of ACTIVATIONS		**25**					

Notes
* Very short activation, no samples taken

Appendix C Table C-3 Cottage Farm CSO Facility, Effluent Characterization, Fiscal Year 1995

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	SUMMARY MEAN	SUMMARY MAX	TIMES DETECTED
Metals (mg/L)																
Cadmium	**0.0020**	**0.0040**	**0.0010**	N	<0.001	**0.0010**	<0.001	<0.001	N	N	N	N	<0.001	0.0016	0.0040	4 of 7
Chromium	NA	NA	NA	O	NA	NA	**0.0050**	NA	O	O	O	O	0.0050	0.0050	0.0050	1 of 1
Copper	**0.1200**	**0.1700**	**0.1700**		**0.0750**	**0.1000**	**0.0530**	**0.0690**					0.0530	0.1080	0.1700	7 of 7
Lead	**0.1200**	**0.2200**	**0.0880**	A	**0.0860**	**0.0380**	**0.0330**	**0.0340**	S	S	S	A	0.0330	0.0088	0.2200	7 of 7
Mercury	**0.0010**	**0.0010**	**0.0010**	C	**0.0008**	**0.0002**	**0.0004**	**0.0004**	A	A	A	C	0.0002	0.0006	0.0010	7 of 7
Nickel	< 0.012	< 0.012	**0.0240**	T	< 0.012	<0.012	<0.012	**0.0180**	M	M	M	T	<0.012	0.0146	0.0240	2 of 7
Zinc	**0.1800**	**0.2900**	**0.2200**	I	**0.1400**	**0.1400**	**0.0760**	**0.1400**	P	P	P	I	0.0760	0.0169	0.2900	7 of 7
				V					L	L	L	V				
Inorganics (mg/L)				A					E	E	E	A				
Cyanide	**0.035**	**0.069**	**0.006**	T	**0.010**	**0.029**	**0.014**	**0.093**	S	S	S	T	0.006	0.037	0.093	7 of 7
Phenol	<0.006	<0.006	<0.006	I	**0.011**	**0.010**	<0.005	**0.012**				I	<0.005	0.008	0.012	3 of 7
Ammonia	**5.830**	**5.800**	**7.200**	O	**3.500**	**9.900**	**4.500**	**0.150**	T	T	T	O	0.150	5.269	9.900	7 of 7
Phosphorus	**2.920**	**1.900**	**1.200**	N	**0.510**	**2.800**	**1.600**	**2.600**	A	A	A	N	0.510	1.933	2.920	7 of 7
MBAS	NA	NA	NA		NA	**3.400**	**1.100**	NA	K	K	K		1.100	2.250	3.400	2 of 2
									E	E	E					
Pesticides/PCBs (ug/L)									N	N	N					
g-BHC	<0.05	<0.25	<0.05		**0.064**	<0.05	<0.052	<0.05					0.064	0.064	0.064	1 of 7
Methoxychlor	**0.270**	< 2.50	**0.200**		**0.370**	<0.50	<0.52	<0.50					<0.50	0.280	0.370	3 of 7
Semi-volatile Organics (ug/L)																
2-methylnaphthalene	< 10.0	**1.0**	< 20.0		< 20.0	**1.0**	< 20.0	< 20.0					< 10.0	1.0	1.0	2 of 7
Benzoic acid	**66.0**	**33.0**	**34.0**		**24.0**	**55.0**	**77.0**	**6.0**					6.0	36.5	77.0	7 of 7
Benzyl alcohol	**3.0**	< 22.0	**3.0**		**2.0**	< 10.0	**3.0**	**5.0**					< 10.0	2.6	5.0	5 of 7
Bis(2-ethylhexl)phthalate	**7.0**	**8.0**	**6.0**		**5.0**	**6.0**	**11.0**	**11.0**					5.0	11.1	11.0	7 of 7
Butylbenzylphthalate	**2.0**	**3.0**	**2.0**		< 20.0	**1.0**	< 20.0	**2.0**					< 10.0	2.2	3.0	5 of 7
Di-n-butylphthalate	**5.0**	< 22.0	**33.0**		**36.0**	**3.0**	**3.0**	**5.0**					< 10.0	3.8	36.0	6 of 7
Diethylphthalate	**5.0**	**3.0**	**6.0**		< 20.0	**7.0**	**4.0**	**5.0**					< 10.0	3.8	7.0	6 of 7
Fluoranthene	**1.0**	**2.0**	< 20.0		< 20.0	< 10.0	< 20.0	< 20.0					< 10.0	1.7	2.0	2 of 7
Naphthalene	< 10.0	< 22.0	< 20.0		< 20.0	**1.0**	< 20.0	< 20.0					< 10.0	1.7	1.0	1 of 7
P-cresol	**12.0**	**9.0**	**12.0**		< 20.0	**17.0**	**13.0**	**17.0**					< 10.0	8.3	17.0	6 of 7
Phenol	< 10.0	< 22.0	**3.0**		**2.0**	< 10.0	**3.0**	< 20.0					< 10.0	1.9	3.0	3 of 7

Notes:
NA Not analyzed.
Bold numbers were detected values.
Average concentrations were calculated by substituting half the method detection limit for those that were below detection.

Appendix C Table C-4 Cottage Farm CSO Facility, Effluent Loadings, Fiscal Year 1995

	LOADINGS (lbs/d)												SUMMARY		
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN	MEAN	MAX
Metals															
Cadmium	0.1323	0.3936	0.0563	N	0.0913	0.2605	0.0822	0.1590	N	N	N	N	0.06	0.17	0.39
Chromium	NA	NA	NA	O	NA	NA	0.8219	NA	O	O	O	O	0.82	0.82	0.82
Copper	7.9363	16.7300	9.5702		13.6985	26.0542	8.7122	21.9423					7.94	14.95	26.05
Lead	7.9363	21.6506	4.9540	A	15.7076	9.9006	5.4246	10.8121	S	S	S	A	4.95	10.91	21.65
Mercury	0.0661	0.0984	0.0563	C	0.1461	0.0521	0.0658	0.1272	A	A	A	C	0.05	0.09	0.15
Nickel	0.3968	0.5905	1.3511	T	1.0959	1.5632	0.9863	5.7241	M	M	M	T	0.40	1.67	5.72
Zinc	11.9045	28.5395	12.3849	I	25.5704	36.4758	12.4930	44.5206	P	P	P	I	11.90	24.56	44.52
				V					L	L	L	V			
Inorganics				A					E	E	E	A			
Cyanide	2.31	6.79	0.34	T	1.83	7.56	2.30	29.57	S	S	S	T	0.34	7.24	29.57
Phenol	0.20	0.30	0.17	I	2.01	2.61	0.41	3.82				I	0.17	1.36	3.82
Ammonia	385.57	570.79	405.32	O	639.26	2579.36	739.72	47.70	T	T	T	O	47.70	766.82	2579.36
Phosphorus	193.12	186.98	67.55	N	93.15	729.52	263.01	826.81	A	A	A	N	67.55	337.16	826.81
MBAS	NA	NA	NA		NA	885.84	180.82	NA	K	K	K		180.82	533.33	885.84
									E	E	E				
Pesticides/PCBs									N	N	N				
g-BHC	0.0003	0.0025	0.000		0.012	0.0013	0.0009	0.0016					0.0003	0.0026	0.0117
Methoxychlor	0.018	0.0246	0.011		0.068	0.0130	0.0085	0.0159					0.0085	0.0227	0.0676
Semi-volatile Organics															
2-methylnaphthalene	0.066	0.098	0.113		0.365	0.261	0.329	0.636					0.066	0.267	0.636
Benzoic acid	4.365	3.248	1.914		4.384	14.330	12.657	1.908					1.908	6.115	14.330
Benzyl alcohol	0.198	0.217	0.169		0.365	0.261	0.493	1.590					0.169	0.470	1.590
Bis(2-ethylhexl)phthalate	0.463	0.787	0.338		0.913	1.563	1.808	3.498					0.338	1.339	3.498
Butylbenzylphthalate	0.132	0.295	0.113		0.365	0.261	0.329	0.636					0.113	0.304	0.636
Di-n-butylphthalate	0.331	0.217	1.858		6.575	0.782	0.493	1.590					0.217	1.692	6.575
Diethylphthalate	0.331	0.295	0.338		0.365	1.824	0.658	1.590					0.295	0.771	1.824
Fluoranthene	0.066	0.197	0.113		0.365	0.261	0.329	0.636					0.066	0.281	0.636
Naphthalene	0.066	0.217	0.113		0.365	0.261	0.329	0.636					0.066	0.284	0.636
P-cresol	0.794	0.886	0.676		0.365	4.429	2.137	5.406					0.365	2.099	5.406
Phenol	0.066	0.217	0.169		0.365	0.261	0.493	0.636					0.066	0.315	0.636
FLOW	7.93	11.80	6.75		21.90	31.24	19.71	38.13							

Notes:
NA Not analyzed.
Bold numbers indicate loadings calculated from detected values.
Unbolded numbers indicate monthly loadings calculated by substituting half the method detection limit for those that were below detection.

Appendix D

Appendix D Table D-1 Prison Point CSO Facility Operations Summary, Fiscal Year 1995

DATE	RAINFALL (INCHES)	DISCHARGE DURATION (HOURS)	TOTAL FLOW (MG)	PH (SU)	BOD INFLUENT (MG/L)	BOD EFFLUENT (MG/L)	TSS INFLUENT (MG/L)	TSS EFFLUENT (MG/L)	SETTL. SOLIDS (MG/L)	FECAL COLIFORM (#/100ml)	CHLORINE RESIDUAL (MG/L)
JULY											
28	0.82	2.25	9.27	6.84	*	*	182	108	< 1.6	10	0.90
AUGUST											
13	1.13	3.00	15.00	6.97	49.1	28.7	330	98	< 2.0	70	1.50
18	2.37	7.00	40.80	6.72	32	22.35	91	114	1.6	< 10	1.32
21	0.78	4.00	13.00	6.94	101	58.1	330	78	2.0	200	1.53
22	1.40	6.50	29.28	6.82	25.8	24.1	52	87	1.2	240	1.20
SEPTEMBER											
17	0.50	3.00	4.79	6.63	70.4	61.8	236	82	1.6	50	1.23
23**	2.64	13.75	126.67	8.98	< 32.0	97.5	99	66	< 0.4	10	1.36
				9.54	25.7	114	216	60	0.4	10	
NOVEMBER											
18	1.33	3.00	12.25	7.13	114	31.8	206	60	0.8	< 10	2.00
19	0.59	6.00	24.51	6.66	66.6	24.9	188	89	< 0.4	< 10	1.50
22	0.66	4.00	11.21	7.06	49.8	23.8	178	102	0.4	< 10	1.88
28	1.17	4.50	14.46	7.13	29	18.2	98	61	< 0.4	100	1.88
DECEMBER											
5	1.42	9.50	14.21	7.77	69	< 13.2	86	166	0.4	< 10	1.78
11	0.30	6.00	4.75	7.02	43.1	24.4	59	33	< 0.4	29400	1.64
23	0.94	3.00	3.50	7.00	67.3	12	241	35	0.8	< 10	2.50
24**	1.33	20.00	46.00	7.21	44.7	13.1	57	31	0.4	< 10	1.93
				6.91	50.4	22	56	36	< 0.4	< 10	2.00
JANUARY											
1	1.07	6.00	18.00	6.89	54	< 13.60	93	32.7	< 0.40	< 10	1.83
2	0.44	3.00	8.20	8.16	52.20	< 9.15	135	26.0	< 0.40	< 10	2.00
7	0.49	3.00	10.14	7.01	53.4	16.90	46	27.0	< 0.40	112000	1.67
20**	1.2	7.00	28.30	7.01	72.7	89.70	382	576.0	5.6	180	1.4
				7.01	37.3	42.60	60	80.0	< 0.40	< 10	
FEBRUARY											
16	0.24	3.00	1.71	7.09	234	42.7	1193	166	0.4	10	1.93
28**	0.84	4.00	2.82	7.24	93.6	58.3	292	154	4.0	< 10	1.34
				7.02	< 44.9	38.6	60	84	< 0.4	< 10	1.5

DATE	RAINFALL (INCHES)	DISCHARGE DURATION (HOURS)	TOTAL FLOW (MG)	PH (SU)	BOD INFLUENT (MG/L)	BOD EFFLUENT (MG/L)	TSS INFLUENT (MG/L)	TSS EFFLUENT (MG/L)	SETTL. SOLIDS (MG/L)	FECAL COLIFORM (#/100ml)	CHLORINE RESIDUAL (MG/L)
MARCH											
9	0.82	7.00	11.69	7.18	110	54	376	162	2.0	80	1.55
17	0.61	3.00	1.63	7.17	84.6	12.6	120	51	< 0.2	< 10	1.83
APRIL											
13	0.49	3.25	3.68	7.38	71.4	43.4	358	82	0.4	< 10	1.67
19	0.55	2.75	2.33	7.30	96.3	65.5	424	192	2.8	270	1.27
MAY											
11	0.48	2.50	2.14	7.19	288	86.6	672	182	0.4	20	2.00
TOTAL		**140.00**	**460.33**								
AVERAGE		**5.38**	**17.71**		**83**	**45**	**231**	**104**	**1.3**	**36**	**1.65**
MINIMUM	**0.24**	**2.25**	**1.63**	**6.63**	**26**	**12**	**46**	**26**	**< 0.2**	**< 10**	**0.90**
MAXIMUM	**2.64**	**20.00**	**126.67**	**9.54**	**288**	**114**	**1193**	**576**	**5.6**	**112000**	**2.50**
NO. of ACTIVATIONS		**26**									

Notes:

* Holding time exceeded, sample discarded.

** Two sets of samples taken.

Appendix D Table D-2 Prison Point CSO BOD and TSS Loadings, Fiscal Year 1995

DATE	Total Flow (MG)	Biochemical Oxygen Demand Influent (mg/L)	Biochemical Oxygen Demand Effluent (mg/L)	Removal (%)	Total Suspended Solids Influent (mg/L)	Total Suspended Solids Effluent (mg/L)	Removal (%)
JULY							
28	9.27	*	*	*	14071	8350	41
AUGUST							
13	15.00	6142	3590	42	41283	12260	70
18	40.80	10889	7605	30	30965	38791	-25
21	13.00	10950	6299	42	35779	8457	76
22	29.28	6299	5884	7	12696	21241	-67
SEPTEMBER							
17	4.79	2814	2470	12	9432	3277	65
23	126.67	30477	111715	-267	166383	66553	60
NOVEMBER							
18	12.25	11647	3249	72	21046	6130	71
19	24.51	13614	5090	63	38430	18193	53
22	11.21	4655	2224	52	16637	9534	43
28	14.46	3498	2195	37	11820	7357	38
DECEMBER							
5	14.21	8178	1565	81	10193	19676	-93
11	4.75	1707	967	43	2337	1307	44
23	3.50	1964	350	82	7035	1022	85
24	46.00	18242	6733	63	21676	12852	41
JANUARY							
1	18.00	8106	2042	75	13961	4909	65
2	8.20	3570	626	82	9232	1778	81
7	10.14	4516	1429	68	3890	2283	41
20	28.30	12983	15615	-20	52168	77426	-48
FEBRUARY							
16	1.71	3339	609	82	17024	2369	86
28	2.82	1626	1138	30	4133	2795	32

DATE	Total Flow (MG)	Biochemical Oxygen Demand Influent (mg/L)	Effluent (mg/L)	Removal (%)	Total Suspended Solids Influent (mg/L)	Effluent (mg/L)	Removal (%)
MARCH							
9	11.69	10722	5263	51	36649	15790	57
17	1.63	1148	171	85	1628	692	58
APRIL							
13	3.68	2191	1332	39	10987	2517	77
19	2.33	1871	1272	32	8236	3729	55
MAY							
11	2.14	5147	1548	70	12010	3253	73
TOTAL	**460.33**						
AVERAGE	**17.71**	**7452**	**7639**	**38**	**23450**	**13559**	**41**
MINIMUM	**1.63**	**1148**	**171**	**-267**	**1628**	**692**	**-93**
MAXIMUM	**126.67**	**30477**	**111715**	**85**	**166383**	**77426**	**86**
NO. Of ACTIVATIONS	**26**						

NOTES:

* No samples analyzed

Appendix D Table D-3 Prison Point CSO Facility, Effluent Characterization, FY95

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	SUMMARY AVE	SUMMARY MAX	TIMES DETECTED
Metals (mg/L)				NO ACTIVATIONS				NO ACTIVATIONS	NO SAMPLES TAKEN		NO SAMPLES TAKEN	NO ACTIVATIONS				
Cadmium	**0.001**	**0.003**	**0.001**		<0.001	**0.002**	**0.001**			<0.001			<0.001	0.001	0.003	5 of 7
Chromium	NA	NA	NA		NA	NA	**0.005**			NA			0.005	0.005	0.005	1 of 1
Copper	**0.057**	**0.180**	**0.170**		**0.064**	**0.075**	**0.051**			**0.071**			0.051	0.095	0.180	7 of 7
Lead	**0.098**	**0.290**	**0.140**		**0.085**	**0.091**	**0.062**			**0.063**			0.062	0.118	0.290	7 of 7
Mercury	**0.0003**	**0.0008**	**0.0003**		<0.0002	<0.0002	**0.0002**			**0.0002**			<0.0002	0.0003	0.0008	5 of 7
Molybdenum	NA	**0.023**	NA		NA	NA	<0.008			NA			0.023	0.014	0.023	1 of 2
Nickel	<0.012	<0.012	**0.016**		<0.012	**0.016**	<0.012			<0.012			<0.012	0.009	0.016	2 of 7
Zinc	**0.640**	**0.400**	**0.320**		**0.170**	**0.190**	**0.130**			**0.190**			0.130	0.291	0.640	7 of 7
Inorganics (mg/L)																
Cyanide	**0.008**	**0.079**	**0.032**		**0.018**	**0.005**	**0.013**			**0.08**			0.005	0.034	0.080	7 of 7
Phenol	NA	<0.006	<0.006		<0.005	0.005	<0.005			**0.012**			<0.005	0.005	0.012	2 of 6
Ammonia	**1.910**	**1.600**	**3.400**		**0.570**	**0.820**	**0.470**			**3.000**			0.470	1.681	3.400	7 of 7
Phosphorus	**1.110**	**0.910**	**1.100**		**0.990**	**1.000**	**0.760**			**1.100**			0.760	0.996	1.110	7 of 7
MBAS	**0.890**	NA	NA		NA	**1.600**	**0.550**			**0.880**			0.550	0.980	1.600	4 of 4
Pesticides/PCBs (ug/L)																
a-BHC	<0.05	<0.25	**0.018**		<0.05	<0.05	<0.05			<0.056			<0.05	0.010	0.018	1 of 7
b-BHC	<0.05	<0.25	**0.016**		<0.05	<0.05	<0.05			<0.056			<0.05	0.010	0.016	1 of 7
g-BHC	<0.05	<0.25	**0.032**		**0.03**	<0.05	<0.05			<0.056			<0.05	0.015	0.032	2 of 7
Heptachlor	<0.05	<0.25	<0.05		<0.05	<0.05	<0.05			**0.088**			<0.05	0.020	0.088	1 of 7
Endrin aldehyde	<0.10	<0.50	**0.039**		<0.10	<0.10	<0.10			<0.110			<0.05	0.020	0.039	1 of 7
Heptachlor epoxide	<0.05	<0.25	<0.05		<0.05	<0.05	<0.05			**0.16**			<0.05	0.030	0.160	1 of 7
Semi-volatile Organic Compounds (ug/L)																
2-methylnaphthalene	**2.0**	**2.0**	**1.0**		< 20.0	**3.0**	< 20.0			< 20.0			< 10.0	2.000	3.0	4 of 7
benzoic acid	**14.0**	**19.0**	**27.0**		**8.0**	**13.0**	**28.0**			**34.0**			8.0	20.429	34.0	7 of 7
bis(2-ethylhexl)phthalate	**4.0**	**120.0**	**7.0**		**6.0**	**29.0**	**15.0**			**20.0**			4.0	28.714	120.0	7 of 7
butylbenzylphthalate	< 10.0	< 20.0	**1.0**		**2.0**	< 20.0	< 20.0			**2.0**			< 10.0	1.714	2.0	3 of 7
chrysene	< 10.0	**2.0**	< 20.0		< 20.0	< 20.0	< 20.0			< 20.0			< 10.0	1.857	2.0	1 of 7
di-n-butylphthalate	**2.0**	< 20.0	**32.0**		**61.0**	**11.0**	< 20.0			**3.0**			< 10.0	16.143	61.0	5 of 7
di-n-octylphthalate	< 10.0	< 20.0	< 20.0		< 20.0	**4.0**	< 20.0			**3.0**			< 10.0	2.286	4.0	2 of 7
diethylphthalate	< 10.0	**2.0**	**2.0**		< 20.0	**2.0**	**3.0**			**3.0**			< 10.0	2.143	3.0	5 of 7
fluoranthene	< 10.0	**4.0**	**2.0**		< 20.0	**2.0**	< 20.0			**4.0**			< 10.0	2.429	4.0	4 of 7
fluorene	< 10.0	< 20.0	< 20.0		< 20.0	**2.0**	< 20.0			< 20.0			< 10.0	1.857	2.0	1 of 7
naphthalene	**1.0**	**2.0**	**2.0**		< 20.0	**7.0**	< 20.0			< 20.0			< 10.0	2.571	7.0	4 of 7
p-cresol	**7.0**	**21.0**	**25.0**		**4.0**	< 20.0	< 20.0			**6.0**			< 10.0	9.571	25.0	5 of 7
p-dichlorobenzene	< 10.0	< 20.0	< 20.0		< 20.0	**1.0**	< 20.0			< 20.0			< 10.0	1.714	1.0	1 of 7
phenanthrene	**1.0**	**4.0**	**2.0**		< 20.0	**4.0**	< 20.0			**3.0**			< 10.0	2.571	4.0	5 of 7
phenol	< 10.0	< 20.0	**3.0**		< 20.0	< 20.0	< 20.0			**3.0**			< 10.0	2.143	3.0	2 of 7
pyrene	< 10.0	**5.0**	**1.0**		< 20.0	< 20.0	< 20.0			**3.0**			< 10.0	2.286	5.0	3 of 7

NOTES:

NA Not analyzed

Bold numbers were detected values.

Appendix D Table D-4 Prison Point CSO Facility, Pollutant Loadings, Fiscal Year 1995

	LOADINGS (lb/d)												SUMMARY		
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN	AVE	MAX
Metals															
Cadmium	0.0773	0.3753	0.0399	N	0.1022	0.2370	0.1501	N	N	0.0019	N	N	0.0019	0.1406	0.3753
Chromium	NA	NA	NA	O	NA	NA	0.7506	O	O	NA	O	O	0.7506	0.7506	0.7506
Copper	4.407	22.518	6.791		13.082	8.888	7.656		S	1.380	S		1.380	9.246	22.518
Lead	7.577	36.279	5.593	A	17.375	10.785	9.307	A	A	1.224	A	A	1.224	12.591	36.279
Mercury	0.0232	0.1001	0.0120	C	0.0204	0.0119	0.0300	C	M	0.0039	M	C	0.0039	0.0288	0.1001
Molybdenum	NA	2.8773	NA	T	NA	NA	0.6005	T	P	NA	P	T	0.6005	1.7389	2.8773
Nickel	0.4639	0.7506	0.6392	I	1.2265	1.8962	0.9007	I	L	0.1166	L	I	0.1166	0.8562	1.8962
Zinc	49.4796	50.0400	12.7836	V	34.7503	22.5172	19.5156	V	E	3.6921	E	V	3.6921	27.5398	50.0400
				A				A	S		S	A			
Inorganics				T				T				T			
cyanide	0.6185	9.8829	1.2784	I	3.6794	0.5926	1.9516	I		1.5546		I	0.5926	2.7940	9.8829
phenol	NA	0.3753	0.1198	O	0.5110	0.5926	0.3753	O	T	0.2332	T	O	0.1198	0.3679	0.5926
Ammonia	147.666	200.160	135.825	N	116.516	97.179	70.556	N	A	58.297	A	N	58.297	118.028	200.160
Phosphorus	85.816	113.841	43.943	S	202.369	118.511	114.091	S	K	21.375	K	S	21.375	99.993	202.369
MBAS	68.808	NA	NA		NA	189.618	82.566		E	17.100	E		17.100	89.523	189.618
									N		N				
Pesticides/PCBs															
a-BHC	0.0004	0.0031	0.0007		0.0010	0.0006	0.0008			0.0001			0.0001	0.0010	0.0031
B-BHC	0.0004	0.0031	0.0006		0.0010	0.0006	0.0008			0.0001			0.0001	0.0009	0.0031
g-BHC	0.0004	0.0031	0.0013		0.0061	0.0006	0.0008			0.0001			0.0001	0.0018	0.0061
heptachlor	0.0004	0.0031	0.0002		0.0010	0.0006	0.0008			0.0017			0.0002	0.0011	0.0031
Endrin aldehyde	0.0008	0.0063	0.0016		0.0020	0.0012	0.0015			0.0002			0.0002	0.0019	0.0063
heptachlor epoxide	0.0004	0.0031	0.0002		0.0010	0.0006	0.0008			0.0031			0.0002	0.0013	0.0031
Semi-volatile Organic Compounds															
2-methylnaphthalene	0.1546	0.2502	0.0399		0.4088	0.3555	0.3002			0.0389			0.0389	0.2212	0.4088
benzoic acid	1.0824	2.3769	1.0786		1.6353	1.5406	4.2034			0.6607			0.6607	1.7968	4.2034
bis(2-ethylhexl)phthalate	0.3092	15.0120	0.2796		1.2265	3.4368	2.2518			0.3886			0.2796	3.2721	15.0120
butylbenzylphthalate	0.0773	0.2502	0.0399		0.4088	0.2370	0.3002			0.0389			0.0389	0.1932	0.4088
chrysene	0.0773	0.2502	0.0799		0.4088	0.2370	0.3002			0.0389			0.0389	0.1989	0.4088
di-n-butylphthalate	0.1546	0.2502	1.2784		12.4692	1.3036	0.3002			0.0583			0.0583	2.2592	12.4692
di-n-octylphthalate	0.0773	0.2502	0.0799		0.4088	0.4740	0.3002			0.0583			0.0583	0.2355	0.4740
diethylphthalate	0.0773	0.2502	0.0799		0.4088	0.2370	0.4504			0.0583			0.0583	0.2231	0.4504
fluoranthene	0.0773	0.5004	0.0799		0.4088	0.2370	0.3002			0.0777			0.0773	0.2402	0.5004
fluorene	0.0773	0.2502	0.0799		0.4088	0.2370	0.3002			0.0389			0.0389	0.1989	0.4088
naphthalene	0.0773	0.2502	0.0799		0.4088	0.8296	0.3002			0.0389			0.0389	0.2836	0.8296
p-cresol	0.5412	2.6271	0.9987		0.8177	0.2370	0.3002			0.1166			0.1166	0.8055	2.6271
p-dichloobenzene	0.0773	0.2502	0.0799		0.4088	0.1185	0.3002			0.0389			0.0389	0.1820	0.4088
phenanthrene	0.0773	0.5004	0.0799		0.4088	0.4740	0.3002			0.0583			0.0583	0.2713	0.5004
phenol	0.0773	0.2502	0.1198		0.4088	0.2370	0.3002			0.0583			0.0583	0.2074	0.4088
pyrene	0.0773	0.6255	0.0399		0.4088	0.2370	0.3002			0.0583			0.0399	0.2496	0.6255
Flow (MGD)	9.2700	15	4.79		24.51	14.21	18			2.33					

Notes:
NA Not Analyzed
Bold numbers indicate loadings calculated from detected values.
Unbolded numbers indicate monthly loadings estimated by substituting half the method detection limit for those that were below detection.

Appendix E

Appendix E Table E-1 Somerville Marginal CSO Facility Operations Summary, Fiscal Year 1995

DATE	RAINFALL (INCHES)	DISCHARGE DURATION (HOURS)	TOTAL FLOW (MG)	PH (SU)	BOD INFLUENT (MG/L)	BOD EFFLUENT (MG/L)	TSS INFLUENT (MG/L)	TSS EFFLUENT (MG/L)	SETTL. SOLIDS (MG/L)	FECAL COLIFORM GEO MEAN	CHLORINE RESIDUAL (MG/L)
JULY											
25*	0.08	4.00	1.625	6.05	40	39	242	222	1.2	10	3.0
27*	0.10	5.00	0.250	7.51	84	14	64	37	< 0.4	< 10	3.0
28	0.82	2.00	1.191	6.62	**	**	98	140	< 1.6	490	4.0
AUGUST											
13	1.13	2.50	1.361	6.64	> 374	18	164	118	< 2.0	< 10	3.0
18	2.37	8.90	2.285	6.93	< 44	< 18	74	80	< 2.0	10	4.0
21*	0.78	4.50	0.500	7.63	< 27	< 18	19	22	0.4	< 10	4.0
22	1.40	9.50	1.552	6.85	< 19	< 16	38	29	< 2.0	< 10	3.0
SEPTEMBER											
17*	0.50	3.00	0.500	6.91	36	52	113	175	4.0	< 10	3.0
18*	0.33	5.50	1.000	7.02	< 29	< 17	13	13	< 0.4	10	2.5
23***	2.64	15.50	14.260	9.25	< 26	< 15	56	18	< 0.4	< 10	4.0
				7.07	< 16	16	27	20	< 0.4	10	
27	0.13	8.00	0.158	7.71	39	15	98	68	0.4	20	4.0
NOVEMBER											
18	1.33	9.50	3.326	6.76	> 140	> 105	640	266	6.0	115000	2.5
22*	0.66	6.75	0.300	8.48	28	12	50	72	< 0.4	< 10	4.0
28	1.17	8.50	1.718	6.87	14	21	27	36	< 0.4	170	3.0
DECEMBER											
5	1.42	9.75	3.327	7.57	33	27	41	53	0.8	< 10	4.0
10	0.30	11.50	0.994	6.47	24	57	50	37	< 0.4	10	3.0
23*	0.94	13.00	2.000	6.90	18	45	22	60	1.2	< 10	4.0
JANUARY											
1	1.07	9.50	1.005	7.17	11	9	32	31	< 0.40	< 10	2.8
2*	0.44	8.75	1.000	6.96	< 9	12	30	38	< 0.40	10	3.7
7	0.49	2.75	0.658	7.04	23	15	39	28	< 0.40	800	2.5
20*	1.2	5.00	3.125	6.88	39	244	35	260	1.6	10	2.5
FEBRUARY											
16	0.24	3.50	0.398	6.99	< 30	< 30	140	170	0.4	510	2.8
28	0.84	5.00	0.728	6.42	61	26	230	368	1.2	< 10	2.5

DATE	RAINFALL (INCHES)	DISCHARGE DURATION (HOURS)	TOTAL FLOW (MG)	PH (SU)	BOD INFLUENT (MG/L)	BOD EFFLUENT (MG/L)	TSS INFLUENT (MG/L)	TSS EFFLUENT (MG/L)	SETTL. SOLIDS (MG/L)	FECAL COLIFORM GEO MEAN	CHLORINE RESIDUAL (MG/L)
MARCH											
9	0.82	10.50	0.239	7.34	< 31	< 23	51	53	< 0.2	< 10	3.0
17*	0.61	7.25	1.500	6.72	32	< 12	70	93	< 0.2	< 10	2.8
APRIL											
13	0.49	2.00	1.694	7.62	< 18	< 22	22	42	< 0.4	< 10	2.9
19	0.55	3.25	0.655	7.24	44	56	128	168	2.4	60	3.7
MAY											
11	0.48	8.00	1.750	7.27	73	42	202	92	4.8	< 10	3.7
TOTAL		**184.90**	**49.10**								
AVERAGE		**6.99**	**1.754**		**48**	**33**	**92**	**94**	**1.1**	**25**	**3.2**
MINIMUM	**0.08**	**2.00**	**0.158**	**6.05**	**11**	**9**	**13**	**13**	**< 0.2**	**< 10**	**2.5**
MAXIMUM	**2.64**	**15.50**	**14.260**	**9.25**	**84**	**244**	**640**	**368**	**6.0**	**115000**	**4.0**
NO. of ACTIVATIONS		**28**									

* Totalizer registering negative flow, flow were estimated based on hypochlorite used.

** Sample holding time exceeded, sample discarded.

**** Two sets of samples taken

Appendix E Table E-2 Somerville Marginal CSO BOD and TSS Loadings, Fiscal Year 1995

DATE	Total Flow (MG)	Biochemical Oxygen Demand Influent (lbs/d)	Biochemical Oxygen Demand Effluent (lbs/d)	Biochemical Oxygen Demand Removal (%)	Total Suspended Solids Influent (lbs/d)	Total Suspended Solids Effluent (lbs/d)	Total Suspended Solids Removal (%)
JULY							
25*	1.63	542	526	3	3280	3009	8
27*	0.25	174	29	83	133	77	42
28	1.19	**	**	**	973	1391	-43
AUGUST							
13	1.36	4245	200	95	1862	1339	28
18	2.29	839	343	59	1410	1525	-8
21*	0.50	113	75	33	79	92	-16
22	1.55	246	207	16	492	375	24
SEPTEMBER							
17*	0.50	152	218	-44	471	730	-55
18*	1.00	242	142	41	108	108	0
23***	14.26	2497	1843	26	4995	2260	55
27	0.16	52	20	61	129	90	31
NOVEMBER							
19	3.33	3883	2913	25	17753	7379	58
22*	0.30	70	30	58	125	180	-44
28	1.72	201	301	-50	387	516	-33
DECEMBER							
5	3.33	924	755	18	1138	1462	-29
10	0.99	202	473	-134	414	307	26
23*	2.00	307	751	-145	367	1001	-173
JANUARY							
1	1.01	95	74	21	268	260	3
2*	1.00	75	98	-31	246	317	-29
7	0.66	123	84	32	214	154	28
20*	3.13	1016	6359	-526	907	6776	-647
FEBRUARY							
16	0.40	100	100	0	465	564	-21
28	0.73	373	155	58	1396	2234	-60
MARCH							
9	0.24	62	46	26	102	106	-4
17*	1.50	395	150	62	876	1163	-33

DATE	Total Flow (MG)	Biochemical Oxygen Demand Influent (lbs/d)	Biochemical Oxygen Demand Effluent (lbs/d)	Biochemical Oxygen Demand Removal (%)	Total Suspended Solids Influent (lbs/d)	Total Suspended Solids Effluent (lbs/d)	Total Suspended Solids Removal (%)
APRIL							
13	1.69	254	311	-22	311	593	-91
19	0.66	242	304	-26	699	918	-31
MAY							
11	1.75	1063	607	43	2948	1343	54
TOTAL	49.10						
AVERAGE	1.75	685	634	-8	1520	1295	-34
MINIMUM	0.16	52	20	-526	79	77	-647
MAXIMUM	14.26	4245	6359	95	17753	7379	58
NO. of ACTIVATIONS	28.00						

NOTES:

* Flow estimated based on chlorine usage

** Sample bottles broken, no analyses conducted

*** Average of two samples taken during the duration of the activation.

Appendix E Table E-3 Somerville Marginal Facility, Effluent Characterization, Fiscal Year 1995

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	SUMMARY MIN	AVE	MAX	TIMES DETECTED
Metals (mg/L)																
Cadmium	<0.001	**0.001**	**0.002**	N	<0.001	**0.001**	<0.001	**0.001**	N	N	N	N	<0.001	0.001	0.002	4 of 7
Copper	**0.040**	**0.061**	**0.100**	O	**0.051**	**0.092**	**0.031**	**0.080**	O	O	O	O	0.031	0.065	0.100	7 of 7
Lead	**0.098**	**0.110**	**0.170**		**0.060**	**0.120**	**0.054**	**0.140**					0.054	0.107	0.170	7 of 7
Mercury	**0.0002**	<0.0002	<0.0002	A	<0.0002	<0.0002	<0.0002	**0.0002**	S	S	S	A	<.0002	0.0001	0.0002	2 of 7
Nickel	**0.016**	<0.012	**0.018**	C	<0.012	**0.029**	<0.012	**0.022**	A	A	A	C	<0.012	0.015	0.029	4 of 7
Zinc	**0.150**	**0.240**	**0.380**	T	**0.150**	**0.300**	**0.130**	**0.390**	M	M	M	T	0.130	0.249	0.390	7 of 7
				I					P	P	P	I				
Inorganics (mg/L)				V					L	L	L	V				
Cyanide	**0.048**	<0.005	**0.044**	A	<0.005	**0.041**	**0.011**	**0.095**	E	E	E	A	<0.005	0.035	0.095	5 of 7
Total phenols	<0.006	<0.006	<0.006	T	<0.005	<0.005	<0.005	**0.026**	S	S	S	T	<0.005	0.006	0.026	1 of 7
Ammonia	**0.11**	**0.17**	**1.80**	I	**0.27**	**0.24**	**0.16**	**1.30**				I	0.11	0.58	1.80	7 of 7
Phosphorus	**0.84**	**0.56**	**1.10**	O	**1.10**	**1.00**	**0.32**	**0.79**	T	T	T	O	0.32	0.82	1.10	7 of 7
MBAS	**0.86**	NA	NA	N	NA	**1.40**	**0.71**	**0.52**	A	A	A	N	0.52	0.87	1.40	4 of 7
				S					K	K	K	S				
Pesticides/PCBs (ug/L)									E	E	E					
4,4'-DDT	<0.10	<0.50	<0.10		**0.110**	<0.10	<0.10	<0.110	N	N	N		<0.100	0.030	0.110	1 of 7
a-BHC	<0.05	<0.25	**0.037**		<0.05	<0.05	<0.051	<0.055					<0.050	0.013	0.037	1 of 7
g-BHC	<0.05	<0.25	**0.050**		<0.05	<0.05	<0.051	<0.055					<0.050	0.014	0.050	1 of 7
d-BHC	<0.05	<0.25	**0.012**		<0.05	<0.05	<0.051	<0.055					<0.050	0.009	0.012	1 of 7
b-BHC	<0.05	<0.25	**0.029**		<0.05	<0.05	**0.049**	**0.073**					<0.050	0.027	0.073	3 of 7
Endosulfan I	<0.05	<0.25	<0.05		<0.05	<0.05	**0.091**	**0.054**					<0.050	0.027	0.091	2 of 7
Endosulfan II	<0.10	<0.50	<0.10		**0.079**	<0.10	<0.10	<0.110					<0.100	0.026	0.079	1 of 7
Heptachlor epoxide	<0.05	<0.25	<0.05		<0.05	<0.05	<0.051	**0.150**					<0.050	0.029	0.150	1 of 7
Semi-volatile Organic Compounds (ug/L)																
Benzoic acid	**28**	**33**	**17**		**43**	**9**	**26**	**6**					6.00	23.14	43.00	7 of 7
Bis(2-ethylhexl)phthalate	**4**	**11**	**7**		**15**	**8**	**79**	**11**					4.00	19.29	79.00	7 of 7
Butylbenzylphthalate	<10	<20	**1**		<100	<20	<21	**2**					<10.00	2.87	2.00	2 of 7
Chrysene	<10	<20	**1**		<100	<20	<21	<21					<10.00	2.89	1.00	1 of 7
Di-n-butylphthalate	**1**	**1**	**19**		**81**	<20	<21	**5**					0.60	15.81	81.00	5 of 7
Diethylphthalate	<10	**3**	<20		<100	<20	<21	**5**					3.00	3.59	5.00	2 of 7
Fluoranthene	**1**	<20	**3**		<100	<20	**2**	<20					1.00	3.14	3.00	3 of 7
Hexachloroethane	<10	**45**	<20		<100	<20	<21	<20					<10.00	9.16	45.00	1 of 7
p-cresol	<10	<20	**4**		<100	<20	**6**	**17**					4.00	6.00	17.00	3 of 7
Phenanthrene	<10	<20	**2**		<100	<20	<21	<21					2.00	3.03	2.00	1 of 7
Pyrene	<10	<20	**2**		<100	<20	<21	<20					2.00	3.01	2.00	1 of 7

Notes:
NA Not analyzed.
Bold numbers were detected values.
Average concentrations were calculated by substituting half the method detection limit for those that were below detection.

Appendix E Table E-4 Somerville Marginal CSO Facility Effluent Loadings, Fiscal Year 1995

	LOADINGS (lbs/d)											SUMMARY		
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN	AVE	MAX
Metals															
Cadmium	0.0050	**0.0114**	**0.0077**	N	0.0139	**0.1185**	0.0042	**0.0033**	N	N	N	N	<0.001	0.023	0.119
Copper	**0.3973**	**0.6924**	**0.3861**	O	**1.4147**	**10.9046**	**0.2598**	**0.2655**	O	O	O	O	0.260	2.046	10.905
Lead	**0.9734**	**1.2486**	**0.6564**		**1.6643**	**14.2234**	**0.4526**	**0.4647**					0.453	2.812	14.223
Mercury	**0.0020**	0.0011	0.0004	A	0.0028	0.0119	0.0008	**0.0007**	S	S	S	A	<.0002	0.003	0.0119
Nickel	**0.1589**	0.0681	**0.0695**	C	0.1664	**0.0290**	0.0503	**0.0730**	A	A	A	C	<0.012	0.088	0.166
Zinc	**1.4899**	**2.7242**	**1.4673**	T	**4.1608**	**35.5584**	**1.0896**	**1.2945**	M	M	M	T	1.090	6.826	35.558
				I					P	P	P	I			
Inorganics				V					L	L	L	V			
Cyanide	**0.4768**	0.0284	**0.1699**	A	0.0693	**4.8597**	**0.0922**	**0.3153**	E	E	E	A	<0.005	0.859	4.860
Total phenols	0.0298	0.0341	0.0116	T	0.0693	**0.2963**	0.0210	**0.0863**	S	S	S	T	<0.005	0.078	0.296
Ammonia	**1.09**	**1.93**	**6.95**	I	**7.49**	**28.45**	**1.34**	**4.32**				I	1.09	7.366	28.45
Phosphorus	**8.34**	**6.36**	**4.25**	O	**30.51**	**118.53**	**2.68**	**2.62**	T	T	T	O	2.62	24.756	118.53
MBAS	**8.54**	NA	NA	N	NA	**165.94**	**5.95**	**1.73**	A	A	A	N	1.73	45.540	165.94
				S					K	K	K	S			
Pesticides/PCBs									E	E	E				
4,4'-DDT	0.00010	0.00057	0.00004		**0.00305**	0.00119	0.00008	0.00004	N	N	N		<0.100	0.0007	0.0031
a-BHC	0.00005	0.00028	**0.00014**		0.00014	0.00059	0.00004	0.00002					<0.050	0.0002	0.0006
g-BHC	0.00005	0.00028	**0.00019**		0.00014	0.00059	0.00004	0.00002					<0.050	0.0002	0.0006
d-BHC	0.00005	0.00028	**0.00005**		0.00014	0.00059	0.00004	0.00002					<0.050	0.0002	0.0006
b-BHC	0.00005	0.00028	**0.00011**		0.00014	0.00059	**0.00041**	**0.00024**					<0.050	0.0003	0.0006
Endosulfan I	0.00005	0.00028	0.00002		0.00014	0.00059	**0.00076**	**0.00018**					<0.050	0.0003	0.0008
Endosulfan II	0.00010	0.00057	0.00004		**0.00219**	0.00119	0.00008	0.00004					<0.100	0.0006	0.0022
Heptachlor epoxide	0.00005	0.00028	0.00002		0.00014	0.00059	0.00004	**0.00050**					<0.050	0.0002	0.0006
Semi-volatile Organic Compounds															
Benzoic acid	**0.2781**	**0.3746**	**0.0656**		**1.1928**	**1.0668**	**0.2179**	**0.0199**					0.02	0.459	1.19
Bis(2-ethylhexl)phthalate	**0.0397**	**0.1249**	**0.0270**		**0.4161**	**0.9482**	**0.6622**	**0.0365**					0.03	0.322	0.95
Butylbenzylphthalate	9.9329	0.0227	**0.0039**		0.2774	0.2371	0.0176	**0.0066**					<10.00	1.500	9.93
Chrysene	9.9329	0.0227	**0.0039**		0.2774	0.2371	0.0176	0.0070					<10.00	1.500	9.93
Di-n-butylphthalate	**0.0099**	**0.0068**	**0.0734**		**2.2468**	0.2371	0.0176	**0.0166**					0.01	0.373	2.25
Diethylphthalate	9.9329	**0.0341**	0.0077		0.2774	0.2371	0.0176	**0.0166**					0.01	1.503	9.93
Fluoranthene	**0.0099**	0.0227	**0.0116**		0.2774	0.2371	**0.0168**	0.0066					0.01	0.083	0.28
Hexachloroethane	0.0099	**0.5108**	0.0077		0.2774	0.2371	0.0176	0.0066					<10.00	0.152	0.51
p-cresol	0.0099	0.0227	**0.0154**		0.2774	0.2371	**0.0503**	**0.0564**					0.01	0.096	0.28
Phenanthrene	0.0099	0.0227	**0.0077**		0.2774	0.2371	0.0176	0.0070					0.01	0.083	0.28
Pyrene	0.0099	0.0227	**0.0077**		0.2774	0.2371	0.0176	0.0066					0.01	0.083	0.28

Notes:

Bold numbers indicate loadings calculated from detected values.

Unbolded numbers indicate monthly loadings calculated by substituting half the method detection limit for those that were below detection.

Appendix F

Appendix F Table F-1 Constitution Beach CSO Facility Operations Summary, Fiscal Year 1995

DATE	RAINFALL (INCHES)	DISCHARGE DURATION (HOURS)	TOTAL FLOW (MG)	PH (SU)	BOD INFLUENT (MG/L)	BOD EFFLUENT (MG/L)	TSS INFLUENT (MG/L)	TSS EFFLUENT (MG/L)	SETTL. SOLIDS (MG/L)	FECAL COLIFORM GEO MEAN	CHLORINE RESIDUAL (MG/L)
AUGUST											
18	2.37	5.75	0.200	7.74	< 30	< 18	84	63	< 2.0	20	3.0
22	1.40	6.80	0.601	6.95	42	< 16	15	18	< 2.0	< 10	3.0
SEPTEMBER											
23	2.64	13.00	0.946	9.87	17	14	52	54	1.2	< 10	3.0
NOVEMBER											
18	1.33	5.00	0.514	6.83	43	11	90	42	< 0.4	70	4.0
22	0.66	3.50	0.269	8.93	< 17	< 12	140	134	0.4	< 10	3.0
28	1.17	2.50	0.739	6.85	32	22	30	28	< 0.4	1000	2.5
DECEMBER											
11	0.30	3.50	1.295	6.87	16	< 11	44	31	< 0.4	840	2.5
23	0.94	6.50	0.856	6.87	< 8	5	36	20	< 0.4	< 10	3.0
JANUARY											
1	1.07	2.00	0.895	6.73	18	11	15	< 0.40	< 0.40	< 10	3.0
MARCH											
17	0.61	9.00	0.016	7.12	16	14	27	69	< 0.2	< 10	2.5
21	0.23	0.75	0.008	7.26	24	23	131	76	< 0.4	< 10	3.0
APRIL											
19	0.55	1.25	0.465	7.49	18	< 12	42	62	< 0.1	< 10	4.0
TOTAL		**46.55**	**6.804**								
AVERAGE		**5.82**	**0.567**		**23**	**14**	**61**	**49**	**0.7**	**26**	**3.0**
MINIMUM	**0.30**	**2.50**	**0.200**	**6.83**	**< 8**	**< 11**	**15**	**< 0.4**	**<0.4**	**<10**	**2.5**
MAXIMUM	**2.64**	**13.00**	**1.295**	**9.87**	**43**	**22**	**140**	**134**	**1.2**	**1000**	**4.0**
NO. of ACTIVATIONS		**12**									

*** No flow records, flow estimated based on chlorine usage.**

Appendix F Table F-2 Constitution Beach CSO BOD and TSS Loadings, Fiscal Year 1995

DATE	Total Flow (MG)	Biochemical Oxygen Demand Influent (lbs/d)	Biochemical Oxygen Demand Effluent (lbs/d)	Biochemical Oxygen Demand Removal (%)	Total Suspended Solids Influent (lbs/d)	Total Suspended Solids Effluent (lbs/d)	Total Suspended Solids Removal (%)
AUGUST							
18	0.200	50	30	40	140	105	25
22	0.601	208	80	61	75	90	-20
SEPTEMBER							
23	0.946	136	110	20	410	426	-4
NOVEMBER							
18	0.514	183	47	74	386	180	53
22	0.269	38	27	29	314	301	4
28	0.739	199	137	31	185	173	7
DECEMBER							
11	1.295	167	119	29	475	335	30
23	0.856	57	32	44	257	143	44
JANUARY							
1	0.895	132	83	37	110	3	97
MARCH							
17	0.016	2	2	14	4	9	-156
21	0.008	2	2	5	9	5	42
APRIL							
19	0.465	69	47	33	163	240	-48
TOTAL	**6.804**						
AVERAGE	**0.567**	**104**	**60**	**35**	**211**	**167**	**6**
MINIMUM	**0.008**	**2**	**2**	**5**	**4**	**3**	**-156**
MAXIMUM	**1.295**	**208**	**137**	**74**	**475**	**426**	**97**
NO. of ACTIVATIONS	**12**						

Appendix G

Appendix G Table G-1 Fox Point CSO Facility Operations Summary, Fiscal Year 1995

DATE	RAINFALL (INCHES)	DISCHARGE DURATION (HOURS)	TOTAL FLOW (MG)	PH (SU)	BOD INFLUENT (MG/L)	BOD EFFLUENT (MG/L)	TSS INFLUENT (MG/L)	TSS EFFLUENT (MG/L)	SETTL. SOLIDS (MG/L)	FECAL COLIFORM (#/100mL)	CHLORINE RESIDUAL (MG/L)
AUGUST											
22	1.40	7.75	6.8	7.26	22	32	74	662	6.0	10	3.00
SEPTEMBER											
23	2.64	9.50	9.7	6.90	23	19	83	20	0.4	< 10	3.00
DECEMBER											
5*	1.42	4.00	6.0	6.96	96	63	284	191	4.0	50	4.00
JANUARY											
20*	1.2	1.00	1.5	6.79	58	53	154	142	2	< 10	2.83
TOTAL		**22.25**	**24.0**								
AVERAGE		**5.56**	**6.0**		**50**	**42**	**149**	**254**	**3.1**	**15**	**3.4**
MINIMUM	**1.20**	**1.00**	**1.5**	**6.79**	**22**	**19**	**74**	**20**	**0.4**	**< 10**	**2.8**
MAXIMUM	**2.64**	**9.50**	**9.7**	**7.26**	**96**	**63**	**284**	**662**	**6.0**	**50**	**4.0**
NO. of ACTIVATIONS		**4**									

* Flow meter malfunction, flow estimated based on chlorine usage.

Appendix G Table G-2 Fox Point CSO Facility BOD and TSS Loadings, Fiscal Year 1995

DATE	Total Flow (MG)	Biochemical Oxygen Demand Influent (lbs/d)	Biochemical Oxygen Demand Effluent (lbs/d)	Biochemical Oxygen Demand Removal (%)	Total Suspended Solids Influent (lbs/d)	Total Suspended Solids Effluent (lbs/d)	Total Suspended Solids Removal (%)
AUGUST 22	6.8	1210	1796	-48	4166	37267	-795
SEPTEMBER 23	9.7	1877	1569	16	6715	1618	76
DECEMBER 5	6.0	4814	3133	35	14211	9558	33
JANUARY 20	1.5	727	657	10	1927	1776	8
TOTAL	**24.0**						
AVERAGE	**6.0**	**2157**	**1789**	**3**	**6755**	**12555**	**-170**
MINIMUM	**1.5**	**727**	**657**	**-48**	**1927**	**1618**	**-795**
MAXIMUM	**9.7**	**4814**	**3133**	**35**	**14211**	**37267**	**76**
NO. of ACTIVATIONS	**4**						

Appendix H

Appendix H Table H-1 Commercial Point CSO Facility Operations Summary, Fiscal Year 1995

DATE	RAINFALL (INCHES)	DISCHARGE DURATION (HOURS)	TOTAL FLOW (MG)	PH (SU)	BOD INFLUENT (MG/L)	BOD EFFLUENT (MG/L)	TSS INFLUENT (MG/L)	TSS EFFLUENT (MG/L)	SETTL. SOLIDS (MG/L)	FECAL COLIFORM GEO MEAN	CHLORINE RESIDUAL (MG/L)
JULY											
28	0.82	1.75	0.240	6.76	*	*	92	81	< 1.6	1220	3.0
AUGUST											
13	1.13	2.50	2.500	7.49	48.4	14.3	184	116	< 2.0	< 10	3.0
18	2.37	3.50	1.220	6.68	< 30	< 10.8	64	47	< 0.4	10	3.0
19	0.29	1.25	0.150	6.83	29.1	< 23.6	114	88	1.2	91000	2.5
22	1.40	8.50	6.120	6.82	< 31.6	20.9	54	119	6.0	< 10	2.0
SEPTEMBER											
23	2.64	13.50	16.700	7.28	148	98.0	334	1482	9.2	6200	3.0
NOVEMBER											
19	0.59	7.50	3.390	7.12	41.6	> 26	46	40	< 2.0	< 10	3.0
22	0.66	2.50	1.950	7.70	< 50	< 30	132	196	< 0.4	< 10	4.0
28	1.17	7.25	4.190	6.57	54.7	44.6	100	104	2.0	3000	4.0
DECEMBER											
5	1.42	5.50	2.930	6.99	31.2	43.1	95	131	4.0	50	3.0
11	0.30	3.50	1.060	7.67	< 18.1	< 13.6	22	23	< 0.4	< 10	3.0
23	0.94	3.50	0.820	6.81	27.7	15.9	54	71	2.8	< 10	
24	1.33	8.50	1.990	7.84	*	< 8.43	10	10	< 0.4	< 10	2.5
JANUARY											
20	1.20	4.00	10.080	6.85	58.3	19.6	504	102	0.4	10	2.7
FEBRUARY											
28	0.84	3.50	0.710	6.63	19.3	15.2	70	154	0.4	< 10	4.0
MARCH											
9	0.82	4.00	0.870	7.20	*	> 140	137	6300	0.4	3600	3.7
17	0.61	6.50	0.220	7.90	20.7	16.5	54	41	< 0.2	< 10	4.0
APRIL											
4	0.07	2.50	0.250	7.80	84.5	70	550	131	0.4	10	3.7
19	0.55	3.75	0.500	7.11	45.4	39.4	124	152	< 0.4	90	3.0
TOTAL		**93.50**	**55.89**								
AVERAGE		**4.92**	**2.942**		**39.00**	**34.2**	**144.21**	**494.11**	**1.8**	**66**	**3.2**
MINIMUM	**0.07**	**1.25**	**0.150**	**6.57**	**< 18.1**	**< 10.8**	**10.00**	**10.00**	**< 0.2**	**< 10**	**2.0**
MAXIMUM	**2.64**	**13.50**	**16.700**	**7.90**	**148.00**	**98.0**	**550.00**	**6300.00**	**9.2**	**91000**	**4.0**
NO. of ACTIVATIONS		**19**									

* Sample holding time exceeded, sample not analyzed

Appendix H Table H-2 Commercial Point CSO BOD and TSS Loadings, Fiscal Year 1995

DATE	Total Flow (MG)	Biochemical Oxygen Demand Influent (lbs/d)	Biochemical Oxygen Demand Effluent (lbs/d)	Biochemical Oxygen Demand Removal (%)	Total Suspended Solids Influent (lbs/d)	Total Suspended Solids Effluent (lbs/d)	Total Suspended Solids Removal (%)
JULY							
28	0.240	*	*	*	184	162	12
AUGUST							
13	2.500	1009	298	70	3836	2419	37
18	1.220	305	110	64	651	478	27
19	0.150	36	30	19	143	110	23
22	6.120	1613	1067	34	2756	6074	-120
SEPTEMBER							
23	16.700	20613	13649	34	46519	206410	-344
NOVEMBER							
19	3.390	1176	735	38	1301	1131	13
22	1.950	813	488	40	2147	3188	-48
28	4.190	1911	1559	18	3494	3634	-4
DECEMBER							
5	2.930	762	1053	-38	2321	3201	-38
11	1.060	160	120	25	194	203	-5
23	0.820	189	109	43	369	485	-31
24	1.990	*	140	*	166	166	0
JANUARY							
20	10.080	4901	1648	66	42370	8575	80
FEBRUARY							
28	0.710	114	90	21	414	912	-120
MARCH							
9	0.870	*	1016	*	994	45712	-4499
17	0.220	38	30	20	99	75	24
APRIL							
4	0.500	352	293	17	2294	546	76
19	0.250	95	82	13	259	317	-23
TOTAL	**55.890**						
AVERAGE	**2.942**	**2131**	**1251**	**30**	**5816**	**14937**	**-260**
MINIMUM	**0.150**	**36**	**30**	**-38**	**99**	**75**	**-4499**
MAXIMUM	**16.700**	**20613**	**13649**	**70**	**46519**	**206410**	**80**
NO. of ACTIVATIONS	**19**						

* Sample holding time exceeded, sample not analyzed

Appendix I

Appendix I Instrument Detection Limits, Method Detection Limits, and Quantitation Limits- A Brief Description

An understanding of the detection limits of analysis is essential to reviewing the data from chemical analyses. There are three different types of detection limits that are most often encountered:

- **Instrument Detection Limits**
- **Method Detection Limits**
- **Quantitation Limits**, also known as **Reporting Limits.**

Instrument detection limits (IDL) reflect only the capability of the Gas Chromatograph (GC), or any other instrument, used to conduct the analysis. This will be the lowest of the three detection limits. The IDL will not take into account the losses of the pollutant associated with the matrix (soil or wastewater) and extraction procedure. This discrepancy is known as matrix interference.

Method detection limits (MDL) are the smallest amount of a substance that can be detected above background noise by following a particular method. The MDL is statistically determined by running a series of analyses using various low concentrations of a pollutant. Using a Student's "T" test, the smallest concentration that has a 99% probability of being detected above the background is designated the MDL for that pollutant. The EPA, using several private laboratories, has determined what the MDLs are for most priority pollutants using their detailed methods. These are published in the 40 CFR and some are listed in Appendix J, Table J-1 of this report.

In general, if a plot is made of pollutant concentration versus instrument response, it will generate a linear relationship. As the pollutant concentration approaches zero, the linearity of the relationship is lost. At the point where the linearity is lost is the **Quantitation Limit (QL)** or sometimes the **Reporting Limit**. In other words, the smallest concentration where the linear relationship holds is the smallest concentration that can be quantified. Generally, the QL can be thought of as about five times the MDL. Quantitative limits only come into play on GC/MS analyses, that is, methods 608, 624, and 625. Specific limits are highly matrix dependent.

The EPA has developed **Contract Required Quantitation Limits (CRQL)**, which serve as a guideline for selecting contract laboratories to perform analyses. Some CRQLs are listed in Appendix J, Table J-1 of this report.

In short, the IDL is the lowest concentration that a particular instrument can detect. The MDL is the lowest concentration that can be detected using a particular method. The QL is the smallest concentration that can be confidently considered to be accurate.

Reported concentrations that are between the MDL and the QL indicate that a pollutant is present, but at a concentration too low to be accurately quantified. For example, using EPA method 624, chloroform has a MDL of 1.6 and a QL of 10 ug/L. If the concentration from an analysis is reported as 5 ug/L then what can be inferred is "A very low concentration of chloroform was detected. We are not sure what the concentration present in the wastewater really is, but our best guess is 5 ug/L." The EPA requires that these intermediate values be flagged with a "J" on any reports submitted to them. Therefore, these are sometimes simply called "J-values."

For non-detects in analyses of metals, cyanide, petroleum hydrocarbons, etc., it is customary for "less than the MDL" to be listed as a result. For a non-detect in the 608, 624, and 625 analyses "less than the QL" is typically listed.

Often it becomes necessary to estimate a concentration for below detection limit values, specifically when calculating the average yearly concentration of a pollutant. A well established method is to assume the actual concentration of a non-detected pollutant is simply one half of the MDL. While no scientific theory supports this assumption, it is more reasonable than either assuming the concentration is zero, or the MDL itself. It is also accepted by the EPA and DEP as a standard practice that can be applied to any series of tests.

This technique is utilized in this report. For all metals, cyanide, petroleum hydrocarbons, etc., half the MDL was assumed for all non-detects (i.e. values below MDL). For the 608, 624, and 625 analyses, 1/2 the MDL, which is the same as 1/10 the QL, was assumed for all non-detects (i.e. values below QL).

In Appendix J, Table J-1 is a list of the parameters regularly tested for in the MWRA 's effluent. The required EPA method is referenced by its number and the recommended EPA detection limit is given. The CRQL is also provided when applicable. These limits are then compared to the detection levels normally attained by the contract laboratory analyzing MWRA effluent.

Appendix J

Appendix J Appendix J-1 List of Parameters Tested
(Influent and Effluent)*

	EPA Method Number	EPA MDL	CRQL	Contract Lab MDL	Contract Lab QL
METALS					
Antimony	204.2	3.0	NA	5.0	NA
Arsenic	206.2	1.0	NA	2.0	NA
Beryllium	200.7	0.3	NA	1.0	NA
Cadmium	213.2	0.1	NA	1.0	NA
Chromium	218.2	1.0	NA	5.0	NA
Copper	200.7	6.0	NA	4.0	NA
Lead	239.2	1.0	NA	1.5	NA
Mercury	245.1	0.2	NA	0.2	NA
Nickel	200.7	15.0	NA	12.0	NA
Selenium	270.2	2.0	NA	2.0	NA
Thallium	279.2	1.0	NA	2.0	NA
Zinc	200.7	2.0	NA	10.0	NA
Boron	200.7	5.0	NA	30.0	NA
Molybdenum	246.2	1.0	NA	8.0	NA
Silver	272.2	0.2	NA	3.0	NA
OTHER INORGANIC CHEMICALS					
Cyanide	335.2	20.0	NA	10.0	NA
Hexavalent Chromium	307 B	10.0	NA	5.0	NA
Oil & Grease (mg/L)	413.1	5.0	NA	5.0	NA
Petroleum Hydrocarbons (mg/L)		1.0	NA	1.0	NA
Surfactants (mg/L)		25.0	NA	25.0	NA
PESTICIDES	608			NA	
alpha-BHC		0.003	0.05		0.05
beta-BHC		0.006	0.05		0.05
delta-BHC		0.009	0.05		0.05
gamma-BHC (Lindane)		0.004	0.05		0.05
Heptachlor		0.003	0.05		0.05
Aldrin		0.004	0.05		0.05
Heptachlor epoxide		0.083	0.05		0.05
Endosulfan I		0.014	0.05		0.05
Endrin aldehyde		0.023	0.10		0.10
Dieldrin		0.002	0.10		0.10
4,4'-DDE		0.004	0.10		0.10
Endrin		0.006	0.10		0.10
Endosulfan II		0.004	0.10		0.10
4,4'-DDD		0.011	0.10		0.10
Endosulfan sulfate		0.066	0.10		0.10
4,4'-DDT		0.012	0.10		0.10
Methoxychlor			0.50		0.50
Toxaphene		0.240	0.50		5.00
Chlordane		0.014	0.05		0.20

	EPA Method Number	EPA MDL	CRQL	Contract Lab MDL	Contract Lab QL
PCBs	608				
Aroclor-1016		ND	1.00		1.00
Aroclor-1221		ND	2.00		2.00
Aroclor-1232		ND	1.00		1.00
Aroclor-1242		0.065	1.00		1.00
Aroclor-1248		ND	1.00		1.00
Aroclor-1254		ND	1.00		1.00
Aroclor-1260		ND	1.00		1.00
VOLATILE ORGANICS	624				
Chloromethane		ND	10		10
Bromomethane		ND	10		10
Vinyl chloride		ND	10		10
Chloroethane		ND	10		10
Methylene chloride		2.8	10		10
Acetone			10		10
Carbon disulfide			10		10
1,1-dichloroethylene		2.8	10		10
1,1-dichloroethane		4.7	10		10
1,2-dichloroethylene		1.6	10		10
Chloroform		1.6	10		10
Methylethyl ketone (2-butanone)			10		10
1,2-dichloroethane		2.8	10		10
1,1,1-trichloroethane		3.8	10		10
Carbon tetrachloride		2.8	10		10
Vinyl acetate			10		10
Bromodichloromethane		2.2	10		10
1,2-dichloropropane		6.0	10		10
Cis 1,3 dichloropropene		5.0			
Trichloroethylene		1.9	10		10
Chlorodibromomethane		3.1	10		10
1,1,2-trichloroethane		5.0	10		10
Benzene		4.4	10		10
Trans-1,3-dichloropropene		ND	10		10
Bromoform		4.7	10		10
4-methyl-2-pentanone			10		10
2-hexanone			10		10
Tetrachloroethylene		4.1	10		10
1,1,2,2-tetrachloroethane		6.9	10		10
Toluene		6.0	10		10
Chlorobenzene		6.0	10		10
Ethlybenzene		7.2	10		10
Styrene			10		10
Xylene (Total)			10		10
2-chloroethylvinylether			10		10

	EPA Method Number	EPA MDL	CRQL	Contract Lab MDL	Contract Lab QL
Volatile Organics (cont)					
Trichlorofluoromethane			10		10
Acrolein			10		10
Acrylontrile			10		10
SEMI-VOLATILES	**625**				
Phenol		1.5	10		10
Bis (2-chloroethyl) ether		5.7	10		10
2-chlorophenol		3.3	10		10
m-dichlorobenzene		1.9	10		10
p-dichlorobenzene		1.9	10		10
o-dichlorobenzene		1.9	10		10
o-cresol			10		10
2,2'oxybis (1-chloropropane)		5.7	10		10
p-cresol			10		10
N-nitroso-di-n-propylamine		ND	10		10
Hexachloroethane		1.6	10		10
Nitrobenzene		1.9	10		10
Isophrone		2.2	10		10
o-nitrophenol		3.6	10		10
2,4-dimethylphenol		2.7	10		10
Bis (2-chloroethoxy)methane		5.3	10		10
2,4-dichlorophenol		2.7	10		25
1,2,4-trichlorobenzene		1.9	10		10
Naphthalene		1.6	10		10
p-chloroaniline			10		10
Hexachlorobutadiene			10		10
p-chloro-m-cresol			10		10
2-methylnaphthalene			10		10
Hexachlorocyclopentadiene		ND	10		10
2,4,6-trichlorophenol		2.7	10		10
2,4,5-trichlorophenol			25		25
2-chloronaphthalene		1.9	10		10
o-nitroaniline			25		25
Dimethyl phthalate		1.6	10		10
Acenaphthylene		3.5	10		10
2,6-dinitrotoluene		1.9	10		10
m-nitroaniline			25		25
Acenaphthene		1.9	10		10
2,4-dinitrophenol		42.0	25		25
p-nitrophenol		3.6	25		25
Dibenzofuran			10		10
2,4-dinitrotoluene		5.7	10		10
Diethyl phthalate		1.9	10		10
4-chlorophenyl phenyl ether		4.2	10		10
Fluorene		1.9	10		10

	EPA Method Number	EPA MDL	CRQL	Contract Lab MDL	Contract Lab QL
Semivolatiles (Cont)	625				
p-nitroaniline			25		25
4,6-dinitro-o-cresol			10		10
N-nitrosodiphenylamine		1.9	10		10
4-bromophenyl phenyl ether		1.9	10		10
Hexachlorobenzene		1.9	10		10
Pentachlorophenol		3.6	25		10
Phenanthrene		5.4	10		10
Anthracene		1.9	10		10
Di-n-butyl phthalate		2.5	10		10
Fluoranthene		2.2	10		10
Pyrene		1.9	10		10
Butyl benzyl phthalate		2.5	10		10
3,3'dichlorobenzidine		16.5	10		10
Benzo(a)anthracene		7.8	10		10
Chrysene		2.5	10		10
Bis (2-ethylhexyl) phthalate		2.5	10		10
Di-n-octyl phthalate		2.5	10		10
Benzo(b)fluoranthene		4.8	10		10
Benzo(k)fluoranthene		2.5	10		10
Benzo(a)pyrene		2.5	10		10
Indeno(1,2,3-cd)pyrene		3.7	10		10
Dibenz(a,h)anthracene		2.5	10		10
Benzo(ghi)perylene		4.1	10		10
Benzoic acid			10		10
Benzyl alcohol			10		10
Benzidene		44	10		10
1,2-diphenylhydrazine			10		10
N-nitrosodimethylamine		ND	10		10

* Pollutants analyzed in addition to influent and effluent analyses of conventional pollutants listed in Appendix A, Table ,
All units expressed in ug/L unless otherwise noted.

ND Not determined by EPA

NA Not Applicable

Appendix J Table J-2 EPA List of 126 Priority Pollutants

Chlorinated Benzenes
- Chlorobenzene
- 1,2-dichlorobenzene
- 1,3-dichlorobenzene
- 1,4-dichlorobenzene
- 1,2,4-trichlorobenzene
- Hexachlorobenzene

Chlorinated Ethanes
- Chloroethane
- 1,1-dichloroethane
- 1,2-dichloroethane
- 1,1,1-trichloroethane
- 1,1,2,2-tetrachloroethane
- Hexachloroethane

Chlorinated Phenols
- 2-chlorophenol
- 2,4-dichlorophenol
- 2,4,6-trichlorophenol
- Parametachlorocresol (4-chloro-3-methyl phenol)

Other Chlorinated Organics
- Chloroform (trichloromethane)
- Carbon tetrachloride (tetrachloromethane)
- Bis(2-chloroethoxy)methane
- Bis(2-chloroethyl)ether
- 2-chloroethyl vinyl ether (mixed)
- 2-chloronaphthalene
- 3,3-dichlorobenzidine
- 1,1-dichlorethylene
- 1,2-trans-dichloroethylene
- 1,2-dichloropropane
- 1,2-dichloropropylene (1,3-dichloropropene)
- Tetrachloroethylene
- Trichloroethylene
- Vinyl chloride (chloroethylene)
- Hexachlorobutadiene
- Hexachlorocyclopentadiene
- 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD)

Haloethers
- 4-chlorophenyl phenyl ether
- 2-bromophenyl phenyl ether
- Bis(2-chloroisopropyl) ether

Halomethanes
- Methylene chloride (dichloromethane)
- Methyl chloride (chloromethane)
- Methyl bromide (bromomethane)
- Bromoform (tribromomethane)
- Dichlorobromomethane
- Chlorodibromomethane

Nitroamines
- N-nitrosodimethylamine
- N-nitrosodiphenylamine
- N-nitrosodi-n-propylamine

Phenols (other than chlorinated)
- 2-nitrophenol
- 4-nitrophenol
- 2,4-dinitrophenol
- 4,6-dinitro-o-cresol (4,6-dinitro-2-methylphenol)
- Pentachlorophenol
- Phenol
- 2,4-dimethylphenol

Phthalate Esters
- Bis(2-ethylhexyl)phthalate
- Butyl benzyl phthalate
- Di-N-butyl phthalate
- Di-n-octyl phthalate
- Diethyl phthalate
- Dimethyl phthalate

Table J-2 Continued

Polynuclear Aromatic Hydrocarbons (PAHs)

- Acenaphthene
- 1,2-benzanthracene (benzo (a) anthracene)
- Benzo(a)pyrene (3,4-benzo-pyrene)
- 3,4-benzofluoranthene (benzo(b) fluoranthene)
- 11,12-benzofluoranthene (benzo(k) fluoranthene)
- Chrysene
- Acenphthalene
- Anthracene
- 1,12-benzoperylene (bonze(ghi) perylene)
- Fluorene
- Fluoranthene
- Phenanthrene
- 1,2,5,6-dibenzanthracene (dibenzo(a,h)anthracene)
- Indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene)
- Pyrene

Pesticides and Metabolites

- Aldrin
- Dieldrin
- Chlordane (technical mixture and metabolites)
- Alpha-endosulfan
- Beta-endosulfan
- Endosulfan sulfate
- Endrin
- Endrin aldehyde
- Heptachlor
- Heptachlor epoxide (BHC-hexachlorocyclohexane)
- Alpha-BHC
- Beta-BHC
- Gamma-BHC (Lindane)
- Delta-BHC
- Toxaphene

DDT and Metabolites

- 4,4-DDT
- 4,4-DDE (p,p-DDX)
- 4,4-DDD (p,p-TDE)

Polychlorinated Biphenyls (PCBs)

- PCB-1242 (Arochlor 1242)
- PCB-1254 (Arochlor 1254)
- PCB-1221 (Arochlor 1221)
- PCB-1232 (Arochlor 1232)
- PCB-1248 (Arochlor 1248)
- PCB-1260 (Arochlor 1260)
- PCB-1016 (Arochlor 1016)

Other Organics

- Acrolein
- Acrylonitrile
- Benzene
- Benzidine
- 2,4-dinitrotoluene
- 2,6-dinitrotoluene
- 1,2-diphenylhydrazine
- Ethylbenzene
- Isophorone
- Naphthalene
- Nitrobenzene
- Toluene

Inorganics

- Antimony
- Arsenic
- Asbestos
- Beryllium
- Cadmium
- Chromium
- Copper
- Cyanide, total
- Lead
- Mercury
- Nickel
- Selenium
- Silver
- Thallium
- Zinc

Appendix J Table J-3 NPDES Permit Application Testing Requirements, 40 CFR 122, Apppendix D, Tables II and III

Organic Toxic Pollutants

Volatiles

acrolein
acrylonitrile
benzene
bromoform
carbon tetrachloride
chlorobenzene
chlorodibromomethane
chloroethane
2-chloroethylvinyl ether
chloroform
dichlorobromomethane
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethylene
1,2-dichloropropane
1,3-dichloropropylene
ethyl benzene
methyl bromide
methyl chloride
methylene chloride
1,1,2,2-tetrachloroethane
tetrachloroethylene
toluene
1,2-trans-dichloroethylene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethylene
vinyl chloride

Acid Compounds

2-chlorophenol
2,4-dichorophenol
2,4-dimethylphenol
4,6-dinitro-o-cresol
2,4-dinitrophenol
2-nitrophenol
4-nitrophenol
p-chloro-m-cresol
pentachlorophenol
phenol
2,4,6-trichlorophenol

Base/Neutral

acenaphthene
acenaphthylene
anthracene
benzidine
benzo(a)anthracene
benzo(a)pyrene
3,4-benzofluoranthracene
benzo(ghi)perylene
benzo(k)fluoranthene
bis(2-chloroethoxy)methane
bis(2-chloroethyl)ether
bis(2-ethylhexyl)phthalate
4-bromophenyl phenyl ether
butylbenzyl phthalate
2-chloronaphthalene
4-chlorophenyl phenyl ether
chrysene
dibenzo(a,h)anthracene
1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzidine
3-3'-dichlorobenzidine
diethyl phthalate
dimethyl phthalate
di-n-butyl phthalate
2,4-dinitrotoluene
2,6-dinitrotoluene
di-n-octyl phthalate
1,2-diphenylhydrazine
fluoranthene
fluorene
hexachlorobenzene
hexachlorobutadiene
hexachlorocyclopentadiene
hexachloroethane
indeno(1,2,3-cd)pyrene
isophorone
napthalene
nitrobenzene
N-nitrosodimethylamine
N-nitrosodi-n-propylamine
N-nitorsodiphenylamine
phenanthrene
pyrene
1,2,4-trichlorobenzene

(**Table J-3** ***Organic Pollutants*** **Contined)**

Pesticides

- aldrin
- alpha-BHC
- beta-BHC
- gamma-BHC
- delta-BHC
- chlordane
- 4,4'-DDT
- 4,4'-DDE
- 4,4'-DDD
- dieldrin
- alpha-endosulfan
- beta-endosulfan
- endosulfan sulfate
- endrin
- endrin aldehyde
- heptachlor
- heptachlor epoxide
- PCB-1242
- PCB-1254
- PCB-1221
- PCB-1232
- PCB-1248
- PCB-1260
- PCB-1016
- toxaphene

Other Toxic Pollutants (Metals and Cyanide) and Total Phenols

- anitmony, total
- arsenic, total
- beryllium, total
- cadmium, total
- chromium, total
- copper, total
- lead, total
- mercury, total
- nickel, total
- selenium, total
- silver, total
- thallium, total
- zinc, total
- cyanide, total
- phenols, total

Appendix K

Glossary
Abbreviations, Acronyms, and Units

GLOSSARY

ABNs- See Acid Base Neutrals
Acid Base Neutrals (ABNs)- Also called semivolatile organics. A category of organic chemical pollutants. See Appendix J, Table J.3.
Acute- A stimulus severe enough to rapidly induce an effect; in aquatic toxicity tests, an effect observed in 96 hours or less typically is considered acute. When referring to aquatic toxicology or human health, an acute effect is not always measured in terms of lethality.
Acute Criteria- The maximum concentration of a constituent in water that an organism may be exposed to one hour over three years without dying.
Acute Static Toxicity Test- Test designed to measure water quality effect on mortality. It measures the effect of the whole effluent sample on an organism. Animals are put in a vial with effluent and the fatal effects are monitored. To calculate water quality standards, the test is run on sensitive animals. The concentration that shows a 95% mortality rate is then multiplied by two.
Activation- An event when the wastewater flow exceeds the holding capacity of the sewer lines and exceeds the hydraulic capacity of the treatment plant causing a diversion of flow to the CSO facilities.
Aeration- The process of adding air to a liquid (e.g. wastewater).
Aliquot- A measured portion of a sample.
Anaerobic Digester- The structure where organic material is broken down by organisms in the absence of oxygen.
Anoxia- The absence of oxygen.
Average Monthly Discharge Limitation- The highest allowable average of "daily discharge" over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges.
Average Weekly Discharge Limitation- The highest allowable average of "daily discharge" over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.
Bar Screen- A screen made of bars designed to catch large debris (e.g. rags, wood, shoes) in waterways.
Below Detection Limit/Level (BDL)- Values below the Reporting or Quantification Limit. For a further explanation see Appendix I.
Bioaccumulation- The process by which a compound is taken up by an aquatic organism, both from water and through food.
Biochemical- Having to do with a chemical change resulting from the metabolic activities of living organisms.
Biochemical Oxygen Demand (BOD)- The amount of oxygen needed to oxidize inorganic materials and to degrade organic materials by *biochemical reactions* in a certain time at a certain temperature. BOD is used as a measure of organic pollution.
Biomagnification- The process by which the concentration of a compound increases in species occupying successive trophic levels.
BDL- See Below Detection Limit
Bloom- A large mass of algae (microscopic and/or macroscopic) in water.
BOD- See Biochemical Oxygen Demand.
Buffering Capacity- The amount certain water bodies are able to resist changes in pH from the addition of acidic or caustic substances.

CFR- See Code of Federal Regulations
40 CFR Part 122- Code of Federal Regulations- Protection of the Environment. Part 122 is Administered Permit Programs: The National Pollutant Discharge Elimination System. Appendix D lists the Permit Application Requirements.
Chemical Oxygen Demand (COD)- The amount of oxygen needed for the *chemical oxidation* of chemicals in water. COD is used to measure the suitability of water for organisms that require oxygen.
Chlorination- The addition of chlorine or chlorine compounds to wastewater. Chlorination is most often done for disinfection purposes.
Choking- A process by which flows that can not be handled by existing pumps are "choked back" into the sewer system, frequently leading to local overflows.
Chronic- A stimulus that lingers or continues for a relatively long period of time, often one-tenth of the life span or more. Chronic should be considered a relative term depending on the life span of an organism. The measurement of a chronic effect can be reduced growth, reduced reproduction, etc., in addition to lethality.
Chronic Criteria- The maximum concentration of a constituent in water that an organism may be exposed to four days over three years without showing long term, short of mortality, harmful effects. Chronic criteria involve the growth, reproductivity, fertility, and sublethal effects on organisms.
Chronic Reproduction Test- A test designed to measure the chronic effects of wastewater on reproduction and fertility.
Chronic Survival and Growth Test- Test designed to see if any mortality occurs after the chronic criteria have been passed. After the organism has survived, the size of the animal is measured after seven days and statistically compared to controls.
Clean Water Act (CWA)- (Formally referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended by Pub. L. 95-576, Pub. L. 96-483, and Pub. L. 97-117: 33 U.S.C.§1251 <u>et seq</u>.
COD- See Chemical Oxygen Demand
Code of Federal Regulations (CFR)- Codification of the general and permanent rules of the Federal Government. CFR 40 covers environmental protection.
Combined Sewer- A sewer receiving both sanitary wastewater and storm water runoff.
Combined Sewer Overflow Facility- A place where overflow from combined sewers is screened, settled, and chlorinated before being discharged.
Combined Sewer Overflow Pipe- A pipe that discharges overflow from combined sewers in order to prevent back ups in the sewerage system.
Composite Sample- A sample consisting of a minimum of eight grab samples collected at equal intervals during a 24-hour period (or lesser period if specified) and combined proportional to flow, or a sample continuously collected proportionally to flow over that same time period.
Conventional Parameters/Pollutants- Those pollutants and constituents that are removed from wastewater by conventional treatment. Generally these constituents are settleable solids, biochemical oxygen demand, total suspended solids, oil and grease, total coliforms, fecal coliform, residual chlorine, and chlorides.
Conventional Treatment- Well-known or well-established water or wastewater treatment methods, usually consisting of primary and secondary processes and may include advanced or tertiary treatment.
Criteria- The numerical and/or narrative elements of water quality standards.
Critical Dilution- Dilution of the effluent required to meet Water Quality Standards.
CWA- See Clean Water Act.

Daily Discharge- The discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the daily discharge is calculated as the average measurement of the pollutant over the day.
Designated Use- Specified use of a body of water included in state water quality standards.
Digester- A place where organic matter is broken either with oxygen (aerobically) or without oxygen (anaerobically).
Disinfection- The destruction of pathogens (e.g. fecal bacteria) in a water source or wastewater.
Effluent- The wastewater or other water coming out of a treatment facility or process.
Effluent Limitation- Any restriction imposed by the Director (the person authorized to sign NPDES permits by EPA and/or the State) on quantities, discharge rates, and concentrations of "pollutants" which are "discharged" from "point sources" into "waters of the United States," the waters of the "contiguous zone," or the ocean.
Eutrophication- The natural process by which a body of water ages. Nutrients stimulate plant growth and lakes, estuaries, and bays evolve into bogs or marshes. Effluent high in nutrient loadings cause excessive plant growth that accelerates eutrophication.
Fecal Coliform- Bacteria found in the wastes of warm blooded animals. Fecal coliform is used as an indicator that disease causing bacteria and viruses are present. It is a component of Total Coliform.
Floatables- Constituents of wastewater that rise to the surface in the settling process, consisting mainly of oil, grease, and plastics.
Grab Sample- An individual sample collected in a period of less than 15 minutes.
Gravity Facility- A combined sewer overflow facility that receives flows by gravity (descending gradients from source to outfall) and no pumping is required.
Grit- Heavy suspended mineral matter in wastewater like sand and gravel.
Grit Chamber- A detention tank where grit is separated by sedimentation (grit settles to the bottom). The settling is controlled by the velocity of the water.
Headwork- A structure where wastewater is screened out and grit and other solids are trapped before the wastewater is pumped to a treatment facility.
Human Health Criteria- Estimated concentrations or quantities of chemicals that can be expected to occur in the environment in water, sediment, or food and that are not likely to pose a significant risk to the exposed human population. Human health criteria are published under section 304(a) of the CWA and are based on the latest scientific information. This information is updated and issued to the states to serve as guidance for the development of criteria.
Hydrocarbons- Chemical compounds only containing hydrogen and carbon.
Hypochlorite- The chemical used for chlorine disinfection of wastewater (either calcium, sodium, or lithium).
Hypoxia- The state of very low oxygen concentration.
IDL- See Instrument Detection Limit.
I/I- Infiltration and Inflow.
Infiltration- Groundwater that enters sewer pipes through cracks.
Inflow- Water that enters sewer pipes through illegal connections and storm water runoff.
Inorganic- Not containing carbon.
Influent- Wastewater or other water going into treatment facility or process.
Instrument Detection Limit (IDL)- The smallest amount of a substance a particular instrument is capable of detecting. See Appendix I for a further explanation.

Interceptor- A large sewerage line collecting water from smaller sewerage pipes.
J values- Values between the Method Detection Limit and the Quantification (or Reporting) Limit. See Appendix I for further explanation.
LC50- See Lethal Concentration 50%
Lethal Concentration 50% (LC50)- The concentration of effluent in a sample that causes mortality to 50% of the test population at a specific time of observation.
Limiting Nutrient- In a given ecosystem, the limiting nutritional factor that controls the growth of plants or animals. Usually the limiting nutrient for plant growth is nitrogen in the marine environment and phosphorus in the fresh water environment. The limiting nutrient can also be thought of as the specific nutrient that will have the most impact on a receiving body of water (for example, the accelerated eutrophication of fresh water bodies caused by phosphorus in wastewater effluent).
Local Limits- The development of specific limits as part of the General Pretreatment Program- "The permittee shall develop and enforce specific effluent limits for industrial users, and all other users, as appropriate, pursuant to 40 CFR 403.5."
LOEC- See Lowest Observed Effect Concentration
Lowest Observed Effect Concentration (LOEC)- The lowest concentration of effluent to which organisms are exposed in a life cycle or partial life-cycle test which contains an adverse effect (on survival, growth, and reproduction).
MATC- See Maximum Acceptable Toxicant Concentration
Maximum Acceptable Toxicant Concentration (MATC)- The effluent concentration that may be present in a receiving water without causing significant harm to productivity or other uses. The MATC is determined by the results of chronic tests of either a partial life-cycle with sensitive life stages or a full life-cycle of the test organism. The MATC is the geometric mean of the No Observed Effect Concentration and the Lowest Observed Effect Concentration.
Maximum Daily Discharge Limitation- The highest allowable daily discharge.
MBAS- See Methylene Blue Anion Surfactant
MDL- See Method Detection Limit
Metals- A group of priority pollutants. See Appendix J, Table J.2 for a complete list.
Method Detection Limit (MDL)- The smallest amount of a substance that can be detected above background noise by following a particular method of analysis. See Appendix I for a further explanation.
Methylene Blue Anion Surfactant- See Surfactant.
Mixing Zone- Area where discharged effluent is first diluted. The area is extended to cover the secondary mixing in the ambient water body. A mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as toxic conditions are prevented.
National Pollutant Discharge Elimination System (NPDES)- The national program for issuing, modifying, revoking and reissuing, terminating, monitoring, and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, and 405 of the Clean Water Act (CWA). The term includes and "approved program."
Nine Minimum Controls- Part of the EPA's CSO Policy. The Nine Minimum Controls are:
1) Proper operation and regular maintenance (O&M) programs for the sewer system and combined sewer overflow points
2) Maximum use of the collection system for storage
3) Review and modification of the pretreatment programs to assure CSO impacts are minimized
4) Maximization of flow to the POTW for treatment

5) Prohibition of CSO discharges during dry weather
6) Control of solid and floatable materials in CSO discharges
7) Pollution prevention programs that focus on contaminant reduction activities
8) Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts, and
9) Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.

Nitrification- The conversion of ammonia and nitrite to nitrate.

NOAL- See No Observed Acute Level

NOEC- See No Observed Effect Concentration

No Observed Acute Level (NOAL)- The highest concentration of effluent to which organisms are exposed in a short-term test in which at least 90% of the test organisms survive.

No Observed Effect Concentration (NOEC)- The highest concentration of effluent to which organisms are exposed in a life cycle of partial life cycle test which contains no adverse effects (on growth, survival, and reproduction).

NPDES- See National Pollutant Discharge Elimination System

Nutrient- Any element or compound essential as raw material for organism growth and development. Examples- phosphorus and nitrogen.

Oil and Grease- Fats, oils, and grease from animal and plant derivation. Also called FOGs.

Organic Compounds- Volatiles, Acid Compounds, Base/Neutral, and Pesticides. Organics are listed in 40 CFR Ch. 1 Appendix D of CWA Section 307(a). See Appendix I, Table J.3 for a complete list.

Ortho-Phosphorus- A form of phosphorus, included in nutrients.

Outfall- the site of initial discharge

PAH- See Polynuclear Aromatic Hydrocarbon

Pesticides/PCBs- Subdivision of priority pollutants. See Appendix J, Table J.2 for a complete list.

Petroleum Hydrocarbon (PHC)- Oil and grease from petroleum derivation.

pH- The negative log of the hydrogen ion concentration used to express acidity (<7) and alkalinity (>7).

PHC- See Petroleum Hydrocarbon.

Pollutant- Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials [except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. §2011 et seq.)], heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water. It does not mean: (a) Sewage from vessels; or (b) Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well, used either to facilitate production or for disposal purposes, is approved by authority of the State in which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water resources.

Polynuclear Aromatic Hydrocarbon (PAH)- A type of semivolatile organic. Also know as polycyclic aromatic hydrocarbon.

POTW- See Publicly Owned Treatment Works

Preaeration- The process by which air is added to primary influent to help in the removal of gases, addition of oxygen, flotation of grease, and in the settling or coagulation of wastewater.

Prechlorination- The addition of chlorine to primary influent at or near the beginning of the treatment facility/process.

Primary Settling- The detention of wastewater as part of primary treatment to settle out solids (sludge) and collect floatables (scum).
Primary Treatment- Screening and settling of wastewater.
Priority Pollutants- Refers to some of the chemicals listed in 40 CFR Ch. 1 Appendix D under Section 307(a) of the CWA. There are 65 compounds and families of compounds that are among the most persistent, prevalent, and toxic of chemicals know to man. These 65 compounds or families of compounds have been translated into 126 individual pollutants. See Appendix J, Table J.2 for the complete list.
Priority Pollutant Scan- A series of chemical analyses to identify the presence of priority pollutants.
Publicly Owned Treatment Works (POTW)- Any facility or system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of liquid nature that is owned by a "State" or "municipality." This definition includes sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.
Pumping Station- Structures where wastewater from low lying areas is pumped.
Quantification Limit- See Reporting Limit.
Reporting Limit- The smallest concentration that can be quantified. On a graph of pollutant concentration versus instrument response, the reporting limit is the smallest concentration where the linear relationship holds before starting to curve as the pollutant concentration goes to zero. Also called the Quantification Limit. See Appendix I for a further explanation.
Residuals- Matter left over by treatment processes including screenings, scum, and sludge.
Screening- The process by which sewage from interceptors first goes through headworks where grit and large objects like leaves, sticks, and hygiene products (like tampon applicators and condoms) are screened out.
Screenings- The objects that are collected by the process of screening.
Scum- Solids that float to the top of wastewater.
Secondary Treatment- Generally, a level of treatment that produces removal efficiencies for BOD and TSS of 85%, sometines used interchangeably with the concept of biological treatment, particularly the activated sludge process.
Sedimentation- The process by which solids are allowed to settle by gravity.
Sedimentation Tank- Tanks used to detain wastewater while the solids settle out.
Semi Volatile Organics- Also known as Acid Base Neutrals (ABNs). A subcategory of organic pollutants. See Appendix J, Table J.3 for a complete list.
Separate Sewer- A sewerage system divided into a storm sewer and a sanitary sewer.
Settleable Solids- The estimated amount of sludge that will settle by sedimentation. It is a fraction of the suspended-solids.
Settled Solids- Sludge. See sludge.
Sewage- Any wastes, including wastes from humans, households, commercial establishments, industries, and storm water runoff, that are discharged to or otherwise enter a POTW.
Sludge- Solids, residues, and precipitate separated from or created in sewage by the unit processes of a POTW.
SOP- See Standard Operating Procedures.
Stratification- The separation of water into layers characterized by thermal differences.
Standard Operating Procedures- Documented protocols for plant operation, laboratory procedures, etc.
Surcharging- When the capacity of the sewer is insufficient and sewage escapes through a manhole.

Surfactant- Surface-active agent. Large organic molecules that cause foaming. They are usually found in detergents.
Thickeners- The structure where sludge is sent to be thickened by removing water.
TKN- See Total Kjeldahl Nitrogen.
Total Coliform- Bacteria found in decaying matter, feces, and soil. It used as an indicator of pathogens that are present in wastewater. A component of Total Coliform is Fecal Coliform.
Total Kjeldahl Nitrogen (TKN)- The total organic and ammonia nitrogen.
Total Phosphorus- A measure of all the forms of phosphorus, a nutrient, found in water (orthophosphates, polyphosphates, and organic phosphates).
Total Suspended Solids (TSS)- The sum of insoluble solids that either float on the surface of, or are in suspension in water, wastewater, or other liquids.
Toxic Pollutant- Any pollutant listed as toxic in Appendix D of 40 CFR Part 122, under Section 307(a)(1) of CWA.
Toxics- Pollutants that have a toxic effect on living organisms. The CWA Section 307(a) "priority pollutants" are a subset of this group of pollutants.
Toxicity Test- A procedure to determine the toxicity of a chemical or an effluent using living organisms. A toxicity test measures the degree of effect on exposed test organisms of a specific chemical or effluent.
TSS- See Total Suspended Solids.
Twelve Month Running Average- The monthly average computed using the specific month AND the previous 11 months.
Unregulated Community- Dischargers not required to have Industrial Permits to discharge into MWRA sewerage system. They are not regulated or required to meet Local Limits, nor are they regulated under the Local Limits Discharge Program.
VOA- See Volatile Organic Acid. Same as Volatile Organic Compound (VOC).
VOC- See Volatile Organic Compound
Volatile Organic Compound (VOC)- Same as Volatile Organic Acid (VOA).
Volatile Solids- Those solids of a suspended solid sample that are burned off in a muffle oven at 550 ±50° C.
Water Quality- The chemical, biological, and physical conditions of a body of water.
Water Quality Criteria- Specific levels of pollutants that would make a body of water unsuitable for its designated use (i.e. harmful if used for drinking, swimming, farming, fishing, or industrial processes).
Water Quality Standard- A law or regulation that consists of: the beneficial designated use or uses of a water body; the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular water body; and an antidegradation statement.
WET- See Whole-Effluent Toxicity
Whole-Effluent Toxicity (WET)- The total toxic effect of effluent - not chemical specific but rather the cumulative effect - whether it be synergic or antagonsitic, of the chemicals found in the effluent.

Abbreviations, Acronyms, and Unit

ABNs- Acid, base, and neutral organic compounds
BDL- Below Detection Limit
BOD- Biochemical Oxygen Demand
BWSC- Boston Water and Sewer Commission
CFR- Code of Federal Register
CSO- Combined Sewer Overflow
CWA- Clean Water Act
DEP- Department of Environmental Protection
DI- Deer Island
ENQUAD- Environmental Quality Department
EPA- Environmental Protection Agency
FY- Fiscal Year
IDL- Instrument Detection Level
I/I- Infiltration and Inflow
LC50- Median Lethal Concentration
LD50- Median Lethal Dose
LOAEL- Lowest Observed Adverse Effect Level
LOEC-Lowest Observed Effect Concentration
MATC- Maximum Acceptable Toxicant Concentration
MDC- Metropolitan District Commission
MDL- Method Detection Limit
MPN- Most Probable Number
MWRA- Massachusetts Water Resources Authority
NI- Nut Island
NOAL-No Observed Acute Level
NOEC- No Observed Effect Concentration
NPDES- National Pollutant Discharge Elimination System
PAH- Polycyclic (or Polynuclear) Aromatic Hydrocarbon
PCB- Polychlorinated Biphenyl
PHC- Petroleum Hydrocarbon
POTW- Pubicly Owned Treatment Works
SD- Standard Deviation
SOP- Standard Operating Procedure
TKN- Total Kjeldahl Nitrogen
TPH- Total Petroleum Hydrocarbon
TRAC- Toxic Reduction and Control Department
TSS- Total Suspended Solids
VOA- Volatile Organic Acid
VOC- Volatile Organic Compound
WET- Whole Effluent Toxicity Test

Units

in/yr- Inches per year
L- Liter
lbs- pounds
lbs/day- pounds per day
mL/L- milliliters per liter
MG- Million Gallons
MGD- Million Gallons per Day
mg/L- milligrams per liter
ug/L- micrograms per liter

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