June 1994

NPDES Compliance Summary Report Fiscal Year 1993

Massachusetts Water Resources Authority

Environmental Quality Department
Technical Report No. 94-7

NPDES COMPLIANCE SUMMARY REPORT
Fiscal Year 1993

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Technical Report No. 94-7
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Acknowledgement

This report was written by Grace Bigornia-Vitale, Program Manager, and Mark J Sullivan, Technical Advisor, under the supervision of John Riccio, Director, NPDES Compliance Unit and the direction of Michael Connor, Director of the Environmental Quality Department. Maury Hall, Carl Pawlowski, Hayes Lamont, Alex Pancic, and Robert Rabideau contributed to the preparation of the report. Kristi Shenk and Erin Graham copy-edited the manuscript.

Citation:

Bigornia-Vitale, G. and M. Sullivan. 1994. **NPDES compliance summary report, fiscal year 1993**. MWRA Enviro. Quality Dept. Tech. Rpt. Series No. 94-7. Massachusetts Water Resources Authority, Boston, MA. 195 pp.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (continued)

EXECUTIVE SUMMARY

This report summarizes monitoring activities conducted by the Massachusetts Water Resources Authority (MWRA) between July 1992 and June 1993. Monitoring activities were conducted at these facilities:

- Deer Island Primary Treatment Plant
- Nut Island Primary Treatment Plant
- Cottage Farm Combined Sewer Overflow (CSO)
- Prison Point CSO
- Somerville Marginal CSO
- Constitution Beach CSO
- Fox Point CSO
- Commercial Point CSO

Monitoring was conducted to comply with the MWRA National Pollutant Discharge Elimination System (NPDES) permit monitoring requirements as well as to monitor plant performance for process control. The MWRA NPDES permit requires monitoring discharge quality of both the primary treatment plants and the Cottage Farm, Prison Point, and Somerville Marginal CSO facilities. Constitution Beach, Fox Point, and Commercial Point are owned and operated by the MWRA, but the discharge pipes from these facilities are included in the Boston Water and Sewer Commission (BWSC) NPDES permit. Because these discharge pipes are not permitted to the MWRA, monitoring activities at these facilities were limited to the analyses of conventional parameters.

NPDES Compliance Summary

Construction activities continue at both the Deer and Nut Island plant sites, and the work has had an effect on plant performance. The new primary plant (first two batteries) at the Deer Island site is scheduled to be on line by October 1995. The Nut Island headwork facility, although expected to be completed prior to that date, will go on line on the same schedule as Deer Island.

In general, most of the NPDES violations were Biochemical Oxygen Demand (BOD)-related. The low BOD removal problems at both plants are the subject of ongoing independent studies. Occasionally, low pH readings have been recorded at Nut Island and some of the CSO facilities. Acid rain and the treatment process may be the reasons or contributing factors for the low pH levels observed at the Nut Island plant.

At Nut Island, additional sampling locations were added to the regular NPDES sampling sites to determine if the existing sites were adequate. At Deer Island, additional samples were taken to confirm existing monitoring program sampling locations.

Biochemical Oxygen Demand

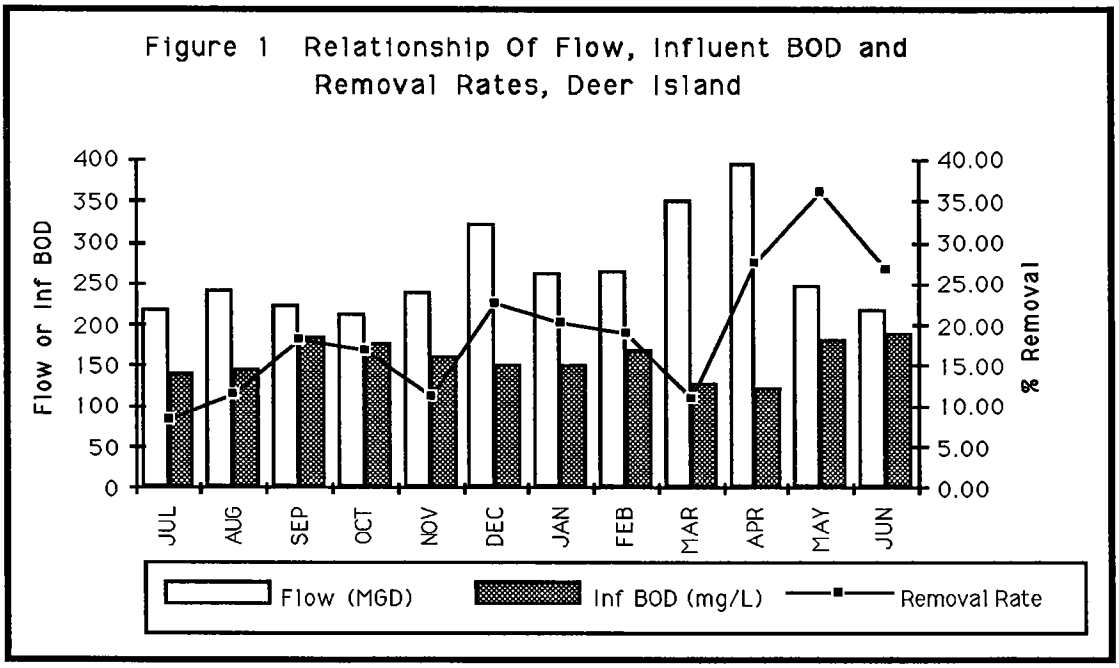
Deer Island The average monthly limit for BOD is 140 mg/ while the maximum concentration allowable is 200 mg/L. The 12-month running average BOD removal rate is 27%.

In FY 93, there were 16 BOD-related violations. Of these violations, three were violations of the average monthly BOD limit, one was a violation of the maximum BOD limit, and the rest were violations of the BOD removal requirement.

Although the BOD removal efficiencies were consistently low, the average monthly BOD effluent limit was violated only during the dry months of September, October and November. The only maximum BOD limit violation, 217 mg/L, was measured in September.

Part of the low BOD removal problem is thought to be flow-related. Low flows produce a more concentrated wastewater with less desirable BOD removal properties. High flows, associated mostly with wet weather activations, produce a less concentrated influent with better removal characteristics. This characterization is presented in Figure 1. Except during the months of November, March, and May, the data appear to support this flow-related theory.

Figure 1 Relationship Of Flow, Influent BOD and Removal Rates, Deer Island

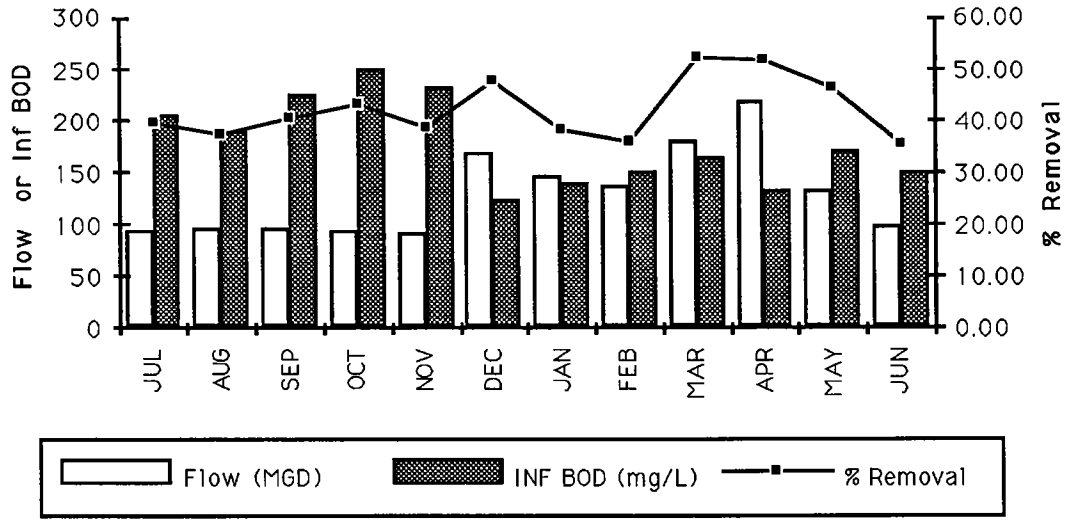


Nut Island The average monthly limit for BOD is 130 mg/L while the maximum concentration allowable is 185 mg/L. The 12-month running average BOD removal rate is 15%.

In FY 93, there were six BOD-related violations. Of these violations, three were violations of the average monthly BOD limit and the other three were violations of the maximum BOD limit. Although the BOD removal rates are generally not a problem at Nut Island, during the dry months of September, October, and November, the average monthly BOD limit was not met.

The flow-related theory for Deer Island appears to be supported by the Nut Island BOD data as shown in Figure 2. During the first few months of the monitoring period, the flows were low, the influent BOD concentration were high, and the removal rates were consistent with what is expected of primary plants. Starting in December, with higher flows and lower influent BOD concentrations, the BOD removal rates appear to be slightly higher than the preceding months. In the succeeding months, the removal rates observed increased with high flows and decreased with low flows.

Figure 2 Relationship of Flow, Influent BOD and Removal Rates, Nut Island



Total Suspended Solids (TSS) At Deer Island, the average monthly limit for TSS is 110 mg/L and the maximum concentration allowable is 180 mg/L. The 12-month running average BOD removal rate is 38%. At Nut Island, the average monthly limit for TSS is 110 mg/L, and the maximum concentration allowable is 195 mg/L. The 12-month running average BOD removal rate is 43%. In FY 93, there were no TSS-related violations at either plant.

Fecal Coliform For both plants, the average monthly fecal coliform limit is 200/100 mL while the total coliform average monthly limit is 1000/100mL. In FY93, there were no fecal or total coliform violations at either plant. The average bacteria counts were well below the coliform limits for the entire year. The reduction in coliform violations is reflected in the reduction of the number of beach closings around the harbor. For the CSO facilities, the average monthly limit for fecal coliform is 1000/100mL. There were three average monthly fecal coliform violations at CSO facilities; two were observed at the Cottage Farm facility and one was measured at the Somerville Marginal facility.

pH The allowable pH is 6.5 to 8.5 for discharges to a marine receiving body of water and 6.5 to 9.0 for discharges to a fresh body of water. In FY93, there were eight pH violations all of which were below the pH threshold: ten at Nut Island, one at Prison Point and one at Somerville Marginal. The ten low pH violations at Nut Island were caused by natural and treatment processes and thus are not considered true violations.

Settleable Solids For Deer Island, the compliance limit for settleable solids is 2.8 mg/L while for Nut Island, it is 1.8 mg/L. In FY93, there were no settleable solids limits violations at either plant.

Total Petroleum Hydrocarbons (TPH) For both plants, the TPH limit is 15 mg/L. In FY93, there were no TPH violations.

Priority Pollutants There are no numerical limits for priority pollutants at either plant. Deer Island and Nut Island priority pollutants effluent concentrations were very similar and compare well with FY92 data. The concentrations of most of the priority pollutants tested were mostly below EPA-approved methods level of detection.

Deer Island

- Copper and zinc were always detected, lead was detected 75 % of the time, and mercury was detected 33% of the time.
- Total phenols was always detected, cyanide and TPH were present 58 % and 75 % of the time, respectively.

- δ-BHC was detected 42 % of the time while DDD and endosulfan sulfate were measured 25 % of the time. A-BHC, ß-BHC, chlordane, aldrin, and heptachlor were detected 17 % of the time.

- Phthalates and 4-methyl phenol were present most of the time. Methylnaphthalene and naphthalene were present less than 40% of the time.

- Methylene chloride, chloroform, 1,2-dichloroethene, trichloroethene, benzene, tetrachloroethane, xylene and toluene were always present, and 1,1,1-trichloroethane, 2-butanone, carbon disulfide and chloromethane were routinely detected.

Nut Island

- Copper and zinc were detected at all times, lead was detected 75% of the time, and mercury was detected 33% of the time.

- Total phenols were always detected, cyanide was present 58 % and total petroleum hydrocarbons were detected 75% of the time.

- δ-BHC and γ-BHC were detected 42 % of the time while heptachlor was detected in 58 % of samples.

- Phthalates and 4-methyl phenol were routinely detected.

- Methylene chloride, chloroform, tetrachloroethane, 2-butanone and toluene were always detected while 1,1,1-trichloroethane, bromodichloromethane, carbon disulfide, dibromochloromethane, trichloroethene and chloromethane were routinely detected.

Table 1 compares the metals analyses results of the NPDES monitoring program, Local Limits study, and the Deer Island (DI) Plant Laboratory. Table 2 shows Nut Island (NI) plant results. In general, the Local Limits, NPDES, and Deer Island Laboratory results show a positive correlation in all effluent metal concentrations. Most of the metals analyzed were below the detection levels of EPA-approved methodologies. Copper, lead and zinc were the only metals constantly detected at measurable amounts.

There was no trend in the FY93 effluent priority pollutant loadings. Variations in the data are probably due to detection limits and normal sampling variability and not to significant changes in pollutant concentrations. Metals and organic pollutants in Deer Island and Nut Island effluents have been decreasing over the years and have reached the stabilized level. The FY93 measurements were small fluctuations around the stabilized level.

Table 1. Deer Island Effluent Metals, FY93 Mean Concentrations

Metals (ug/L)	Geometric Mean Concentration			
	DI Laboratory	NPDES	Local Limits	Harbor Studies
Arsenic	1.82	1.64	2.00	
Cadmium	1.07	1.00	2.00	0.52
Chromium	7.97	3.30	6.00	3.18
Copper	52.86	56.02	62.00	71.45
Lead	13.95	12.40	13.00	11.12
Mercury	0.17	0.24	0.40	0.14
Nickel	10.37	< 15.00	10.00	5.94
Silver	3.91	2.63	5.00	3.86
Zinc	84.63	82.28	97.00	85.21

Table 2. Nut Island Effluent Metals, FY93 Mean Concentrations

Metals (ug/L)	Geometric Mean Concentration		
	NI Laboratory	NPDES	Local Limits
Arsenic	3.51	1.51	2.00
Cadmium	1.42	< 1.00	2.00
Chromium	3.87	5.04	5.00
Copper	56.61	58.59	59.00
Lead	13.67	9.12	11.00
Mercury	0.36	0.23	0.30
Nickel	9.05	8.65	< 20.00
Silver	3.91	2.45	4.00
Zinc	122.22	63.74	78.00

The FY93 NPDES effluent data are very similar to FY92 data but substantially lower than the primary effluent projections contained in the Supplemental Environmental Impact Statement document (US EPA, 1988). The comparison of FY92, FY93 and earlier projections is presented in Figure 3.

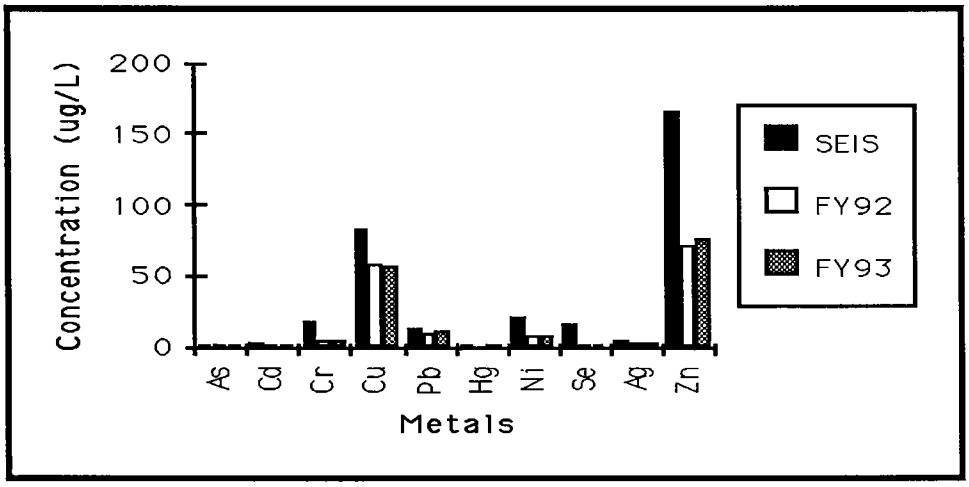


Figure 3 Effluent Metals Concentrations Compared to Earlier Projections

When the same removal rates assumptions used in the 1987 study are applied to FY93 influent data, the resulting effluent quality resembles the FY92 estimates, but is much lower than the 1987 estimates (Table 3).

Table 3 Primary and Secondary Effluent Projections

	1987 (1)		1993 (2)	
	Primary Effluent	Secondary Effluent	Primary Effluent	Secondary Effluent
Metals (ug/L)				
Arsenic	1.810	1.17	1.626	1.084
Cadmium	2.277	1.29	2.033	1.196
Chromium	16.890	6.53	3.355	1.342
Copper	82.265	22.13	39.734	11.003
Lead	11.940	9.19	6.965	5.547
Mercury	1.240	0.38	0.280	0.090
Nickel	21.380	16.54	8.423	6.738
Selenium	15.260	8.19	1.996	1.109
Silver	4.010	0.55	3.448	0.493
Zinc	165.300	63.91	54.707	21.883

(1) Supplement Envionmental Impact Statement (SEIS), EPA, 1988
(2) Based on FY93 Influent Data and applying removal efficiencies used in the SEIS document.

Bioaccumulation Study

The 1992 Bioaccumulation Study results support the theory that the discharge of toxics into the harbor is decreasing. Table 4 compares the results of Bioaccumulation Studies conducted in 1987 (SEIS), FY91 (NPDES) and FY92 (NPDES).

Except for Polycyclic Aromatic Hydrocarbons (PAH), there appears to be a decrease in the levels of contaminants from last year's study; however, when compared with the 1987 study results, the latest study suggests an overall general decrease in the amount of contaminants bioaccumulating in mussels. Probable reasons for this decrease in the levels of contaminants may be due to: the cessation of sludge discharge to the harbor, lower concentration of contaminants in the effluent, and lower contribution from CSOs, river and atmosphere.

Table 4. Comparison of Mussel Bioaccumulation Study Results

Year Exposure Parameter (2)	1987 (1) 30 days Mean (SD)	1991 60 days Mean (SD)	1992 60 days Mean (SD)
Total PAHs	2343 (251)	1543 (376)	1934 (480)
Total PCBs	630 (264)	200 (49)	133 (22.5)
Total DDTs	62.6 (33.7)	45.9 (12.8)	25.1 (6.2)
Dieldrin	11.4 (3.9)	2.5 (0.6)	2.7 (0.7)
Alpha-chlordane	21.5 (5.6)	10 (3.2)	6.9 (1.1)
Trans-nonachlor	18 (3.7)	8.3 (2.3)	8.3 (1.8)
Lead	7.2 (2.0)	6.1 (1.2)	
Copper	9.6 (1.9)	9.7 (1.4)	
Zinc	171 (68.6)	145 (20.3)	

1. Metals measured after 60 days, all other parameters measured after 30 days.
2. Organics concentrations expressed in ug/Kg, metals in mg/Kg.

For the coming years, we need to conduct several studies again:

- The secondary treatment pilot plant will not only provide us with a valuable opportunity to gather data on secondary treatment plant process control and operations, but it will also allow us to conduct effluent characterization and whole effluent toxicity testing.

- The results of the Detailed Effluent Characterization Study, Task 18 of the Harbor and Outfall Monitoring under contract with Battelle,Inc., should provide better estimates of discharge loads because that study employs methodologies with lower detection limits.

- The NPDES monitoring program, started in 1988, will provide a good historical perspective since the program uses analytical methodologies employed since it started.

- The Local Limits Study will provide us with valuable influent loading characterization.

I. Introduction

This report summarizes the monitoring activities conducted by the Massachusetts Water Resources Authority (MWRA) during the period of July 1992 to June 1993. Two treatment plants and six Combined Sewer Overflow (CSO) facilities were monitored to gather operational data, and to comply with the requirements contained in the MWRA NPDES permit. Other wastewater characterization studies conducted in FY93 are also included in this report as a means of comparing monitoring efforts.

I.A. Monitoring Programs

In FY93, the MWRA conducted several NPDES monitoring activities. In addition, other monitoring activities were conducted. These studies, including the NPDES monitoring program are as follows:

- Plant Monitoring Program, Process Control and NPDES Monitoring, were conducted by the Deer Island and Nut Island Treatment Plant Laboratories.

- NPDES Compliance and Monitoring Program, NPDES monitoring for toxicity and toxics, managed by NPDES Compliance Unit. Analyses were conducted by Aquatec, Inc. of Colchester, VT and Energy and Environmental Engineering of Somerville, MA.

- Local Limits Monitoring Program, Local Limits Study was managed by the Toxic Reduction and Control Department (TRAC). Analyses were conducted by New England Testing, Inc. of Bedford, MA.

- Harbor Studies Monitoring Program, Chemical Effluent Characterization, managed by Harbor Studies. Chemical analyses were conducted by Battelle, Inc.of Duxbury, MA.

Sampling and analyses were conducted in accordance with established standard procedures and methodologies contained in 40 CFR 136, except for the analytical methods used by the Harbor Studies characterization. The Harbor Studies's analytical methods' detection limits were much lower than those of the Environmental Protection Agency's (EPA) established methodologies.

A.1 Plant Monitoring Program

The treatment plants monitored for plant performance and NPDES compliance daily. This report, however, will only present monitoring data addressing NPDES permit compliance concerns. Sampling was conducted daily by Laboratory personnel and in some instances, by Operations staff. Samples were

delivered to the laboratory and were analyzed within prescribed holding times and in accordance with the Plant's Standard Operating Procedures (SOP). Grab samples were collected at each sampling site at approximately the same time and almost always, by the same personnel. Daily composite samples were collected by a 24-hour time-composite sampler. For metals analyses, an aliquot portion of a composite sample was measured-out and stored in a properly preserved container until the last day of the month aliquot portion was collected. The preserved composite portions constituted the month's metal sample.

The Deer Island Laboratory, in addition to testing Deer Island samples, also analyzed CSO samples. During each activation, grab samples were collected by facility personnel. Except for samples used for fecal coliform analyses, samples were collected during the first four hours of discharge or any portion of discharges that were less than four hours duration. The samples were collected every fifteen minutes during the first hour, after one-and-one-half hour, two hours, three hours and four hours from the onset of the discharge. The samples were transported to the Deer Island laboratory for analyses. Samples were flow-weighted to make a composite sample at the laboratory.

For fecal coliform analyses, grab samples were taken during the first two hours of activation, and every 8 hours thereafter.

A list of parameters, sampling frequency, analytical procedures and other relevant information is presented in Table I.A.1.

A.2. NPDES Compliance Monitoring Program

The NPDES Monitoring program conducted monthly priority pollutant scans and whole effluent toxicity tests (WET) on the Deer Island and Nut Island effluents and conducted chemical analyses on the Cottage Farm, Prison Point, and Somerville Marginal CSO facility overflows. The chemical analyses were conducted by Energy and Environmental Engineering of Somerville, Ma. and Aquatec, Inc. of New Bedford, Ma. while the WET were performed by Aquatec, Inc. of Colchester, Vt. Sampling for NPDES compliance was conducted by the Monitoring Section of TRAC. Sampling at the treatment plants was normally scheduled on the second full week of the month, over a period of six days to respond to the requirements of the chronic 7-day renewal test.

Two automatic samplers were set up three times to collect samples on Day 2, Day 4, and Day 6, during each sampling period. One sampler collected samples for chemical analyses, and the other sampler collected samples for toxicity tests. Both grab and composite samples were collected during each sampling event. For the chemistry portion, the three discrete 24-hour daily composite samples were further combined at the laboratory to make the month's composite sample. This laboratory-composited sample was then analyzed for priority pollutant metals, acid/base/neutral organic compounds, total phenols, and pesticides.

Grab samples were collected for analyses of cyanide, volatile organics, hexavalent chromium, and petroleum hydrocarbons (PHC). PHC analysis was performed once a week. All other analyses were conducted once a month. Sampling at the three permitted CSO facilities was conducted at the first activation of each month for selected priority pollutant analyses and at every activation for conventional parameters analyses.

A list of parameters, sampling frequency, analytical procedures, and other relevant information is presented in Table I.A.2.

A.3 Local Limits Monitoring Program

The Local Limits Monitoring program design was very similar to the NPDES program. Mandated by the Pretreatment Program of the NPDES Permit, samples were collected from Deer Island and Nut Island during the same time period as are those for the NPDES program. There were three major differences between the NPDES and Local Limits program, of which the latter:

- monitored both influents and effluents
- conducted no toxicity tests
- analyzed each of the three daily composite samples separately

A list of parameters, sampling frequency, analytical procedures, and other relevant information is presented in Table I.A.3.

A.4 Harbor Studies Monitoring Program

Since the majority of priority pollutants in the Deer Island effluent were not detected using EPA-approved methodologies, the Harbor Studies monitoring program was designed to give a better estimate of the concentration of constituents in Deer Island effluent. The Battelle methodologies used provided much lower analytical detection levels than those employed by the NPDES and TRAC laboratories. This study was conducted from June 1993 to November 1993 and the effluent samples were collected from the Deer Island treatment plant. These samples were analyzed for PAHs, pesticides/PCBs, and eight selected metals.

Table I.A.1
Deer Island and Nut Island Treatment Plants
Monitoring Program

Parameter	Type[1]	Frequency	Analytical Method [2]
Conventional			
pH	Grab	Daily	150.1
Settleable Solids	Grab	Daily	160.5
Biochemical Oxygen Demand	Composite	Daily	405.1
Total Suspended Solids	Composite	Daily	160.2
Total Coliform	Grab	3 times Daily	9222 D [3]
Fecal Coliform	Grab	3 times Daily	9222 B [3]
Oil and Grease	Grab	Daily	413.1
Total Chlorine Residual	Grab	Daily	330.5
Chlorides	Grab	Daily	4500 B [3]
Metals [4]			
Arsenic	Composite	Monthly	206.2
Cadmium	Composite	Monthly	213.1
Chromium	Composite	Monthly	218.1
Copper	Composite	Monthly	220.1
Lead	Composite	Monthly	239.1
Mercury	Composite	Monthly	245.1
Nickel	Composite	Monthly	249.1
Silver	Composite	Monthly	272.1
Zinc	Composite	Monthly	289.1
Nutrients			
Total Kjeldahl Nitrogen	Composite	Monthly	351.3
Ammonia	Composite	Monthly	350.2
Nitrates	Composite	Monthly	353.3
Nitrites	Composite	Monthly	354.1
Orthophosphorus	Composite	Monthly	365.2
Total Phosphorus	Composite	Monthly	365.2

1 Composite samples are 24-hour time composite except for samples for metals analyses.
2 EPA methods
3 Standard Methods
4 laboratory-composited aliquot portions of the daily 24-hour daily composites.

Table I.A.2
NPDES Compliance Monitoring Program

Parameter	Type [1]	Frequency	Analytical Method [2]
Metals [3]			
Antimony	Composite	Monthly	204.2
Arsenic	Composite	Monthly	206.2
Beryllium	Composite	Monthly	200.7
Cadmium	Composite	Monthly	213.1
Chromium	Composite	Monthly	200.7
Copper	Composite	Monthly	200.7
Lead	Composite	Monthly	239.2
Mercury	Composite	Monthly	245.1
Molybdenum	Composite	Monthly	200.7
Selenium	Composite	Monthly	270.2
Silver	Composite	Monthly	200.7
Thallium	Composite	Monthly	279.2
Zinc	Composite	Monthly	200.7
Cyanide	Grab	3 x Monthly	335.2
Total petroleum hydrocarbon	Grab	Weekly	418.1
Pesticides/PCBs [3]	Composite	Monthly	Modified 608
Semi-volatiles [3]	Composite	Monthly	Modified 625
Volatiles	Composite	3 x Monthly	Modified 624

1 Composite samples are 24-hour time composite
2 EPA methods
3 laboratory-composited aliquot portions of the three 24-hour daily composites.

Table I.A.3
Local Limits Monitoring Program

Parameter	Type [1]	Frequency	Analytical Method [2]
Metals			
Antimony	Composite	3 x Monthly	204.2
Arsenic	Composite	3 x Monthly	206.2
Beryllium	Composite	3 x Monthly	200.7
Cadmium	Composite	3 x Monthly	213.1
Chromium	Composite	3 x Monthly	200.7
Copper	Composite	3 x Monthly	200.7
Lead	Composite	3 x Monthly	239.2
Mercury	Composite	3 x Monthly	245.1
Molybdenum	Composite	3 x Monthly	200.7
Selenium	Composite	3 x Monthly	270.2
Silver	Composite	3 x Monthly	200.7
Thallium	Composite	3 x Monthly	279.2
Zinc	Composite	3 x Monthly	200.7
Cyanide	Composite	3 x Monthly	335.2
Pesticides/PCBs	Composite	3 x Monthly	608
Semi-volatiles	Composite	3 x Monthly	625
Volatiles	Composite	3 x Monthly	624

1 24-hr composite
2 EPA Methods

II. The Facilities

Currently, the Authority is permitted to discharge effluent from two primary treatment plants, Deer Island and Nut Island, and three combined sewer overflow treatment facilities, Cottage Farm, Prison Point, and Somerville Marginal.

The Deer Island plant discharges through outfalls 001 through 005 to Boston Harbor. The Nut Island plant discharges through outfalls 101 through 103 to Boston Harbor and 104 to Hingham Bay. The Cottage Farm (201), Prison Point (203), and Somerville Marginal (205) CSO facilities discharge to the Charles River, Inner Harbor, and Mystic River respectively.

Three new CSO facilities, Constitution Beach, Fox Point, and Commercial Point, are owned and operated by the Authority. Effluent from these facilities discharge to BWSC lines. Consequently, these discharge locations are included in the BWSC NPDES permit.

Table II.1 lists the MWRA treatment facilities and relevant information pertaining to each facility. The table also includes the outfall number along with the permittee.

A. Deer Island

The Deer Island treatment plant, in operation since June of 1968, serves 22 communities and portions of Boston, Brookline, Newton, and Milton, encompassing an area of approximately 168 square miles.

Six MWRA pumping stations are located throughout the contributing area. Three remote headworks, Chelsea Creek, Ward Street, and Columbus Park, are connected to the Deer Island main pumping station by deep rock tunnels. Wastewater from the various pumping stations arrives at the treatment plant through these head works and wastewater from the town of Winthrop arrives at the plant through the Winthrop terminal.

The Deer Island plant is designed to provide primary treatment for an average daily flow of 343 million gallons per day (MGD) and a peak flow of 848 MGD. Figure II.A.1 presents the process flow diagram of the existing plant. Currently, the Deer Island consists of the following:

- screening and grit removal at all headworks
- pre-chlorination
- pre-aeration
- primary settling
- disinfection

Table II.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 (1.3 MG)	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 (1.2 MG)	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

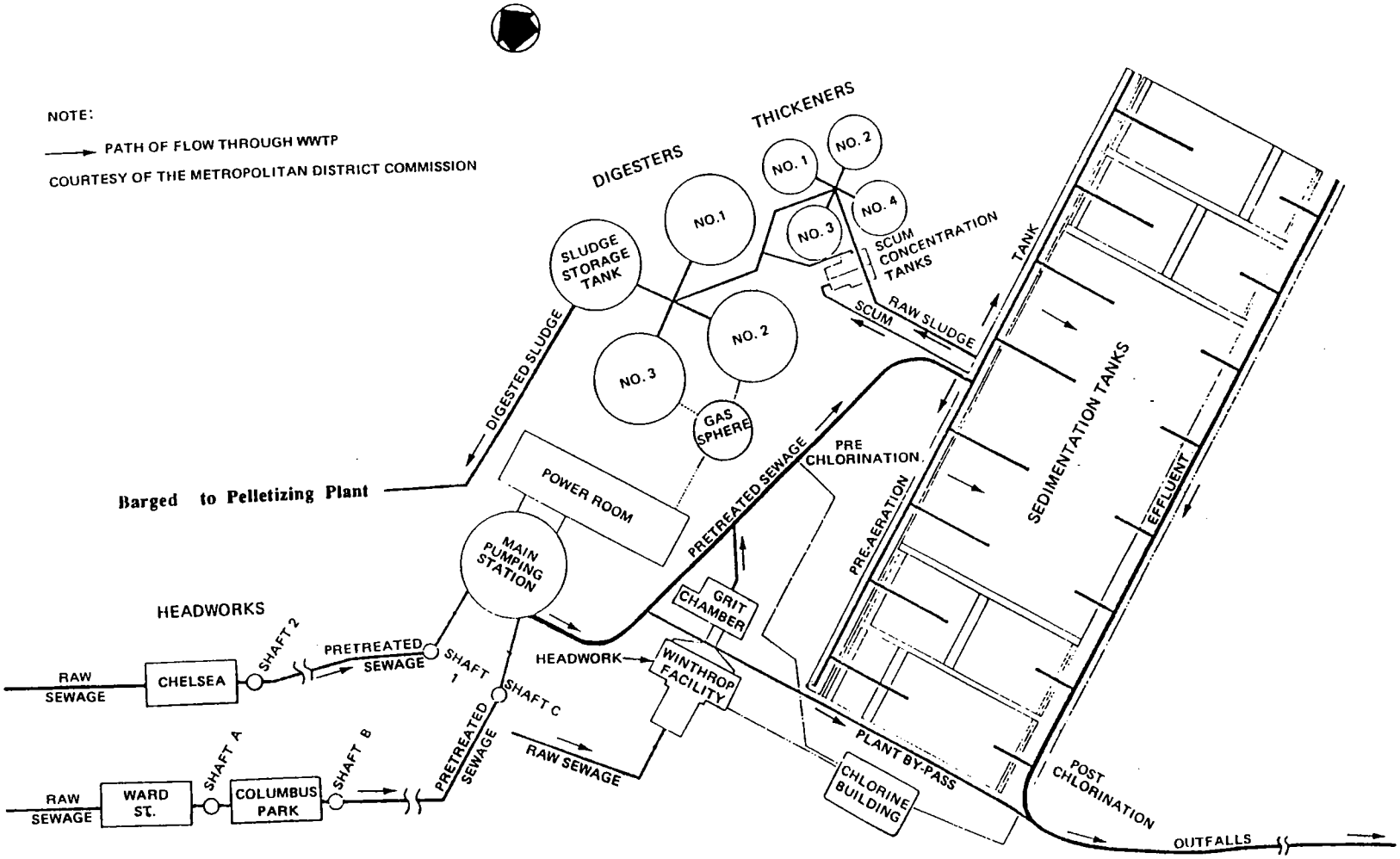


Figure II.A.1 Deer Island Process Flow Diagram

The facility consist of two preaeration channels, eight sedimentation tanks, four thickeners, and four digesters. Wastewater flows through the preaeration channels where air is introduced to help in the settling process and to avoid odor problems. The wastewater then flows to the sedimentation tanks where the sludge, heavier solid particles, is allowed to settle out while floatables, consisting mainly of oil, grease, and plastics, rise to the surface. The sludge (settled solids) is scraped off and sent to the thickeners. The floatables (scum) are skimmed off and mixed with the sludge.

Effluent is disinfected with hypochlorite prior to discharge to the harbor through two long submerged lines with five outfall pipes. Currently, only two of the five permitted outfall pipes, which are designated 001 to 005, are used daily, 001 and 002. Outfall 003 is permanently blocked and outfall 004 is used only during extreme high flows. Outfall 005 is temporarily blocked by sand and debris but can be activated if the need ever arises by simply cleaning the line. Figure II.A.2 is the plant's outfall system schematic.

Raw sludge from the sedimentation tanks is pumped to the thickeners prior to treatment at the anaerobic digesters. After digestion, the sludge is barged to the Fore River Pelletizing Plant where it is converted into fertilizer pellets.

Construction activities for the new secondary treatment plant continue. In 1995, the new primary plant is expected to be in full operation and should be discharging through the new outfall location. In 1996, the first two batteries of secondary treatment will become operational. The other two batteries of secondary treatment is scheduled for completion by 1999.

A.1 Influent Characteristics

A.1.1 Flow

In FY93, the average flow into Deer Island was 268 MGD, the minimum flow recorded was 174 MGD, and the maximum flow, which occurred after a three-day total rainfall event of 1.92 inches on March 28, 29, and 30, was 628 MGD (Figure II.A.3).

The high flows were measured in December, March and April were due to heavy precipitation.

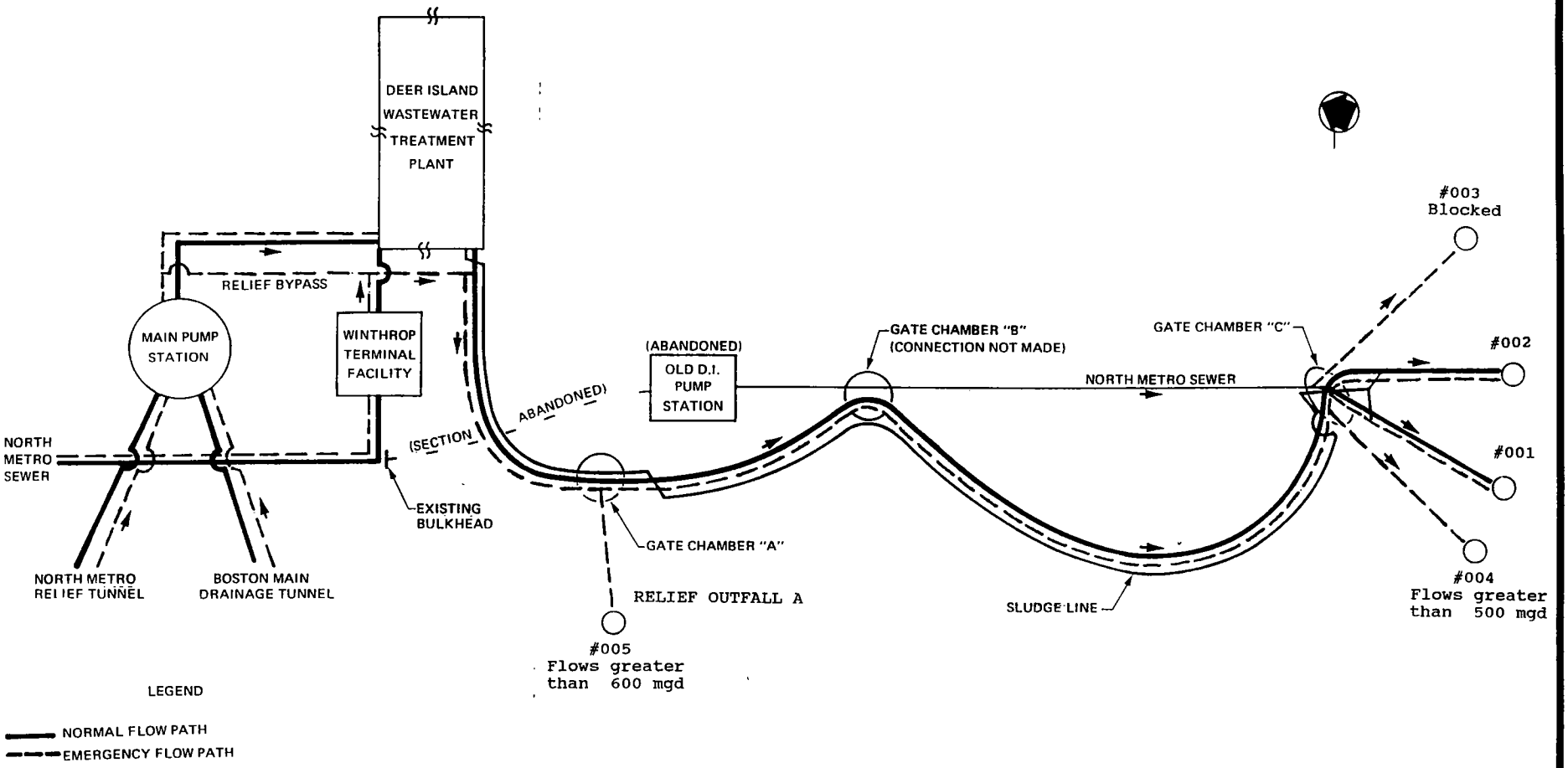
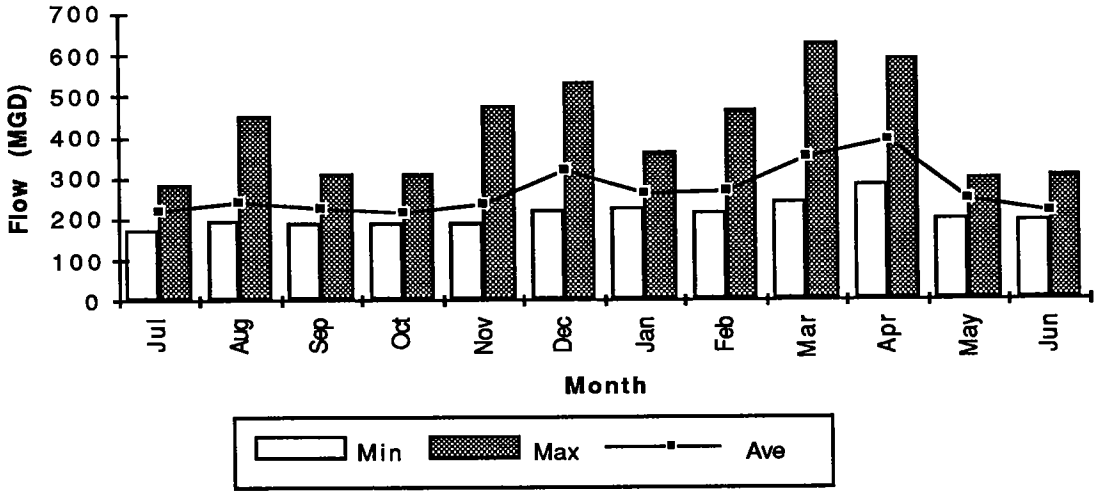


Figure II.A.2 Deer Island Treatment Plants Outfall Schematic

Figure II.A.3 Deer Island Flows, Fiscal Year 1993



In FY93, with the exception of December, March, and April, months with heavy precipitation, the average influent flows to Deer Island were noticeably lower than in the past five years (Figure II.A.4).

Figure II.A.4 Deer Island FY93 Daily Flow Compared to Historical Data

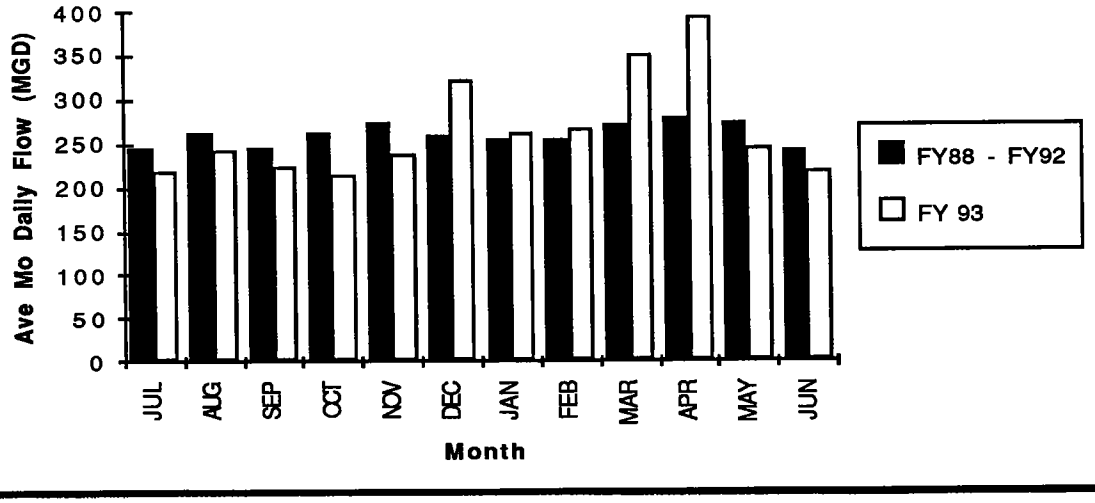
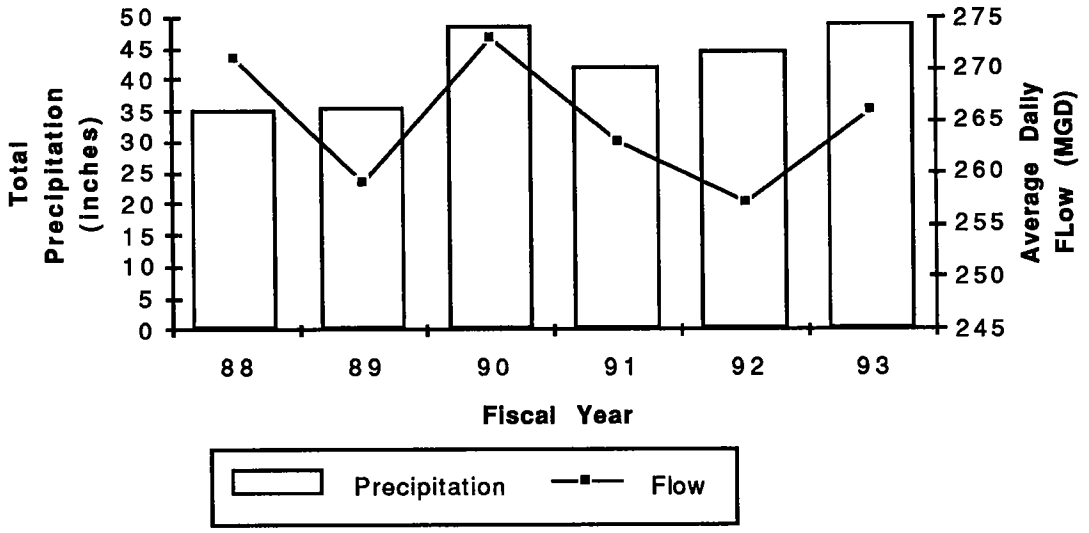


Figure II.A.5 illustrates the relationship between average daily flow and total precipitation for the last six years. In FY93, there was an increase in the average daily flow going through the plant when compared to FY92 records. This is due to the higher amount of precipitation in FY93. However, the graph suggests that during the last three years, the average flows going through the facility have decreased although the total precipitation has increased. One probable reason for the reduced influent flow is the reduction of inflow entering the sewer system.

Figure II.A.5 Average Daily Flow Compared to Total Precipitation



A.1.2 Conventional Parameters

Results of monitoring for influent conventional pollutants are presented in Appendix A, Table A-1, Deer Island Treatment Plant Operations Summary.

Table II.A.1 provides a quick overview of the flow and influent loadings to the Deer Island plant. The table shows that the influent loadings in FY93 were slightly higher than in FY92.

The influent BOD and TSS concentrations show a very slight increase over last year's average concentrations. Even with the slight increase, the wastewater strength can still be classified as "weak" to "medium." The combination of slight increases in both concentration and flow have resulted in increased TSS and BOD loadings of 25% and 13% respectively.

Table II.A.1 Deer Island Influent Characterization, FY 1993

Parameter	FY92	FY93
Flow (MGD)		
Minimum	166	174
Average	257	268
Maximum	582	628
Total Suspended Solids		
Min Conc (mg/L)	113	121
Ave Conc (mg/L) a	132	159
Max Conc (mg/L)	170	224
Average Loading (lbs/d)	283000	355000
Biochemical Oxygen Demand		
Min Conc (mg/L)	123	123
Ave Conc (mg/L)	146	159
Max Conc (mg/L)	169	190
Average Loading (lbs/d)	313000	355000
Settleable Solids		
Min Conc (mg/L)	3	1
Ave Conc (mg/L)	3	4
Max Conc (mg/L)	4	5
Oil and Grease		
Min Conc (mg/L)	28	20
Ave Conc (mg/L)	64	43
Max Conc (mg/L)	127	84

a Influent sampler clogged in September. Suspect data not included in the month's data set.

A.1.3 Priority Pollutants

There were two sets of influent priority parameters data gathered during FY93: the Deer Island Laboratory data and the Local Limits study data.

The Deer Island Laboratory only measured the concentration of select metals. The Local Limits Study conducted a complete priority pollutant scan. The results of these analyses are presented in Appendix A, Tables A-1 and A-2 respectively.

Metals

The influent data consistently showed measurable amounts of copper and zinc. Lead was detected 16 times out of 36 samples; other metals were present at very low concentrations. The concentrations of copper and zinc were similar for both the Deer Island Lab and Local Limits studies. However, the concentrations of all other metals, except cadmium, were higher in the Deer Island results (Table II.A.2). Some probable explanations for these results are differences in sample preparation, sample type, and analytical methods employed.

Except for copper, lead, and zinc, most of the metals were detected infrequently and were "J" values (estimated values below quantitation limit) when detected. Substituting half the quantitation limit for below detection level (BDL) values to derive average values may have artificially raised the average concentration.

Table II.A.2 Deer Island FY93 Influent Metals Concentration Compared

	Geometric Mean Concentration (mg/L)	
Metals	**Local Limits Data ***	**Deer Island Lab Data ***
Arsenic	0.002	0.006
Chromium	0.007	0.029
Copper	0.081	0.089
Cadmium	0.003	0.001
Lead	0.019	0.048
Mercury	0.0004	0.0017
Nickel	0.01	0.022
Silver	0.005	0.006
Zinc	0.132	0.158

* Half the MDL was substituted for measurements that were below detection.

Historical Metals Loadings

Historical metal loadings from the Deer Island laboratory data are presented in Figure II.A.6. The metal loadings to the facility were high in the late 80s, coinciding with economic boom times. An apparent decrease in the metal loadings that started in the 90s seems to have levelled off over the past two years.

Pesticides

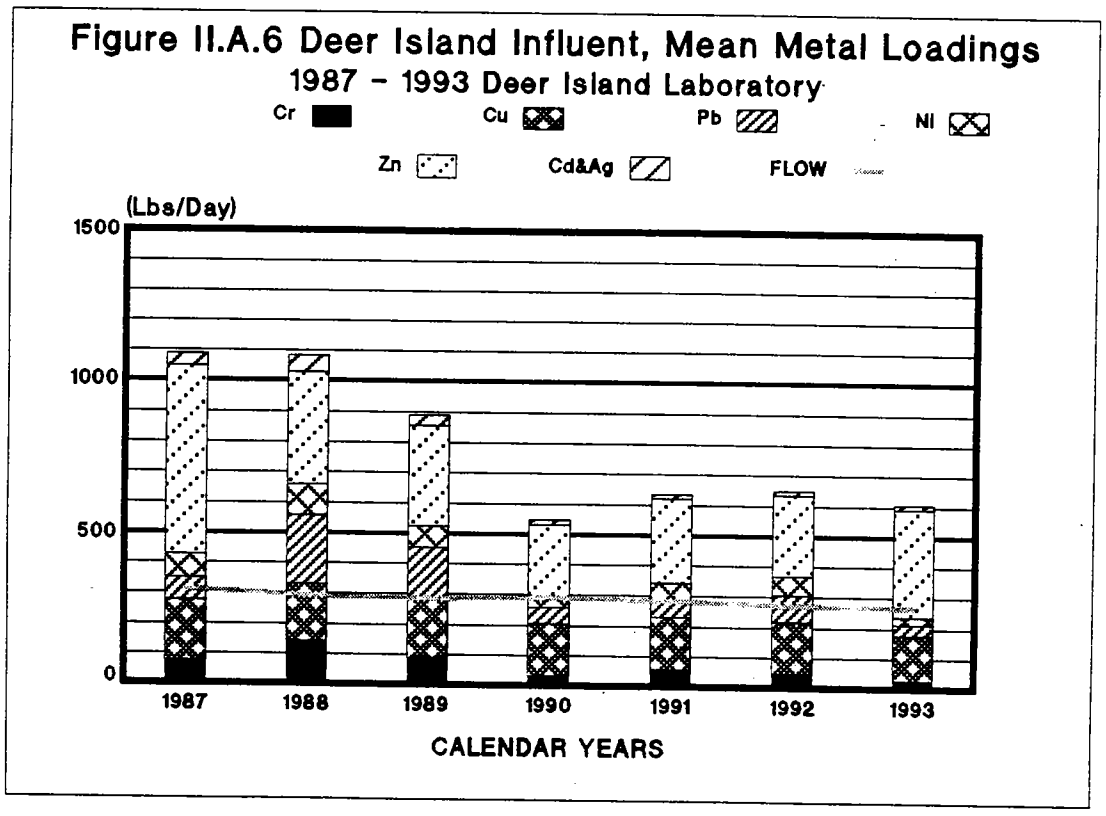
There were several pesticides/PCBs detected in the 36 Local Limits samples; lindane was detected in seven, heptachlor in five, dieldrin and toxaphene in three, and DDT and DDE in one.

Polynuclear Aromatic Hydrocarbons (PAH)

The Local Limits study detected several PAHs: 2-methyl naphthalene, naphthalene, and phenanthrene.

Other Organic Compounds

The semivolatile organic compounds: dichlorobenzene, phthalates, and phenols, and the volatile organic compounds: acetone, methylene chloride, trichlorethenes, tetrachloroethenes, and xylenes were detected in the Local Limits study.



A.2 Effluent Characteristics

A.2.1 Conventional Parameters

The effluent characteristics for conventional parameters are presented in Appendix A, Table A-1. Table II.A.3 compares Deer Island effluent quality with court-ordered interim limits. In FY93, a total of 16 court-ordered interim limit violations, which were all BOD-related, occurred at Deer Island. There were no other violations.

Table II.A.3 Deer Island Effluent Quality Compared to Interim Limits

Parameter	Interim Limits*	Effluent Values Exceeding Limits	No of Violations
Biochemical Oxygen Demand			
Mo Ave (mg/L)	140	152, 147, 144	3
Dly Max (mg/L)	200	217	1
12-mo running removal rate (%)	27	12 - 19	12
Total Suspended Solids			
Mo Ave (mg/L)	110		0
Dly Max (mg/L)	180		0
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		0
pH	6.5 - 8.5		0
		Total Number of Violations	**16**

* Except for removal rates, the effluent quality must be equal or less than limits
Removal rates must be equal or greater than limits

Trend analyses of conventional parameters for the twelve monitoring months in FY93 are presented in Figure II.A.7. The interim limit for treatment plant removal efficiency is a 12-month running average based on the monthly average that is the calculated monthly concentration. The daily maximum is the maximum allowable discharge concentration for the day. As indicated on Figure II.A.7, Chart 1, there were only three BOD monthly average violations and one maximum BOD violation in the early part of the fiscal year. The BOD % removal (12-month running average) requirement, however, was not consistently satisfied throughout the year (Chart 3).

Figure II.A.7 Deer Island Trend Analyses of Conventional Pollutants

Chart 1

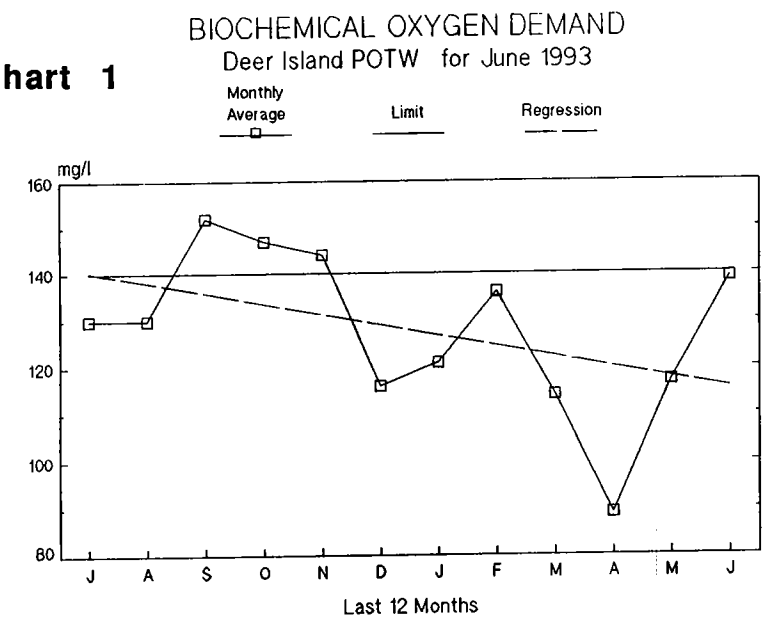


Chart 2

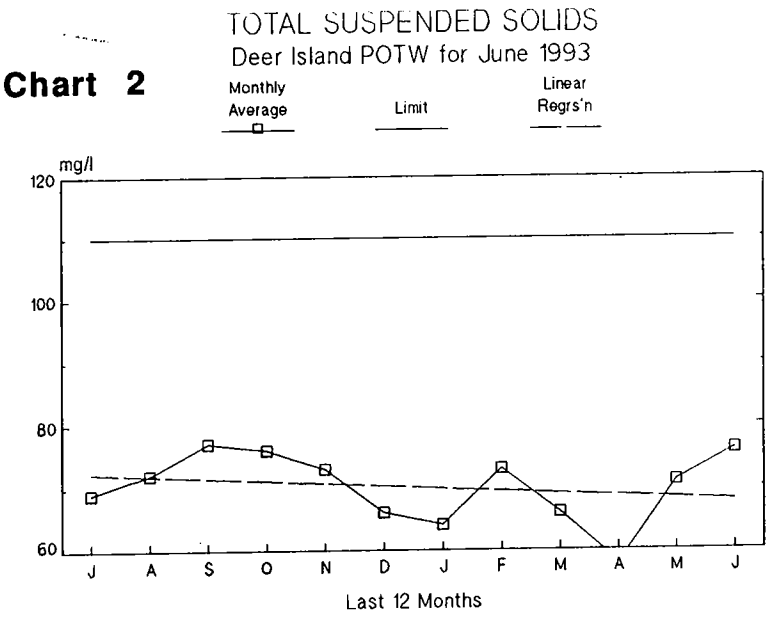


Chart 3

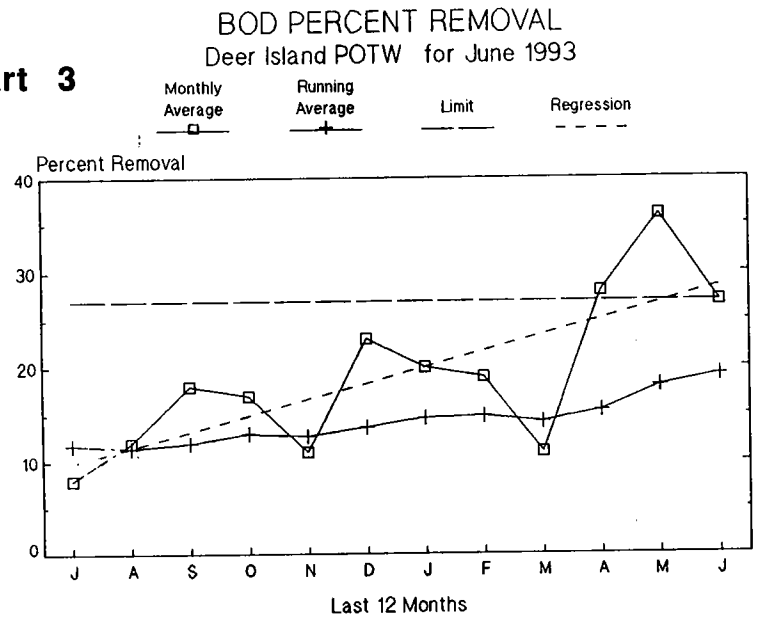


Chart 4

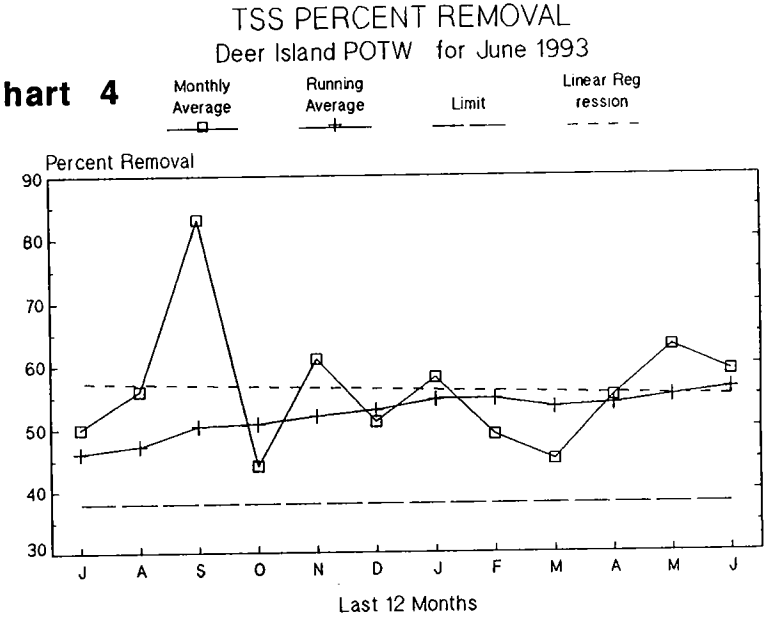


Chart 5

FECAL COLIFORM BACTERIA
Deer Island POTW for June 1993

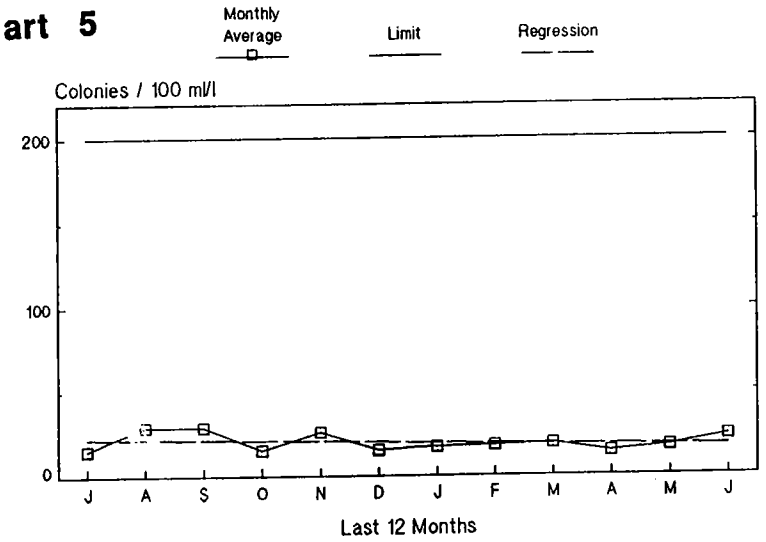


Chart 6

pH
Deer Island POTW for June 1993

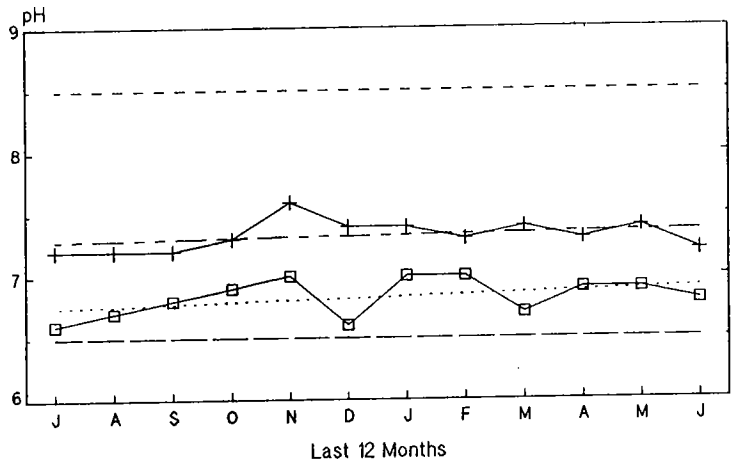


Chart 7

TOTAL COLIFORM BACTERIA
Deer Island POTW for June 1993

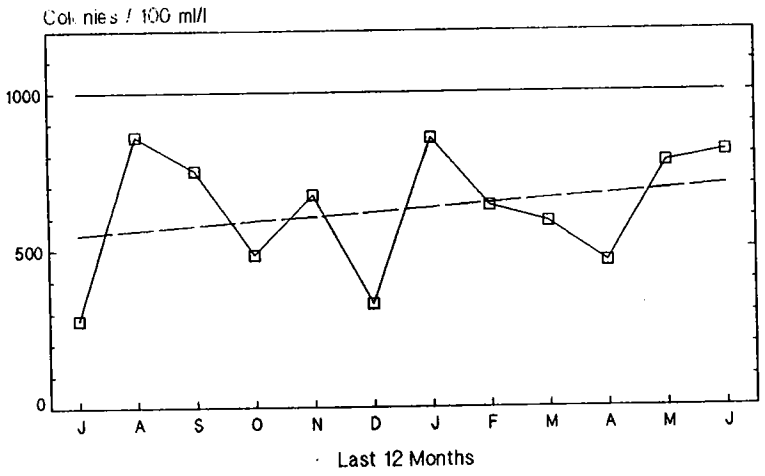
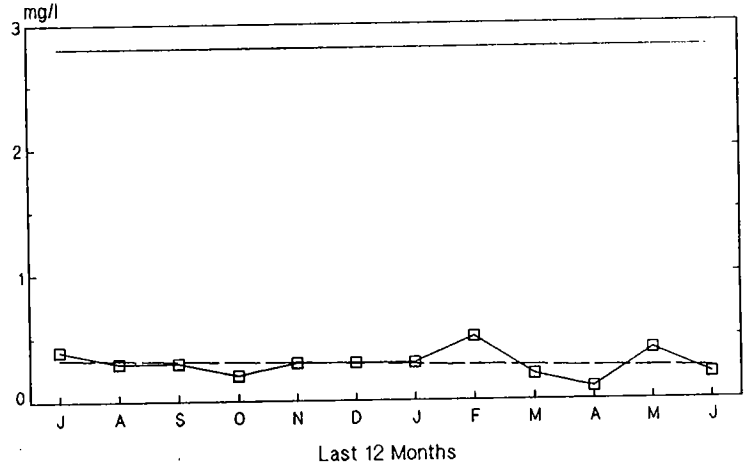


Chart 8

SETTLEABLE SOLIDS
Deer Island POTW for June 1993



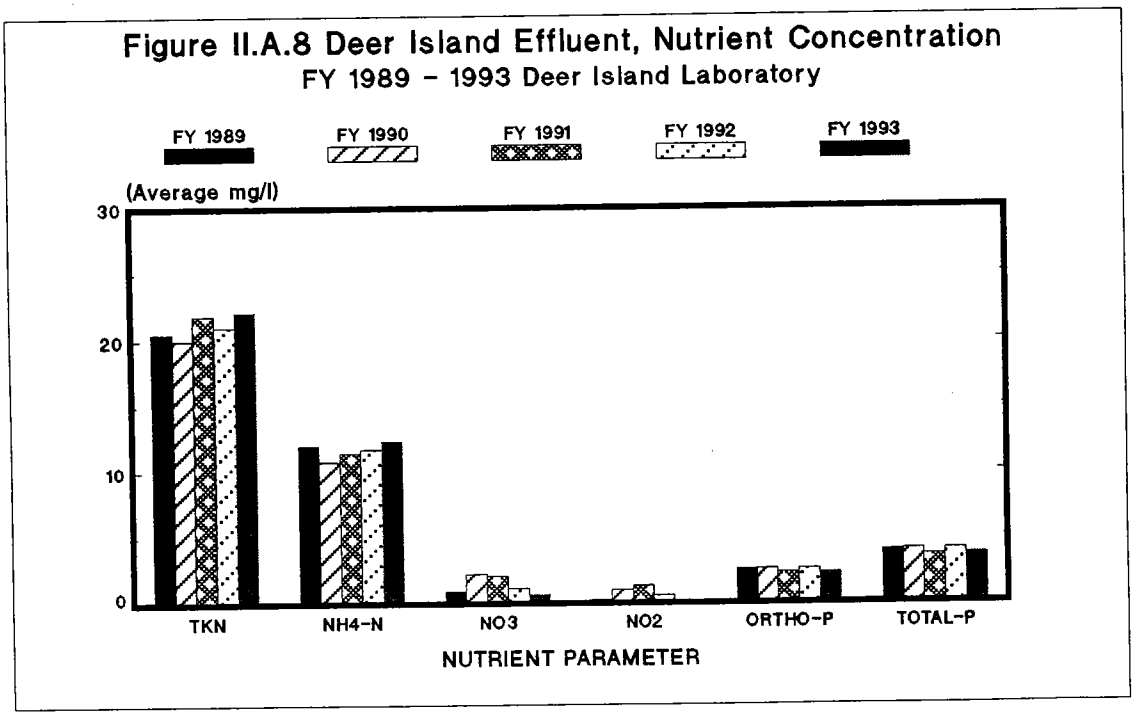
A.2.2 Nutrients

Because of the potential effect on algal growth in receiving bodies of water, nutrients, especially the nitrogen compounds, are closely monitored. Nutrient loadings to the harbor that were monitored included: kjeldahl nitrogen (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 summarized in Table II.A.4.

There was no seasonal pattern to the nutrient data. Similarly, there were no historical trends over the past five years (Figure II.A.8).

Table II.A.4 Deer Island Effluent FY93 Nutrient Concentration

Nutrient (mg/L)	Concentration Minimum	Average	Maximum
TKN	14.88	22.15	26.21
Ammonia	7.59	12.35	15.70
Nitrates	0.05	0.66	1.63
Nitrites	0.02	0.16	0.48
Orthophosphorus	0.98	2.27	3.59
Total Phosphorus	2.03	3.64	4.71



A.2.3 Priority Pollutants

Independent testing of Deer Island effluent was performed by NPDES as well as by Local Limits, Harbor Studies and the Deer Island Laboratory monitoring programs. Both the NPDES and Local Limits programs conducted full priority pollutant scans; the Deer Island lab analyzed for some selected metals. The Harbor Studies only analyzed some metals, pesticides/PCBs, and PAHs.

Results from the Deer Island, NPDES, Local Limits and Harbor Studies analyses are found in Appendix A, Tables A-1, A-4, A-5 and A-6, and are compared in Table II.A.5. In general, the three data sets show a positive correlation despite the differences in monitoring protocols.

Metals Most of the metals detected in the influent were also detected in the effluent, as expected of a primary treatment facility. Copper, lead and zinc were detected in measurable amounts; the other metals, if detected, were slightly above detection levels. The Harbor Studies results were lower than the other study results, except for copper. Figure II.A.9 compares the calculated metal loadings for each of the data sets. Except for copper and zinc, the three data sets show comparable loadings.

Figure II.A.9 Deer Island Mean Metals Effluent Loadings, FY93, Comparison of Studies

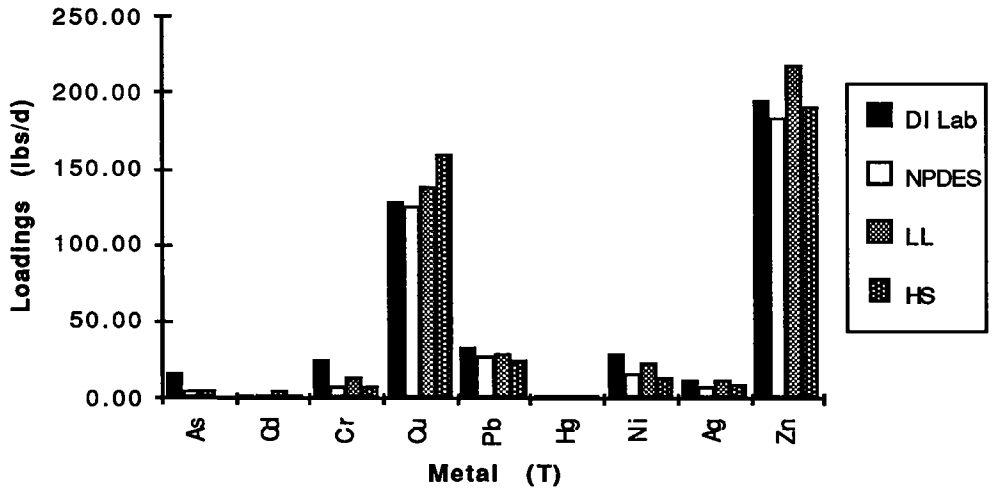
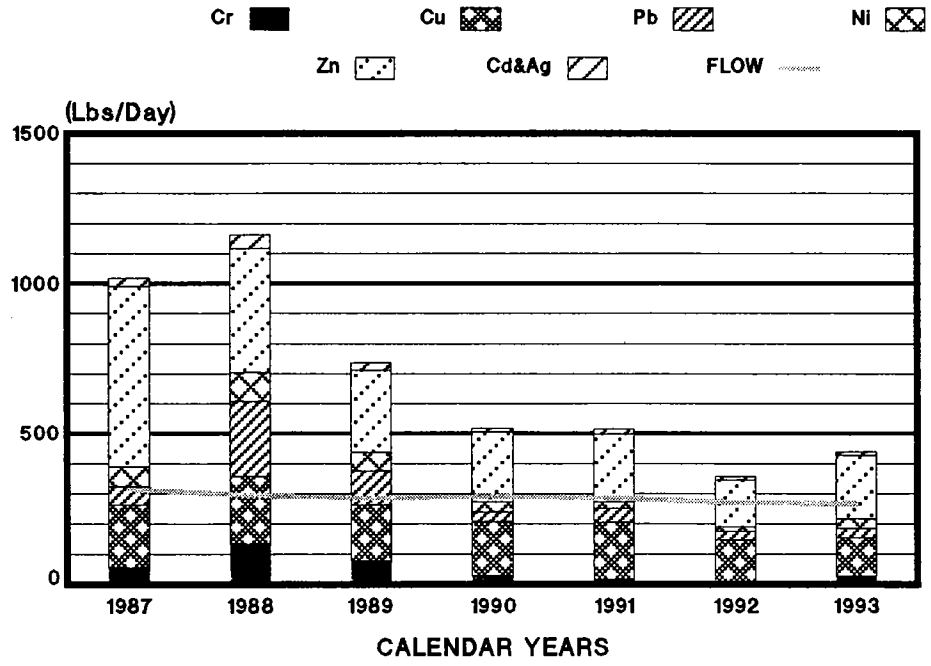


Figure II.A.10 graphs the metal loadings from FY87 to FY93 and depicts decreasing total metal loads discharged to the harbor.

Figure II.A.10 Deer Island Effluent, Mean Metal Loadings
1987 - 1993, Deer Island Laboratory



Pesticides

The Local Limits study detected pesticides/PCBs that were also present in the influent. The NPDES data set reported several compounds in the effluent including: aldrin, chlordane, a-BHC, b-BHC, d-BHC, g-BHC, DDD, DDE, dieldrin, endosulfan sulfate, heptachlor and heptachlor epoxide.

Polynuclear Aromatic Hydrocarbon (PAH)

Of the PAH group, naphthalene, 2-methyl naphthalene, phenanthrene, fluoranthene, perylene, and dibenzo(a,h)anthracene were detected.

Other Semivolatile Organics

Semivolatile organics present include chloroform, 4-methyl phenol, and phthalates.

Volatile Organic Compounds

Of all the volatile compounds, 1,2-dichloroethene, acetone, benzene, chloroform, methylene chloride, tetrachloroethylene, and toluene were detected at all times.

Table II.A.5 Deer Island Effluent Characterization Compared, FY93

	Geometric Mean Concentration			
Metals (mg/L)	Deer Island Data (1)	NPDES Data (2)	Local Limits Data (3)	Harbor Studies Data (4)
Antimony		0.005	0.040	
Arsenic	0.007	0.002	0.002	
Boron		0.304	0.483	
Cadmium	0.001	0.001	0.002	0.0005
Chromium (Total)	0.011	0.003	0.006	0.0032
Copper	0.057	0.056	0.062	0.0715
Lead	0.015	0.012	0.013	0.0110
Mercury	0.0003	0.0002	0.0004	0.0001
Nickel	0.013	0.007	0.010	0.0059
Selenium		0.001	0.002	
Silver	0.005	0.003	0.005	0.0039
Zinc	0.087	0.082	0.097	0.0850
Cyanide (mg/L)		0.007	0.009	
PHC (mg/L)		1.902	2.644	
Pesticides/PCBs (ug/L)				
4,4'DDD		0.024	0.017	0.0001
aldrin		0.009	0.009	< 0.0100
b-BHC		0.010	0.010	
Chlordane		0.072	0.042	0.0024
d-BHC		0.020	0.012	
Dieldrin		0.016	0.017	0.0011
Endosulfan I		0.007	0.009	
Endosulfan Sulfate		0.031	0.018	
g-BHC		0.008	0.010	0.0146
Heptachlor		0.009	0.017	< 0.0100
Heptachlor epoxide		0.007	0.009	< 0.0100
SEMIVOLATILE ORGANICS (ug/L)				
2-methylnaphthalene		1.455	3.758	
4-Methyl phenol		23.764	29.470	
Benzyl alcohol		10.438	11.341	
bis(2-ethylhexyl)pthalate		8.447	9.986	
Butylbenzyl phthalate		2.495	3.911	
Di-n-butylpthalate		3.940	3.825	
Di-n-octylphthalate		1.373	2.764	
Diethyl pthalate		5.376	6.095	
Naphthalene		1.328	3.669	1.3180
Phenol		1.212	5.716	

Table II.A.5 (Con't)

	Geometric Mean Concentration			
	Deer Island Data (1)	NPDES Data (2)	Local Limits Data (3)	Harbor Studies Data (4)
VOLATILE ORGANICS (ug/L)				
1,1,1-trichloroethane		1.205	1.152	
2-butanone		2.446	1.410	
Acetone		113.058	83.000	
Benzene		1.473	1.290	
Bromodichloromethane		1.071	1.143	
Bromoform		0.778	1.001	
Bromomethane		1.150	0.993	
Carbon disulfide		2.306	1.822	
Chloroform		7.366	5.948	
Chloromethane		1.962	1.558	
Dibromochloromethane		0.749	0.983	
Ethyl benzene		0.672	0.954	
Methylene chloride		6.30	4.825	
Tetrachloroethene		5.818	4.500	
Toluene		5.685	4.936	
Trichloroethene		2.859	2.214	
Vinyl Acetate		1.041	0.924	
Xylene		3.114	2.287	

(1) Analytical results, Deer Island Laboratory, Appendix A, Table A-1
(2) Analytical results, NPDES Program, Appendix A, Table A-3
(3) Analytical results, Local Limits Study, Appendix A, Table A-4
(4) Analytical results, Harbor Studies, Appendix A, Table A-5

B. Nut Island

The Nut Island treatment plant, in operation since 1952, serves 21 communities including portions of Boston, Brookline, Newton and Milton. The area served by this treatment plant is approximately 238 square miles. Five MWRA pumping stations are located throughout the contributing area.

The Nut Island plant is designed to provide primary treatment for an average daily flow of 112 MGD and a peak flow of 300 MGD.

Current treatment processes are:

- pre-chlorination
- screening, grit removal
- pre-aeration
- primary settling
- disinfection

The facility consist of two bar screens, six grit chambers, five preaeration tanks, six sedimentation tanks, four thickeners and four digesters. Screening and grit removal is accomplished at the plant. Figure II.B.1 presents the process flow diagram of the existing Nut Island plant.

Wastewater from the high level sewer passes through bar screens, grit chambers before it is pumped to the preaeration channels. Wastewater then flows by gravity through the sedimentation tanks. Effluent is disinfected with chlorine gas prior to discharge. Figure II.B.2 shows its outfall system schematic.

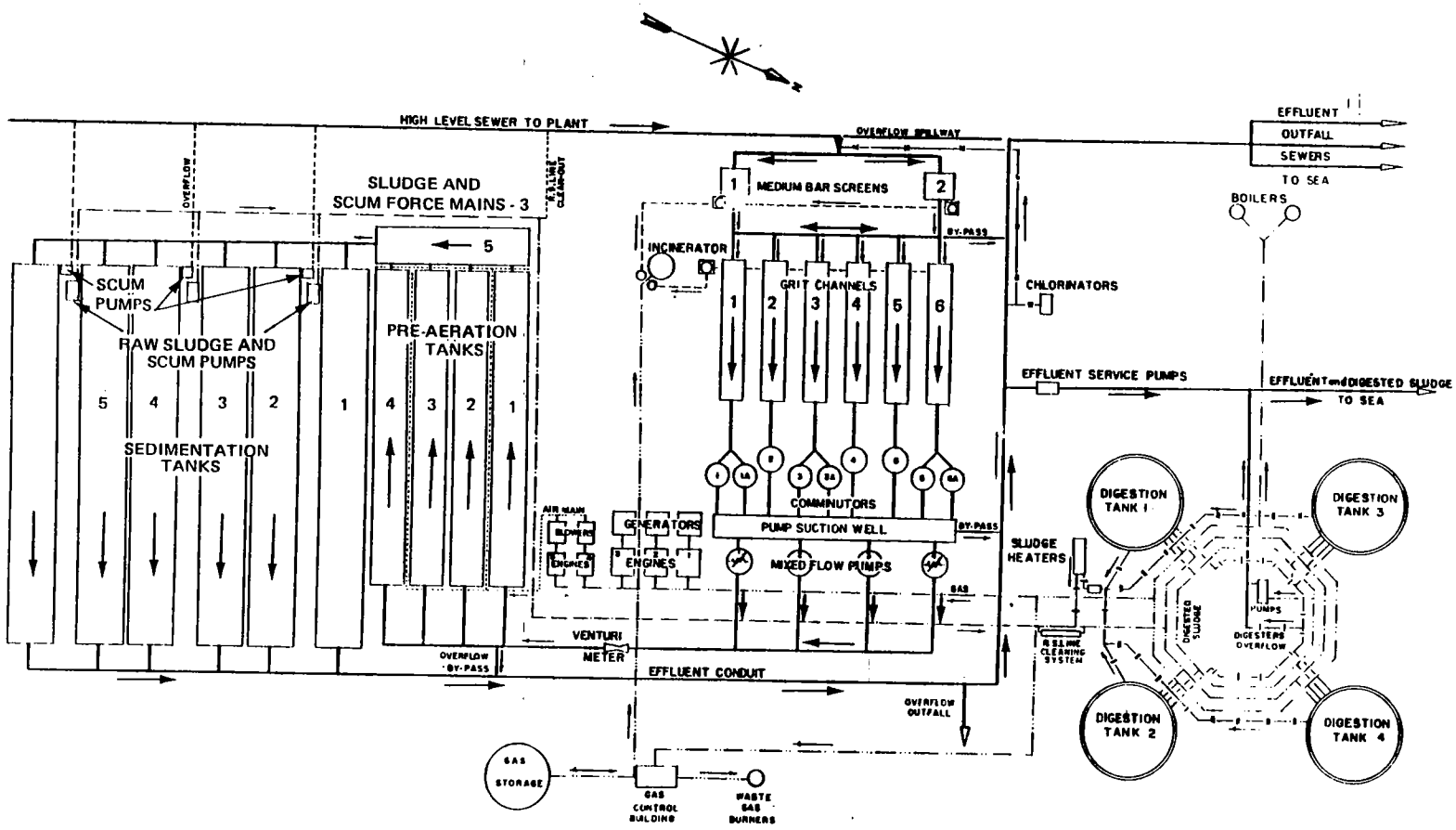
Sludge removed from the sedimentation tanks is pumped to the anaerobic digesters for further treatment. The digested sludge is barged and converted to fertilizer at the Fore River Pelletizing Plant.

Construction activities to retrofit this facility into a headwork for the new Deer Island secondary treatment plant are continuing. The project is expected to be completed by July 1995.

B.1 Influent Characteristics

B.1.1 Flow

In FY 93, the average influent flow into Nut Island was 129 MGD and the minimum recorded flow was 50 MGD. The maximum flow of 262 MGD occurred after a three-day total rainfall event of 1.92 inches in March 28, 29, and 30.



NOTE:

← PATH OF FLOW THROUGH WWTP

COURTESY OF THE METROPOLITAN DISTRICT COMMISSION

Figure II.B.1 Nut Island Treatment Plants Process Flow Diagram

Figure II.B.2 Nut Island Outfall System Schematic

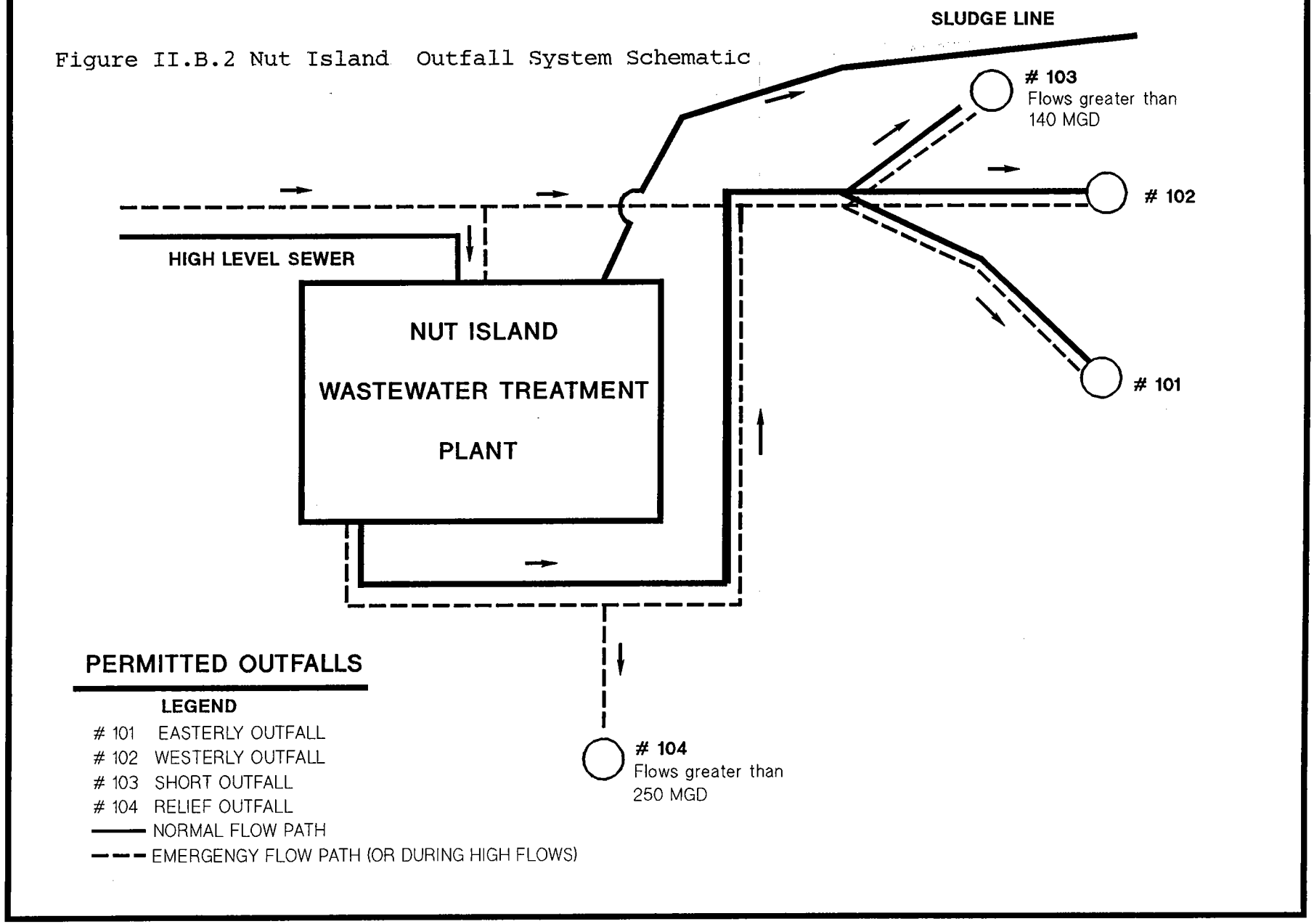
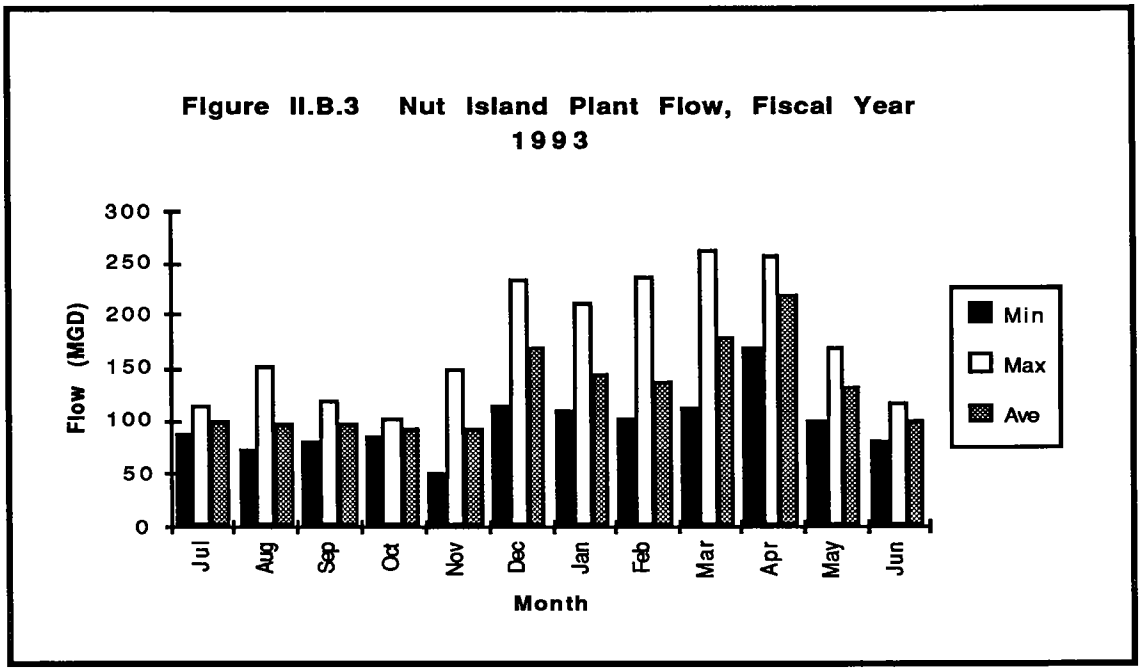


Figure II.B.3 graphs the minimum, average, and maximum flows of FY93. The Nut Island flow data suggest a more pronounced seasonal variability when compared to the Deer Island data. Flows were lower in late spring, continuing through the fall. High flows were recorded during the months of high precipitation, suggesting a high percentage of infiltration/inflow into the system.



The seasonality is also evident when the flow records for FY88 to 93 are analyzed. In general, the average monthly flow over the six-year period follows the trend depicted in the FY93 data; the flows were high during the wet months and low during the low-precipitation months. Except for the months with high precipitation, the monthly average daily flows in FY93 were slightly lower than the monthly average flows for the five-year period (Figure II.B.4).

Figure II.B.4 Nut Island FY93 Average Daily Flow Compared to Historical Data

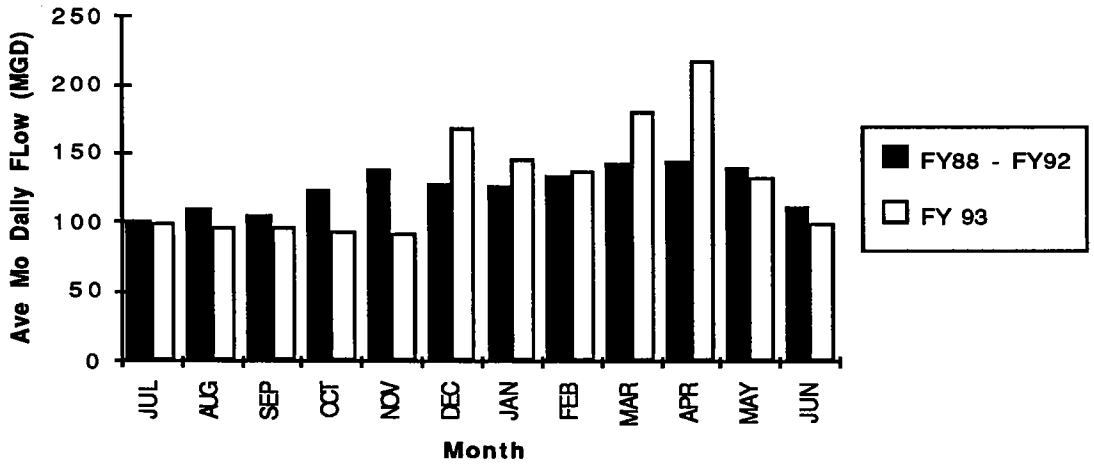
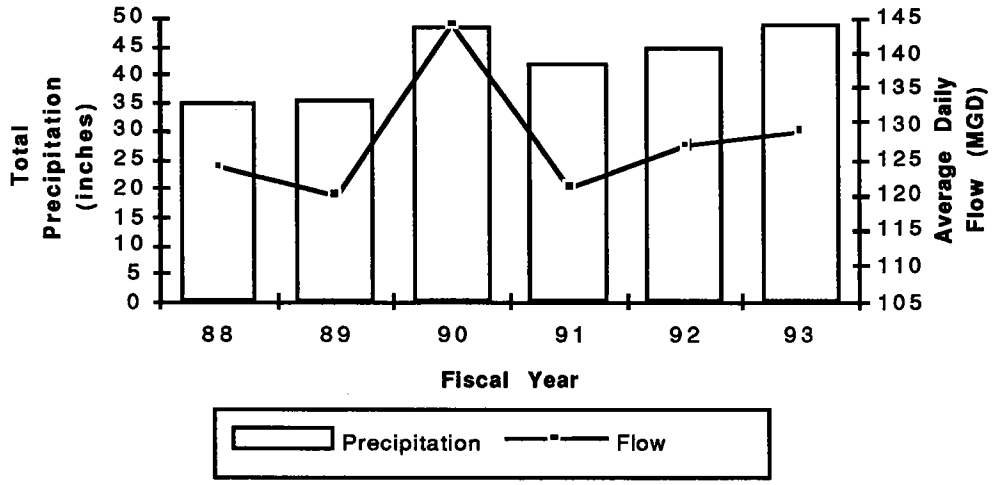


Figure II.B.5 illustrates the relationship between daily flow and total precipitation for the last six years. Unlike that of Deer Island, the Nut Island flow seems to increase with increased precipitation. The data suggest a significant inflow entering the system.

Figure II.B.5 Average Daily Flow Compared to Total Precipitation



B.1.2 Conventional Parameters

Results of monitoring for influent conventional pollutants are presented in Appendix B-1, Nut Island Treatment Plant Operations Summary.

Table II.B.1 provides a quick overview of the flow and influent loadings to the plant. As shown, the influent concentration this year is lower than last year's record. When compared to Deer Island's influent, the Nut Island data suggest a weaker wastewater.

Table II.B.1 Nut Island Influent Characterization, FY 1993

Parameter	FY92	FY93
Flow (MGD)		
Minimum	73	50
Average	127	129
Maximum	254	262
Total Suspended Solids		
Minimum (mg/L)	162	112
Average (mg/L)	221	174
Maximum (mg/L)	437	206
Loadings (lb/d)	234079	187200
Biochemical Oxygen Demand		
Minimum (mg/L)	141	122
Average (mg/L)	194	177
Maximum (mg/L)	259	251
Loadings (lb/d)	205481	190427
Settleable Solids (mg/L)		
Minimum	5.2	5.1
Average	10.3	8
Maximum	39.3	10.5
Oil and Grease (mg/L)		
Minimum	23	11
Average	42	35
Maximum	119	59

B.1.3 Priority Pollutants

There are two sets of Nut Island data for influent priority pollutants: the Nut Island Lab set and the Local Limits set. Although the Deer Island Laboratory conducted the chemical analyses of Nut Island effluent samples, to avoid confusion, the Deer Island Lab results will be labelled the Nut Island set. The Local Limits Study conducted a priority pollutant scan. The results of these analyses are presented in Appendix B, Tables B-1, B-2 and B-3 respectively.

Metals

Measurable amounts of copper, lead and zinc and very low concentrations of other metals were observed in both the Nut Island Lab and the Local Limits data. With the exception of copper, the values reported by Deer Island Lab were considerably higher than those measured in the Local Limits study (Table II.B.2).

Historical Metal Loadings

The Nut Island historical influent metal loadings are presented in Figure II.B.6. There was a decrease of total metals from 1987 to 1990, however, over the past three years the decrease appears to be leveling off.

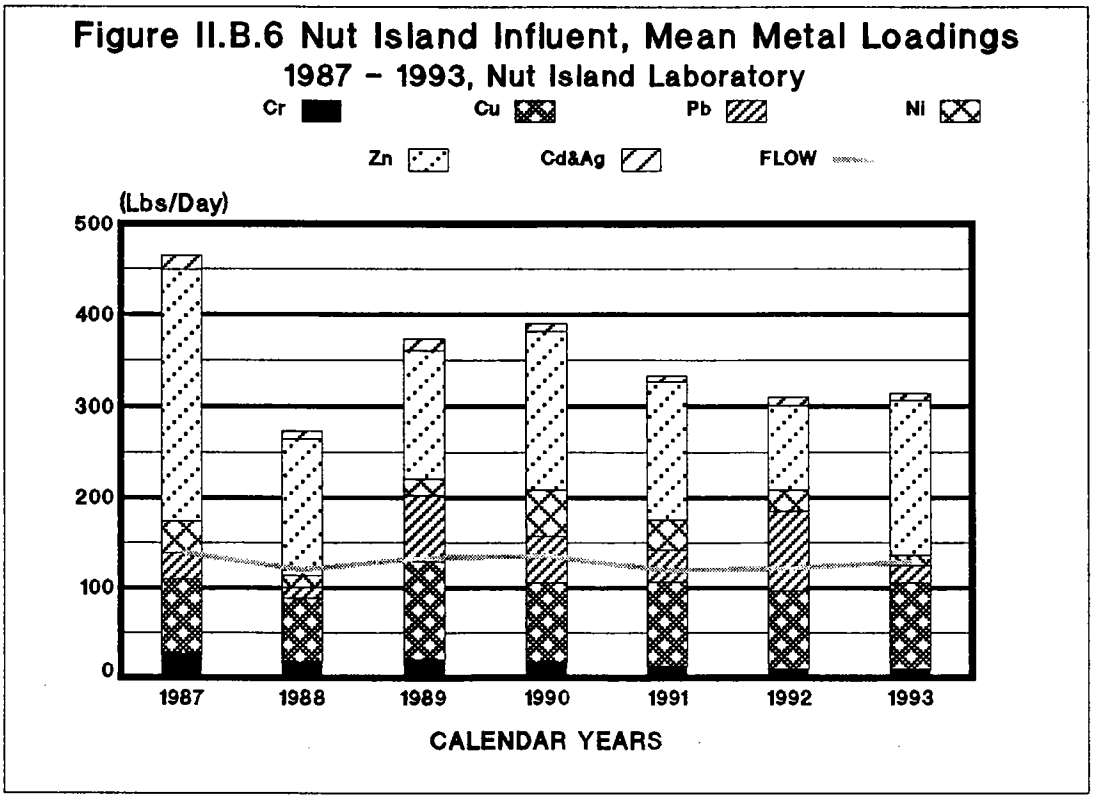


Table II.B.2 Nut Island FY93 Influent Metals Concentration Compared

Metals	Geometric Mean Concentration (mg/L)[a]	
	Local Limits Data	Nut Island Lab Data[b]
Arsenic	0.002	0.0118
Chromium	0.007	0.0143
Copper	0.102	0.0923
Cadmium	0.003	0.0013
Lead	0.016	0.0405
Mercury	0.001	0.0017
Nickel	0.011	0.0163
Silver	0.006	0.0071
Zinc	0.137	0.1606

Notes:
a The geometric mean concentration was calculated by substituting half the MDL for measurements that were below detection.
b Analyses conducted by Deer Island Laboratory

Pesticides/PCBs

The Local Limits study detected measurable amounts of a-BHC, g-BHC, chlordane, DDD, DDT, dieldrin, aldrin, heptachlor, and toxaphene. However, the frequency at which they were detected was quite low. The most frequently detected pesticide was g-BHC detected in ten out of 35 samples.

Polynuclear Aromatic Hydrocarbons (PAH)

The Local Limits study detected acenaphthene, benzo(ghi)perylene, 2-methyl naphthalene, naphthalene, and phenanthrene in the influent. With the exception of naphthalene, which was detected four times out of 35 samples, the other PAHs were detected only once in 35 samples.

Other Organic Compounds

Other semi-volatile and volatile organic compounds consistently measured in the influent include phenols, phthalates, acetone, chlorinated hydrocarbons, methylene chlorides, toluene, and xylenes.

B.2 Effluent Characteristics

B.2.1 Conventional Parameters

The concentrations of conventional parameters in the effluent are contained in Appendix B, Table B-1. Table II.B.3 compares the Nut Island effluent quality with court-ordered interim limits. Trend analyses of conventional parameters for the twelve monitoring months in FY 93 are presented in Figure II.B.7.

Table II.B.3 Nut Island Effluent Quality Compared to Interim Limits

Parameter	Interim Limits*	Effluent Values Exceeding Limits	No of Violations
Biochemical Oxygen Demand			
Mo Ave (mg/L)	130	134, 142, 142	3
Dly Max (mg/L)	185	203, 190, 195	3
12-mo running removal rate (%)	15		
Total Suspended Solids			
Mo Ave (mg/L)	110		
Dly Max (mg/L)	195		
12-mo running removal rate (%)	43		
Settleable Solids (mg/L)	1.8		
Fecal Coliform (#/100 mL)	200		
Total Coliform (#/100 mL)	1000		
pH	6.5 - 8.5	6.3, 6.48, 6.46 6.3, 6.4, 5.6, 6.4 6.4, 6.4, 6.47	10
Volatile Solids			
2-mo running removal rate (%)	61	60, 59, 57, 58, 60	5
		Total Number of Violations	21

* 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.

Figure II.B.7 Nut Island Trend Analyses of Conventional Pollutants

Chart 1

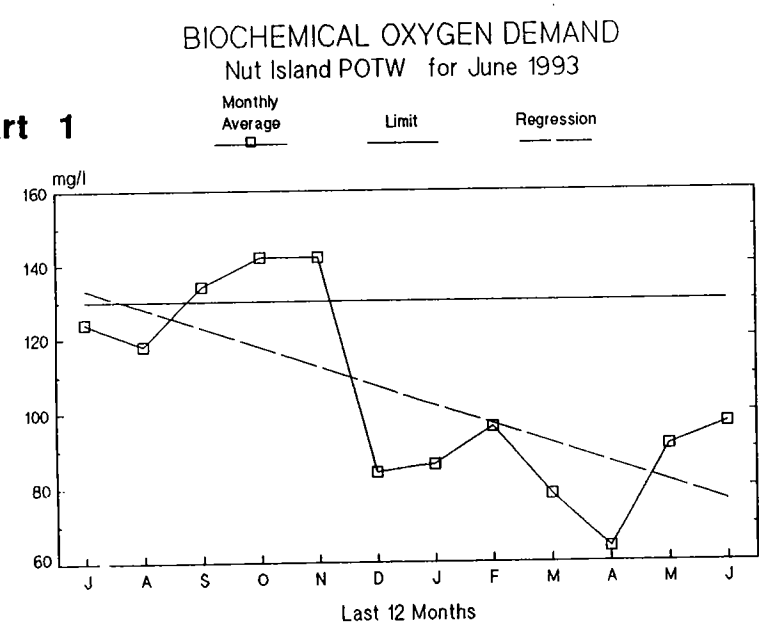


Chart 2

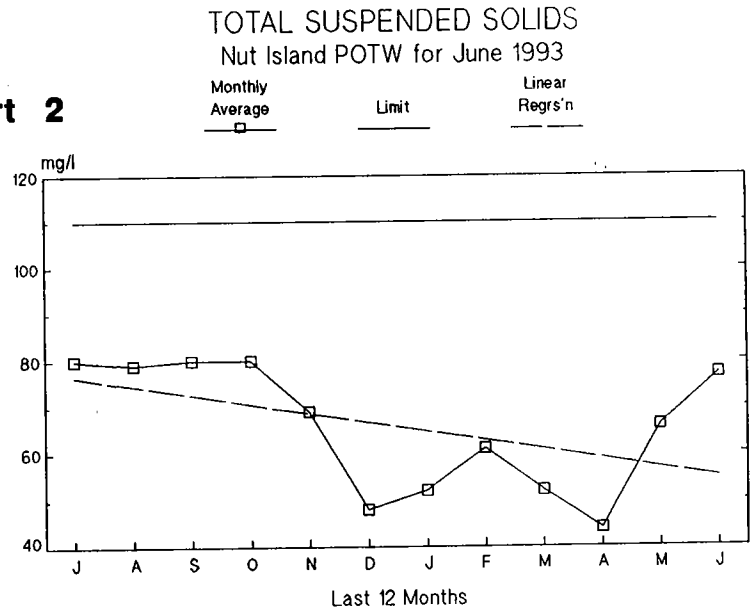


Chart 3

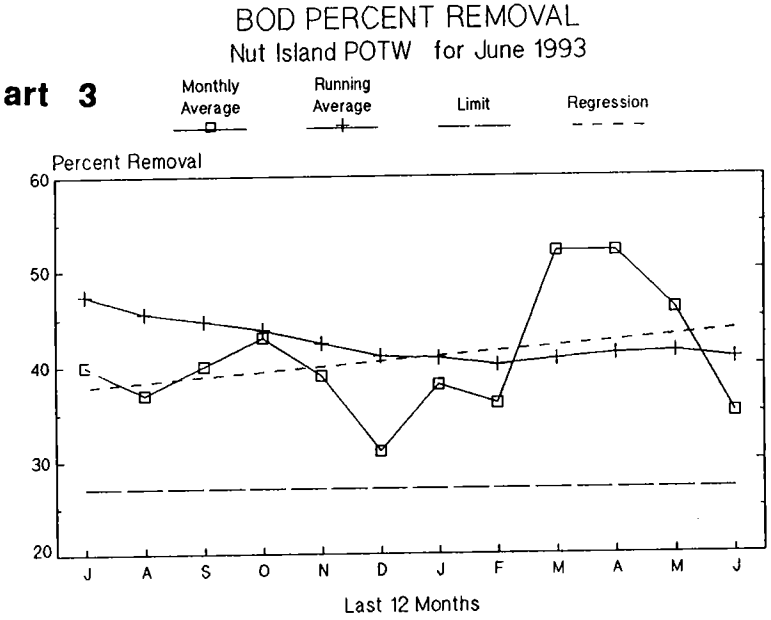


Chart 4

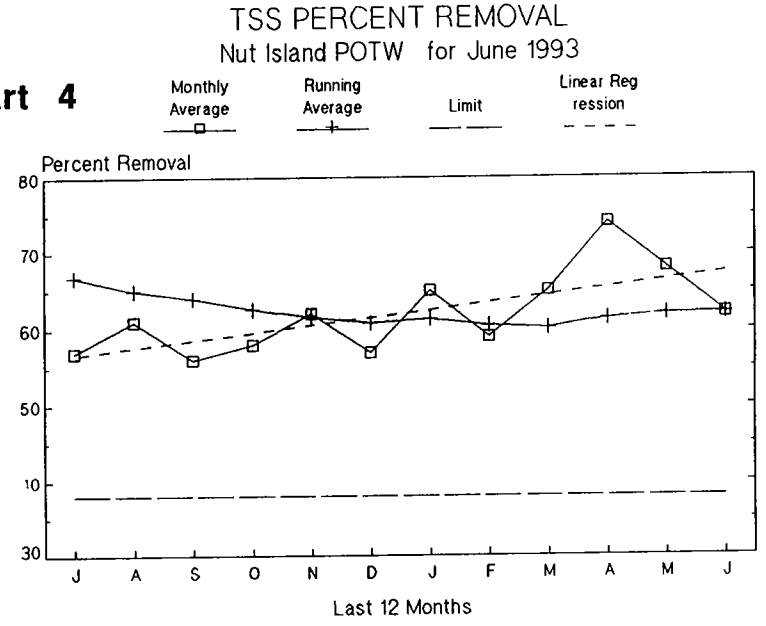


Chart 5

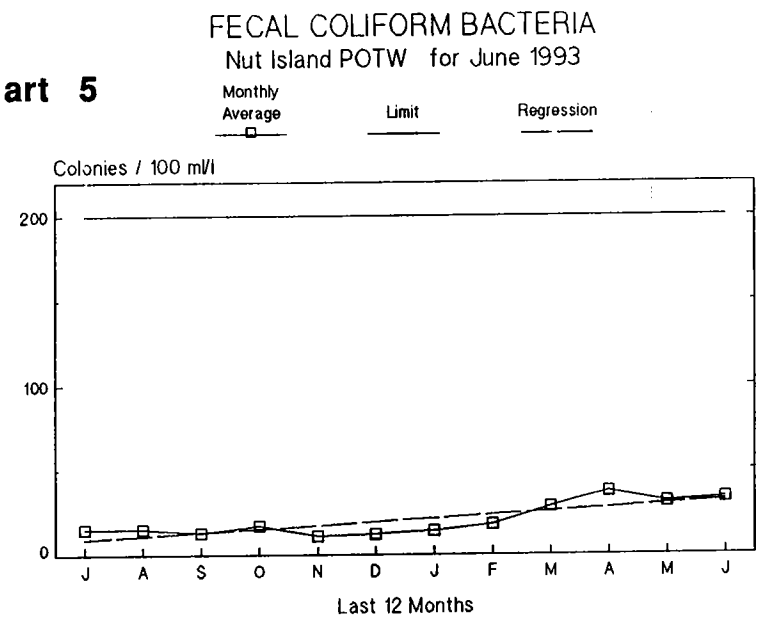


Chart 6

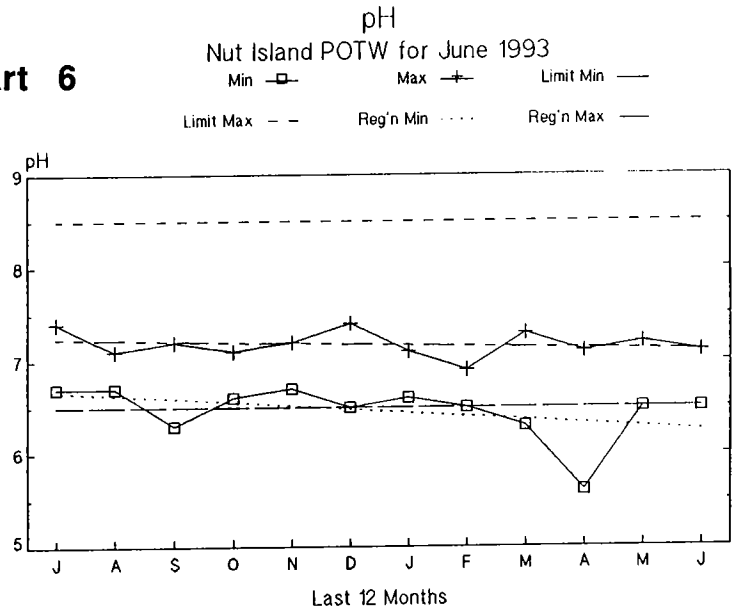


Chart 7

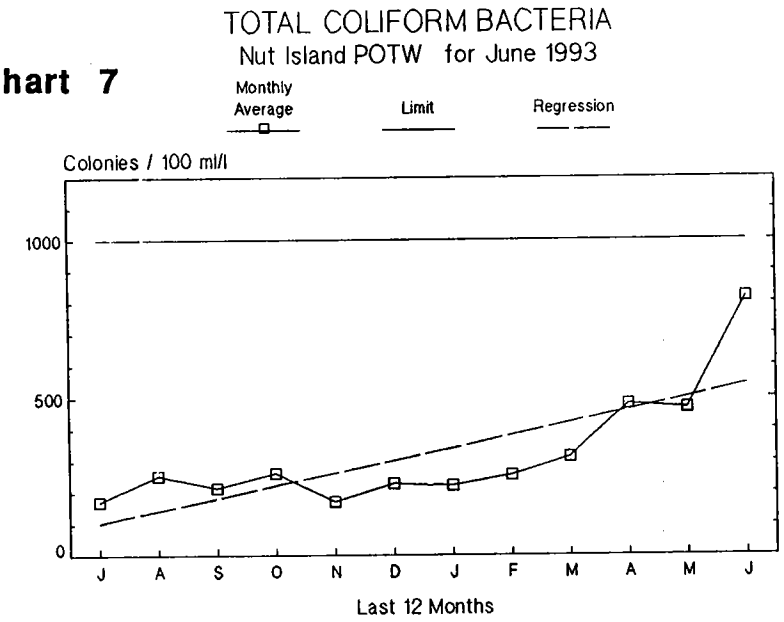
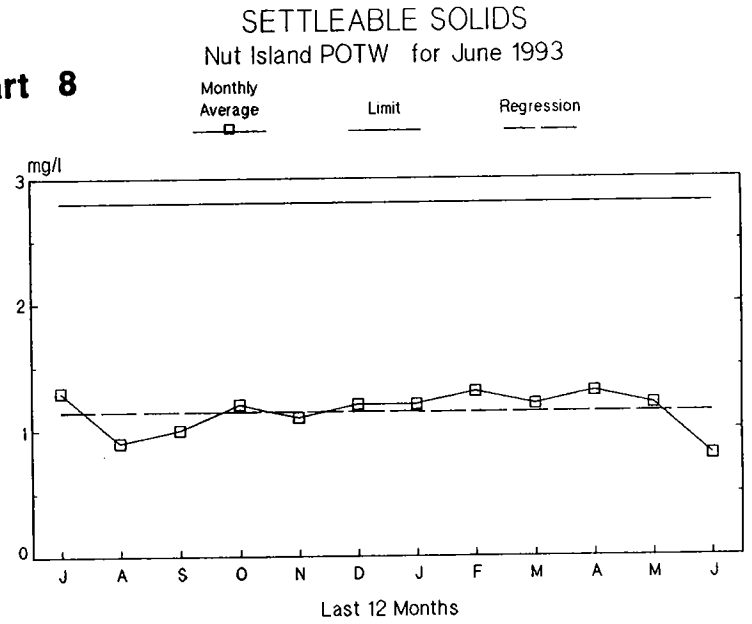


Chart 8



B.2.2 Nutrients

Because of the potential effect on algal growth in the receiving bodies of water, nutrients, especially the nitrogen compounds are closely monitored. This nutrient group includes: total kjeldahl nitrogen (TKN), ammonia, nitrates, nitrites, orthophosphorus, and total phosphorus.

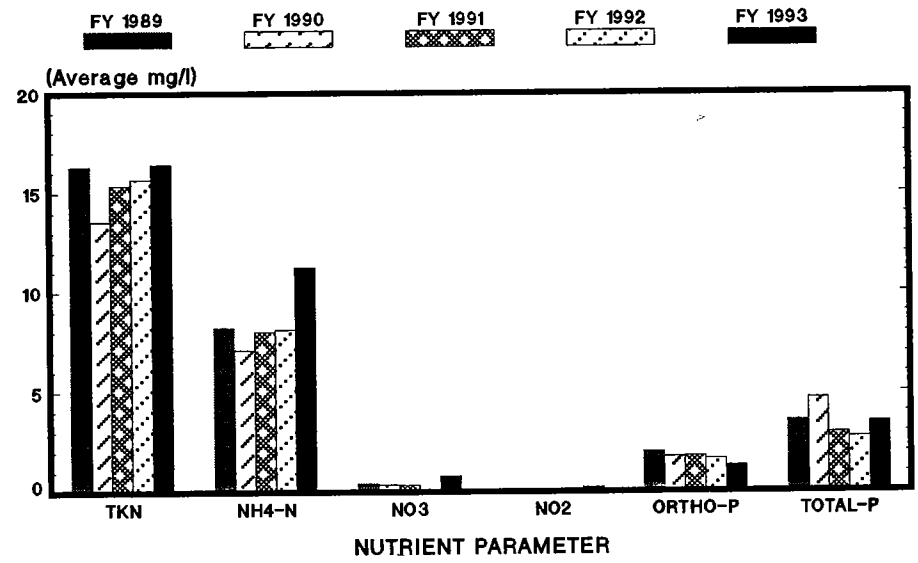
Nutrient data are in the Nut Island Operations Summary Report in Appendix B, Table B-1. Table II.B.4 summarizes the FY93 data.

Table II.B.4 Nut Island Effluent FY93 Nutrients Concentration

Nutrient (mg/L)	Concentration Minimum	Average	Maximum
TKN	7.14	16.41	24.58
Ammonia	2.45	11.25	17.35
Nitrates	0.03	0.82	1.50
Nitrites	0.06	0.24	0.76
Orthophosphorus	0.24	1.32	2.83
Total Phosphorus	1.50	3.50	9.13

Figure II.B.8 compares nutrient loadings from 1989 to 1993. As shown, there was a slight increase in ammonia-nitrogen and nitrates concentration in FY93. It is suspected that this increase was due to ammonia-rich filtrate from the sludge pelletizing facility being discharged back to the Nut Island Plant.

Figure II.B.8 Nut Island Effluent, Nutrient Concentrations
FY 1989 - 1993, Nut Island Laboratory

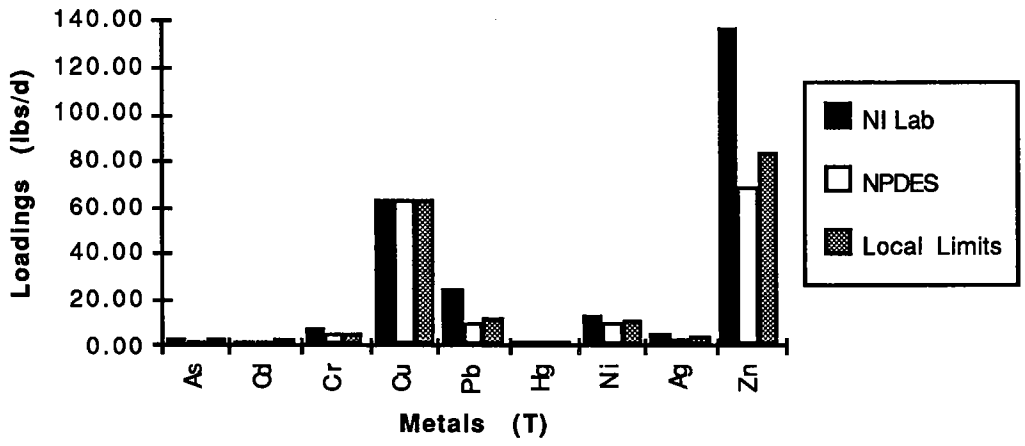


B.2.3 Priority Pollutants

The results of the Nut Island Laboratory, NPDES, and Local Limits monitoring programs are presented in Appendix B, Tables B-1, B-3, and B-4 respectively and are compared in Table II.B.5.

Metals Local Limits and NPDES analytical results are consistently lower than those of the Local Limits study, except for copper. The Nut Island study reports higher concentrations than do the NPDES and Local Limits studies.
Figure II.B.9 compares the calculated metal loadings for each of the data set.
Figure II.B.10 shows a decrease in metal loads from 1987 to 1993.

Figure II.B.9 Nut Island Metals Effluent Loadings, Fiscal Year 1993, Comparison of Studies



Pesticides/PCBs

The Local Limits study did not detect any pesticides/PCBs in either the influent or effluent. Endosulfan I, ß-BHC, DDD, DDT and chlordane were detected in the NPDES samples.

Polynuclear Aromatic Hydrocarbons (PAHs)

There were no PAHs detected in either the NPDES or Local Limits studies.

Other Organics

Other organic compounds measured in the Nut Island effluent include: phthalates, phenolic compounds, chlorinated hydrocarbons, 2-butanone, benzene, styrene, toluene, and xylenes. Acetone was also measured, and in high concentration, presumably due to laboratory contamination. However, acetone is naturally produced during biodegradation and is not considered a priority pollutant by the EPA.

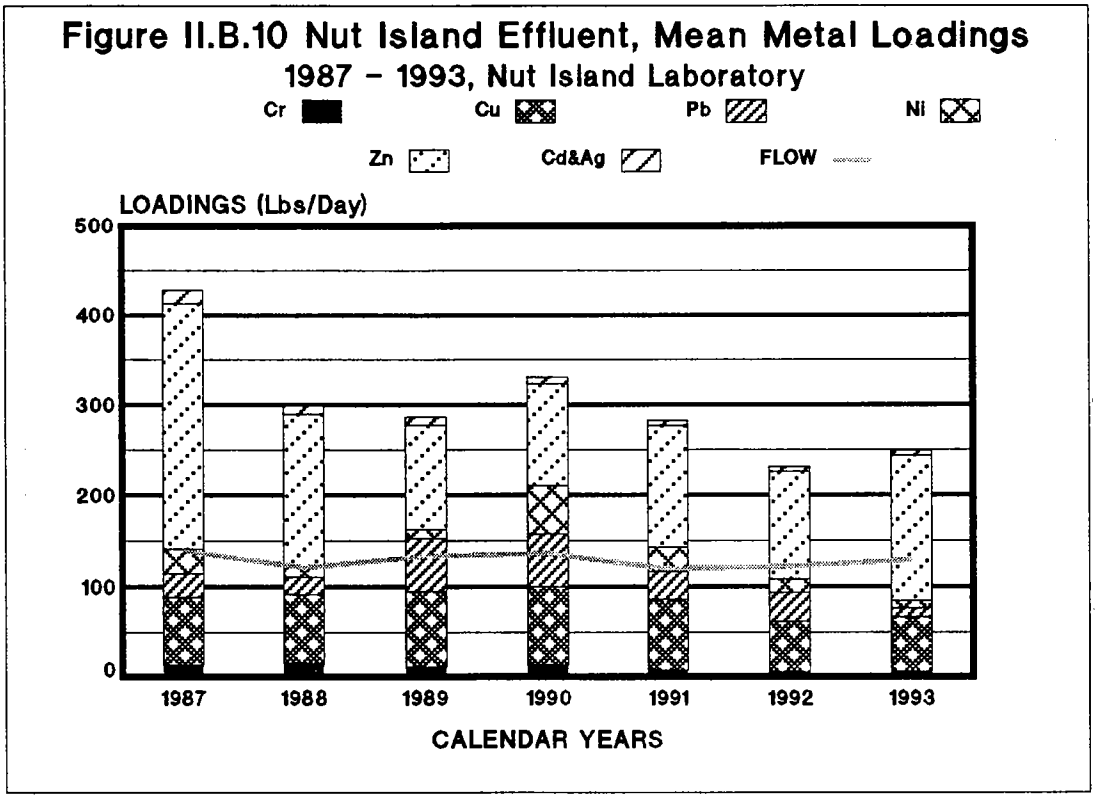


Table II.B.5 Nut Island Effluent Characterization Compared, FY93

	Geometric Mean Concentration		
Metals (mg/L)	Nut Island Data (1)	NPDES Data (2)	Local Limits Data (3)
Arsenic	0.0020	0.0015	0.0020
Cadmium	0.0013	0.0008	0.0020
Chromium (Total)	0.0065	0.0050	0.0050
Copper	0.0582	0.0586	0.0590
Lead	0.0230	0.0091	0.0110
Mercury	0.0015	0.0002	0.0003
Nickel	0.0122	0.0087	0.0100
Silver	0.0047	0.0025	0.0040
Zinc	0.1275	0.0637	0.0780
Cyanide (mg/L)		0.010	0.005
PHC (mg/L)		1.510	2.608
Pesticides/PCBs (ug/L)			
4,4'DDE		0.020	0.016
4,4'DDD		0.020	
4,4'DDT			0.017
aldrin		0.010	0.010
a-BHC		0.010	0.014
b-BHC			0.011
Chlordane		0.070	0.041
d-BHC		0.010	0.014
Dieldrin		0.010	0.019
Endosulfan I			0.009
Endosulfan Sulfate		0.030	
g-BHC		0.010	0.011
Heptachlor		0.010	0.014
Heptachlor epoxide			0.011
SEMIVOLATILE ORGANICS (ug/L)			
2-methylnaphthalene			2.868
4-Methyl phenol		18.830	19.865
Benzyl alcohol		8.100	8.828
bis(2-ethylhexyl)pthalate		8.570	9.266
Butylbenzyl phthalate		2.710	3.649
Di-n-butylpthalate		3.090	4.123
Di-n-octylphthalate			2.808
Diethyl pthalate		6.150	6.714
Naphthalene		1.000	2.952
Phenol (4)		1.520	7.008

Table II.B.5 (Con't)

	Geometric Mean Concentration		
	Nut Island Data (1)	NPDES Data (2)	Local Limits Data (3)
VOLATILE ORGANICS (ug/L)			
1,1,1-trichloroethane		1.370	1.290
2-butanone		54.150	45.500
Acetone		112.800	78.300
Benzene		0.840	1.000
Bromodichloromethane		2.040	1.740
Bromoform			0.970
Carbon disulfide		1.000	0.910
Chloroform		6.050	4.960
Chloromethane		1.130	1.030
Dibromochloromethane		1.040	1.080
Ethyl benzene		0.730	0.910
Methylene chloride		3.77	2.290
Tetrachloroethene		4.170	3.130
Toluene		5.090	4.400
Trichloroethene		0.750	0.920
Xylene		2.190	1.520

(1) Analytical results, Deer Island Laboratory, Appendix B, Table B-1
(2) Analytical results, NPDES Program, Appendix B, Table B-3
(3) Analytical results, Local Limits Study, Appendix B, Table B-4
(4) Artificially high because of the high MDL employed in analyses.

C. Cottage Farm Combined Sewer Overflow Facility

During dry weather conditions, this facility pumps wastewater to the Ward Street Headworks which eventually discharges to the Deer Island Treatment plant. The sewer line has a hydraulic capacity of 1.3 million gallons (MG). Under storm conditions, flows received by the station in excess of the 1.3 MG capacity threshold are screened, settled, chlorinated and discharged to the Charles river through outfall number MWR 201. This facility has a design capacity of 233 MGD. Figure II.C.1 is a schematic of a typical combined sewer overflow treatment facility.

C.1 Activations

In general, the volume of storm-induced flow is dependent on rainfall intensity, drainage area, and the sewer line capacity at the time of storm occurrence. When there is a multiple storm event, prediction of rainfall runoff becomes even more complicated. Appendix C, Table C-1 contains the Cottage Farm FY93 operations summary. Table II.C.1 summarizes and compares the activations during this monitoring period with FY92 data.

Table II.C.1 Cottage Farm CSO FY93 Activations Summary

	FY92	FY93
Number of Activations	23	33
Total Volume Treated (MG)	361	677.23
Maximum Flow (MGD)	64	144.7
Minimum Flow (MGD)	0.01	0.69
Average Flow (MGD) *	15.69	20.52
Total Rainfall (in/year)	44.60	48.82

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

Except for the month of May and June, there was an activation each month at this facility. More activations occurred in the month of April than in any other month. Figure II.C.2 presents the individual activations during FY93. Figure II.C.3 compares the total number of activations at Cottage Farm from 1989 to 1993. As shown, the number of times Cottage Farm activated decreased steadily during the last four years, except in 1993 when the number of times the facility activated increased because the total rainfall was greater per storm than in FY92.

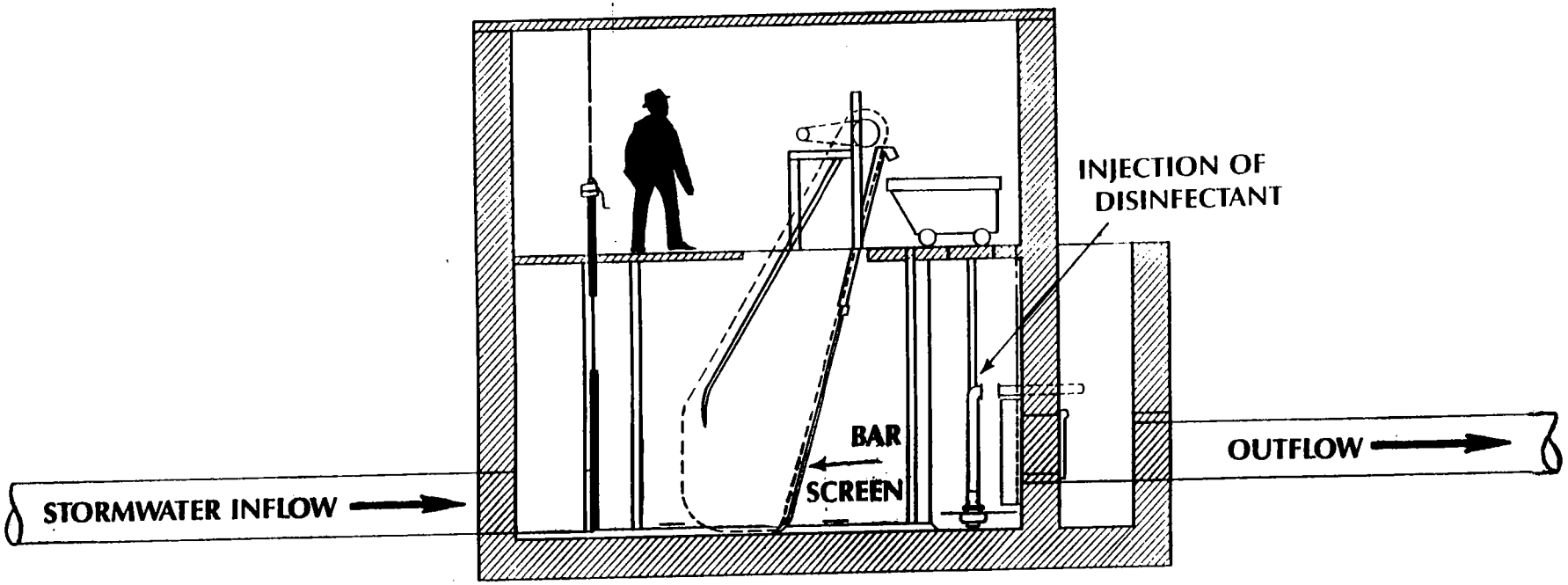


Figure II.C.1 Combined Sewer Overflow Facility Treatment Schematic

Figure II.C.2 Cottage Farm CSO Fiscal Year 1993 Activations

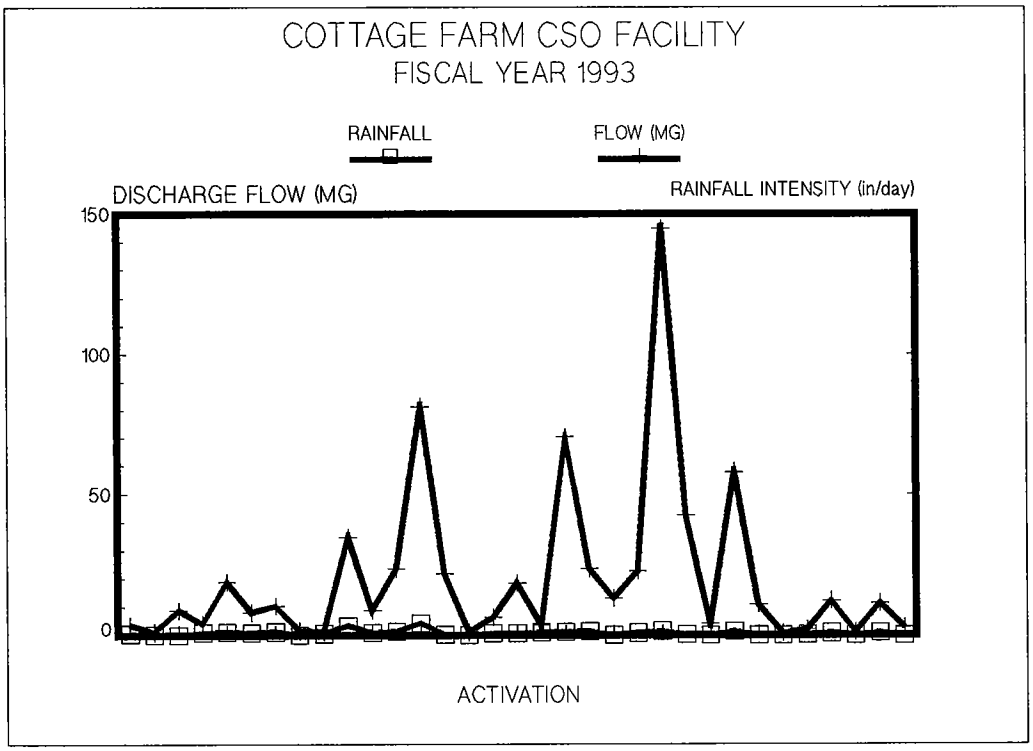
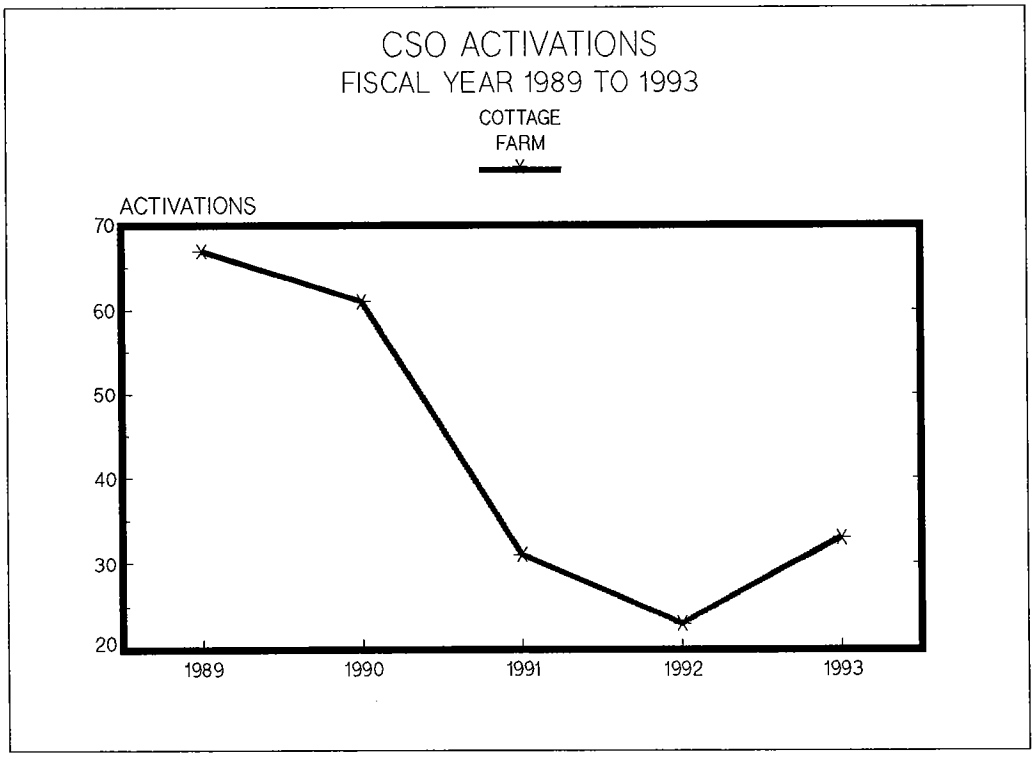


Figure II.C.3 Cottage Farm CSO Activations FY89 to FY93



C.2 Conventional Parameters

The amount of runoff available for dilution, sampling occurrence with respect to first flush, representativeness of sample, and sample handling all affect the concentrations in samples collected during a wet weather activation. Due to these factors, a very wide spread in the measured amount of pollutants in all of our CSO samples should be expected.

Because the CSO facilities are not designed to remove BOD and TSS, no removal of these contaminants are expected, and at times, the effluent concentration may even be higher than the influent. Analytical results of conventional parameter testing of both influent and effluent are included in Appendix C, Table C-1 and is summarized in Table II.C.2. Appendix C Table II.C.2 quantifies the amount of suspended solids and BOD discharged to the Charles during each activation.

Table II.C.2 Cottage Farm CSO Influent and Effluent Characteristics

Parameter	Concentration *					
	Influent			Effluent		
	Min	Ave	Max	Min	Ave	Max
TSS	14	151	938	5	66.2	226
BOD	34	93	263	5	84.9	283
Fecal Coliform (#/100 mL)				1	26.2	2519
pH (units)				6.51		8.06

* Concentration expressed in mg/L except for pH and Fecal Coliform

BOD and TSS There are no BOD or TSS numerical limits for CSO discharges. The ranges observed for these parameters were large: BOD was 5 mg/L to 283 mg/L and TSS was 66 mg/L to 226 mg/L.

Fecal Coliform There were two high fecal counts of 45,000 and 35,000 colonies/100 mL that were measured in August and April, respectively. The August sample made up 25 % of the total number of samples that month and the April sample of 35,000 colonies/100 mL made up 12.5 % of the total number of samples that month. During these two months, the NPDES permit limit, which states that no more than 10 % of the samples can exceed 2500 colonies/100 mL, was violated.

pH There were no pH violations in FY93.

C.3 Priority Pollutants

During the first significant storm event, samples were collected for selected priority pollutants. Results of effluent monitoring conducted in 1993 are in Appendix C, Table C-3. Figure II.C.4 depicts the priority pollutant concentrations measured in the effluent.

Metals Of the metals detected, copper, lead, arsenic, boron, cadmium, chromium, molybdenum and zinc were consistently present. Mercury was present more than 50 % of the time.

Cyanide/Total Phenols Out of seven samples, cyanide was detected five times and total phenols were detected six times.

Pesticides/PCBs The pesticides methoxychlor, d-BHC , and heptachlor were detected 60 %, 43 %, and 29 % of the time, respectively.

Other Organic Compounds Of the semivolatile organic compounds, phthalates, 4-methyl phenol and benzoic acid were frequently detected. Out of seven samples, phenanthrene was detected three times, fluoranthene was detected two times, and naphthalene, phenol, and pyrene were detected at least one time.

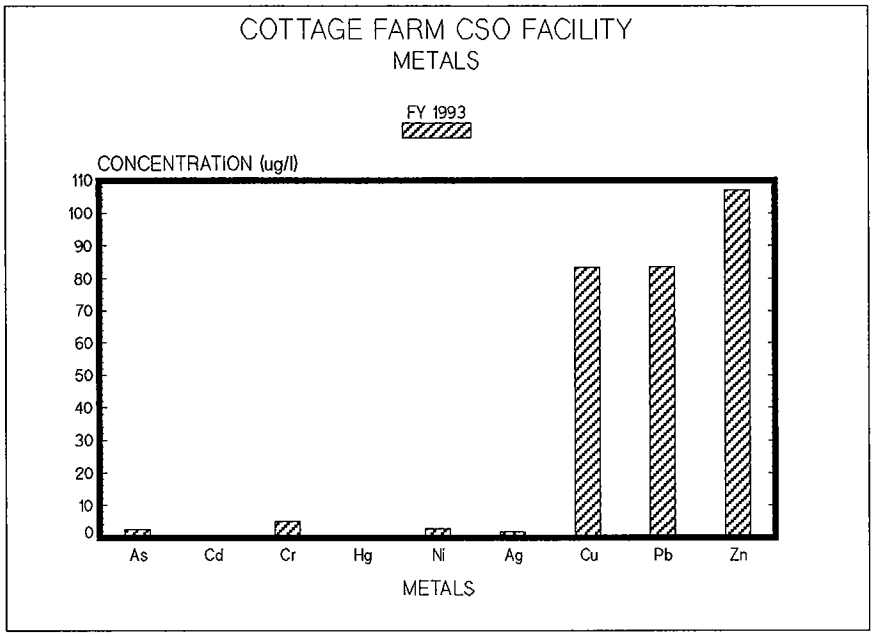
Appendix C, Table C-4 shows the contaminant loadings during each activation in FY93 while Table II.C.5 compares the concentration of toxic pollutants from FY90 to FY93.

C.4 Loadings

Appendix C, Table C-4 quantifies the amounts of toxic contaminants discharged to the Charles River through the Cottage Farm facility during each monthly sampling event. The flows used to calculate the loadings were those measured during the time of sampling. Because only one storm per month was sampled for priority pollutants at each permitted CSO facility, the calculated loadings should not be used to project monthly or yearly loadings.

Figure II.C.4 Cottage Farm CSO, Priority Pollutant Concentrations, FY93

Chart 1



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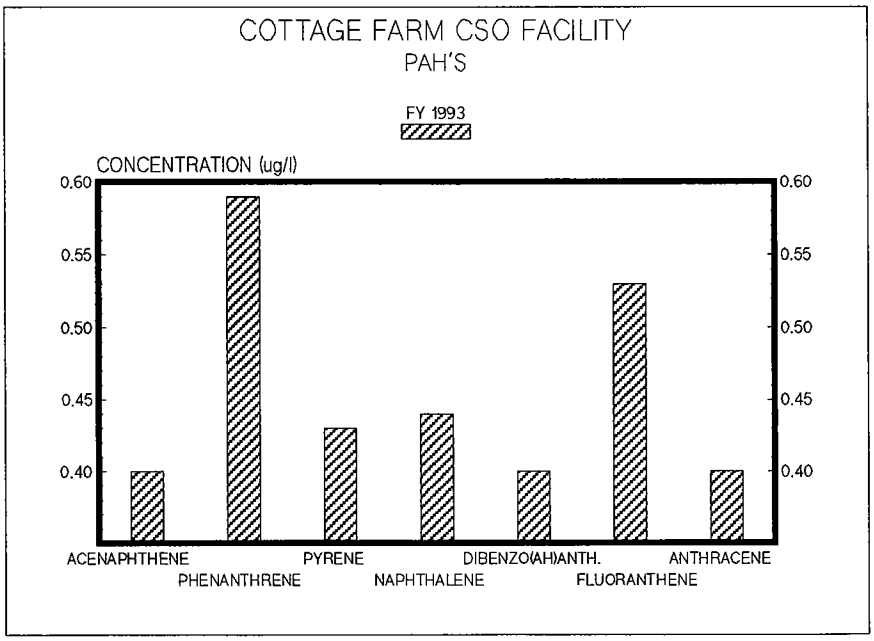


Figure II.C.5 Cottage Farm CSO, Priority Pollutant Concentrations, Compared

Chart 1

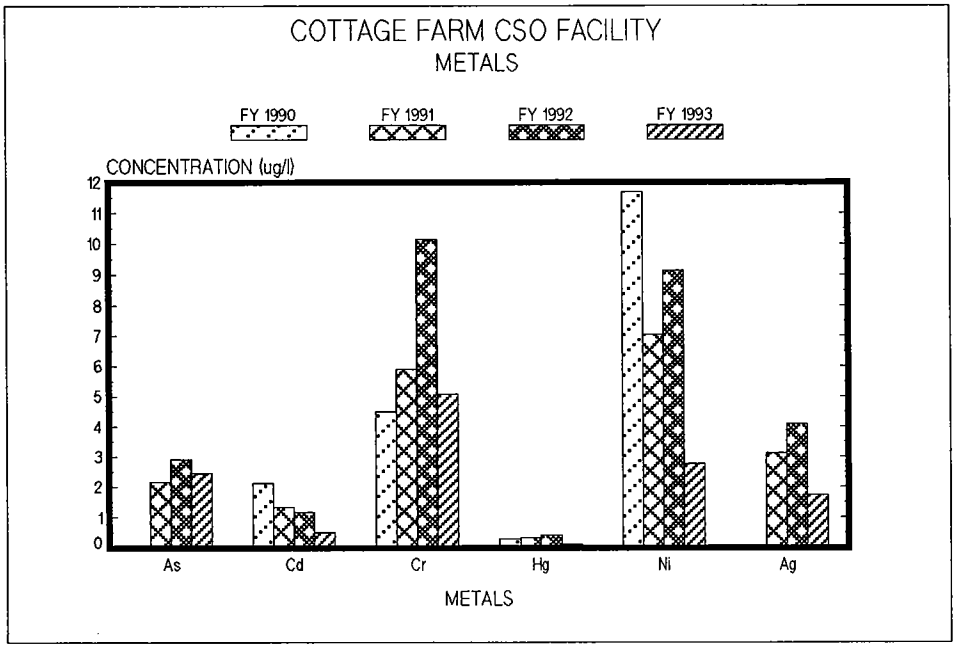


Chart 2

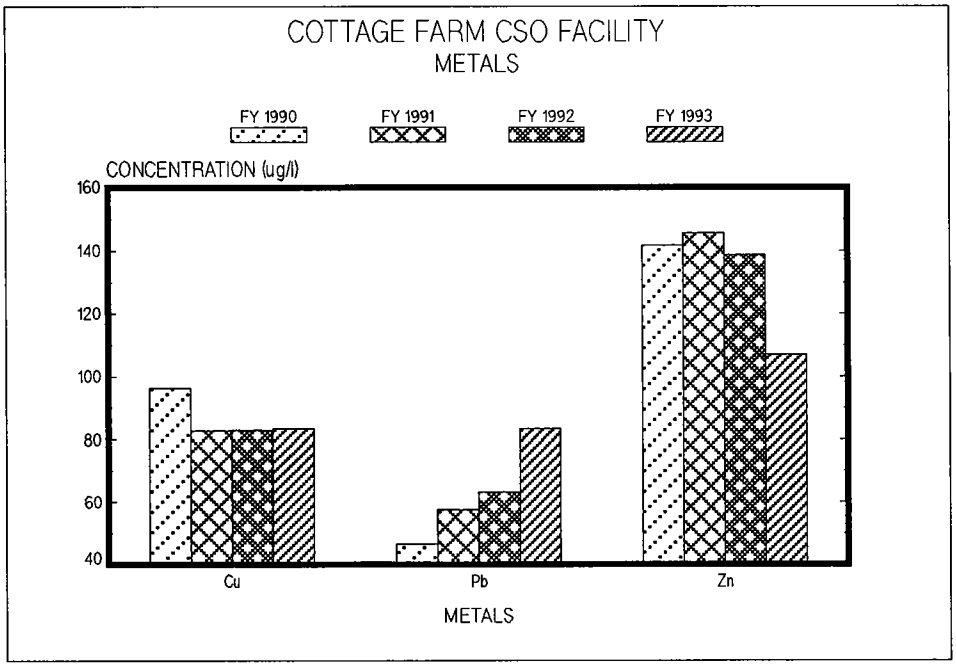
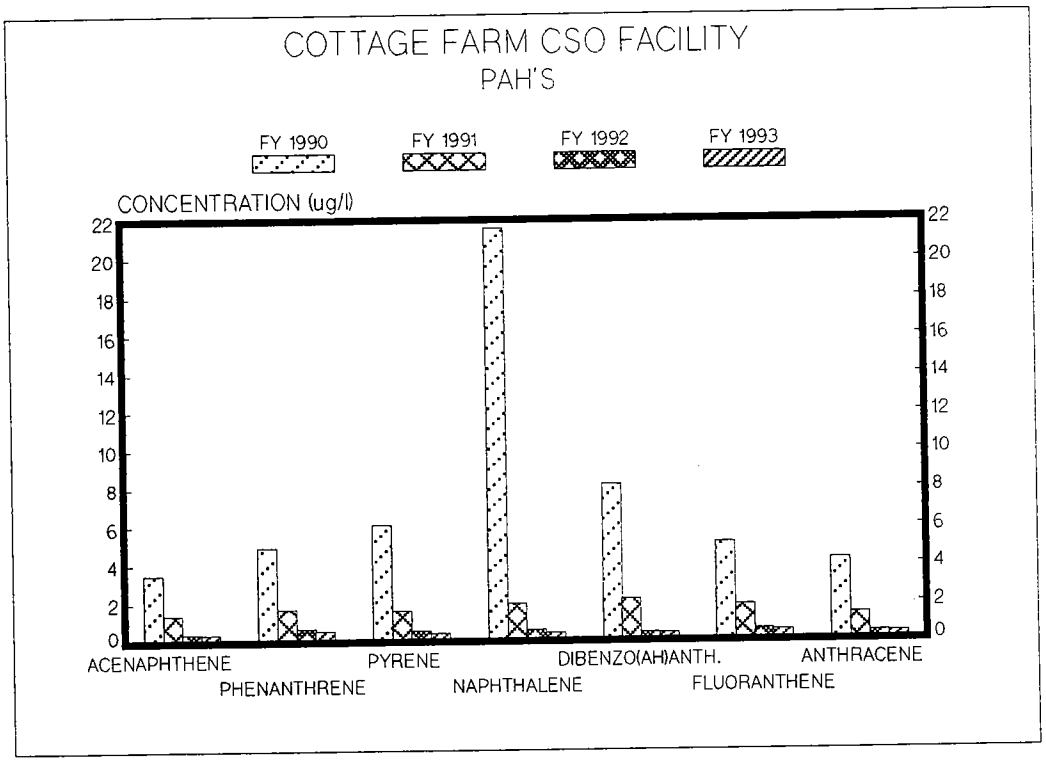


Figure II.C.5 Cottage Farm (Con't)

Chart 3



D. Prison Point Combined Sewer Overflow Facility

This facility, like Cottage Farm, is a dry weather and a stormwater flow pumping station with a design capacity of 385 MGD. The dry weather phase is a five MGD capacity sewer pumping station, which discharges to a sewer in Charlestown. The dry weather discharge eventually flows to the Deer Island Plant. The stormwater phase, any amount in excess of sewer capacity, is screened, settled, chlorinated and discharged downstream below the new Charles River Dam at outfall MWR 203.

D.1 Activations

Appendix D, Table D-1 contains the Prison Point FY93 operations summary and is summarized in Table II.D.1.

Figure II.D.1 depicts the activations in FY93. Except for the months of May and June, there was at least one activation each month. Further, more activations occurred in the month of April than in any other month.

Figure II.D.2 compares the total number of activations from 1989 to 1993. The graph shows a sharp increase in the number of activations from 1989 to 1990, but the number has decreased dramatically since then.

Table II.D.1 Prison Point CSO FY93 Activations Summary

	FY92	FY93
Number of Activations	29	26
Total Volume Treated (MG)	429	268.87
Maximum Flow (MGD)	63	27.73
Minimum Flow (MGD)	1	1.63
Average Flow (MGD) *	14.79	10.34
Total Rainfall (in/year)	44.60	48.82

* 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, Prison Point CSO Operations Summary. Table II.D.2 quantifies the conventional pollutant loadings discharged from the Prison Point facility to the lower Charles river.

Table II.D.2 Prison Point CSO Influent and Effluent Characteristics

	Concentration *					
Parameter	**Influent**			**Effluent**		
	Min	**Ave**	**Max**	**Min**	**Ave**	**Max**
TSS	4	126	520	12	75	146
BOD	24	65	153	14	80	276
Fecal Coliform (#/100 mL)				10	20	80
pH (units)				6.24		7.80

* Concentration expressed in mg/L except for pH and Fecal Coliform

BOD and TSS There are no BOD or TSS numerical limits for CSO discharges. The ranges observed for these parameters were large: BOD was 14 mg/L to 276 mg/L and TSS was 12 mg/L to 146 mg/L.

Fecal Coliform There were no NPDES permit violations for fecal coliform.

pH The MWRA permit limits the pH range from 6.5 to 9.0 standard units. There was one low pH recorded at 6.2.

Figure II.D.1 Prison Point CSO Fiscal Year 1993 Activations

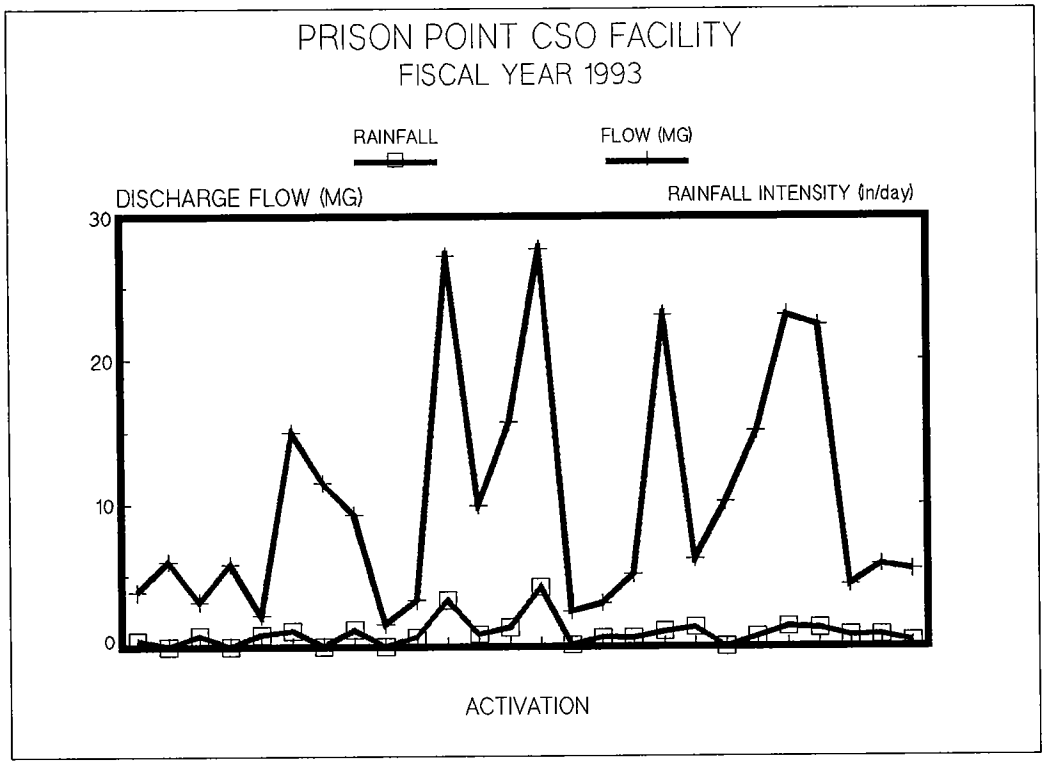
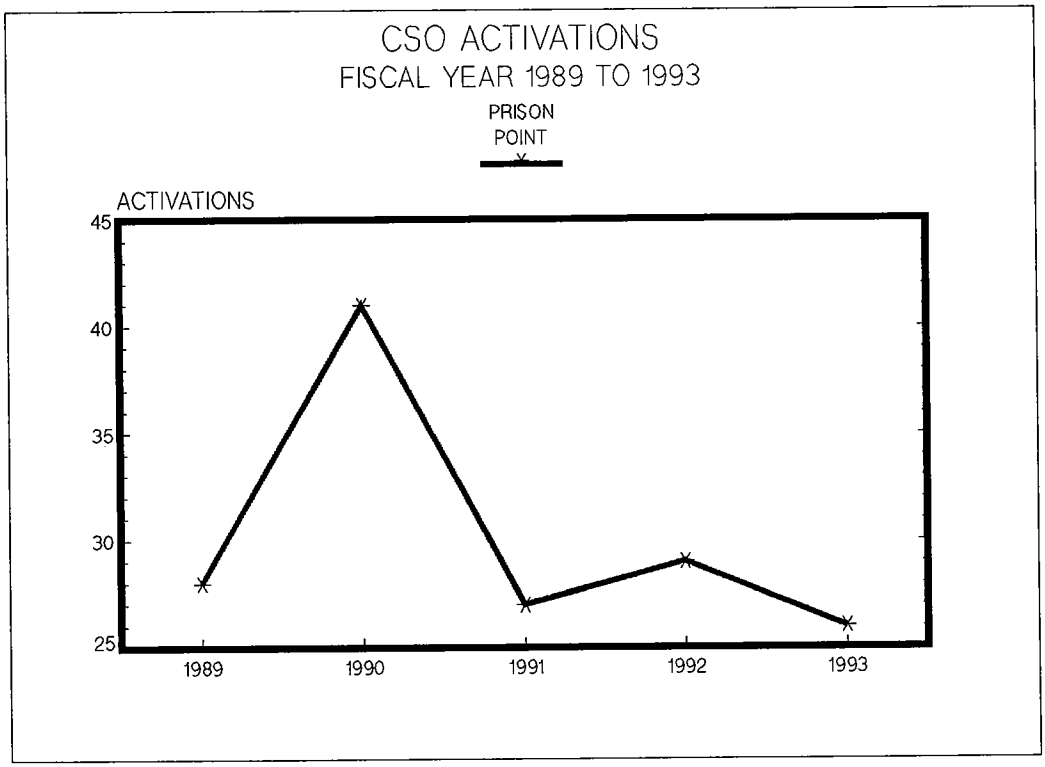


Figure II.D.2 Prison Point CSO Activations FY89 to FY93



D.3 Priority Pollutants

Results of priority pollutant analyses performed in FY93 are presented in Appendix D, Table D-3 and are graphed in Figure II.D.3. Effluent characteristics of the Prison Point facility are comparable to those of the Cottage Farm effluent.

Metals Of the metals detected, copper, lead, cadmium, and zinc were consistently present.

Cyanide Cyanide and total phenols were detected 56 % and 67 % of the time, respectively.

Pesticides/PCBs Of the pesticides, d-BHC was detected in four of the nine samples.

Other Organic Compounds A number of compounds were detected at least 50 % of the time: benzoic acid, bis(2-ethylether)phthalate, fluoranthene, di-n-butylphthalate, diethylphthalate, phenanthrene, and pyrene.

Appendix D, Table D-5 and Figure II.D.4 compares the concentration of pollutants discharged from the Prison Point facility from FY90 to FY93.

D.4 Loadings

Appendix D, Table D-4 calculates the discharge loadings from Prison Point during each monthly sampling event. The flows used to calculate the loadings were those measured during the time of sampling. Because only one storm per month was sampled for priority pollutants at each permitted CSO facility, the calculated loadings should not be used to project monthly or yearly loadings.

Figure II.D.3 Prison Point CSO, Priority Pollutant Concentration, FY93

Chart 1

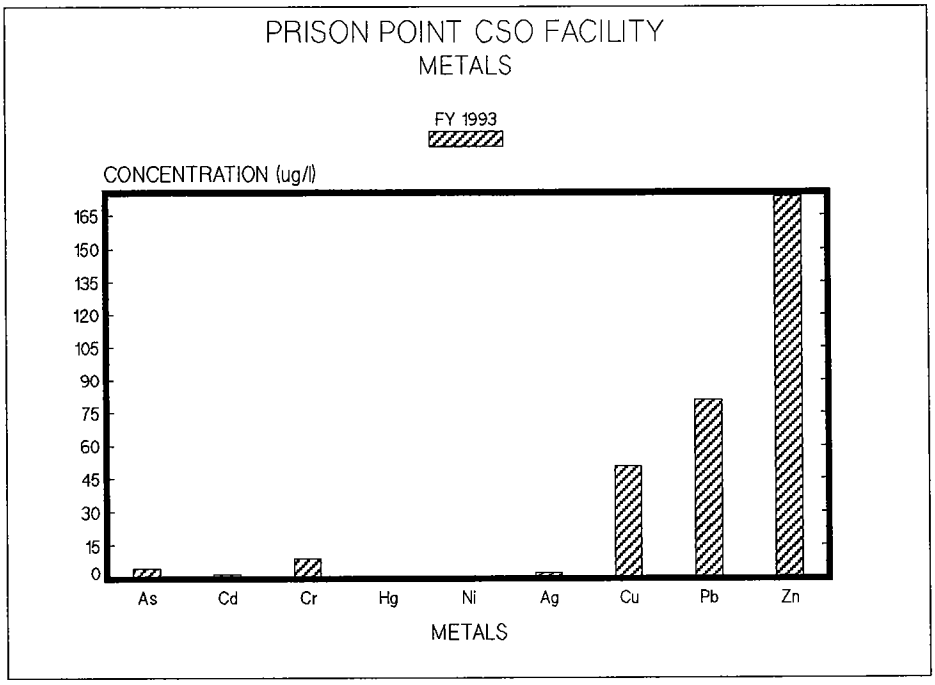


Chart 2

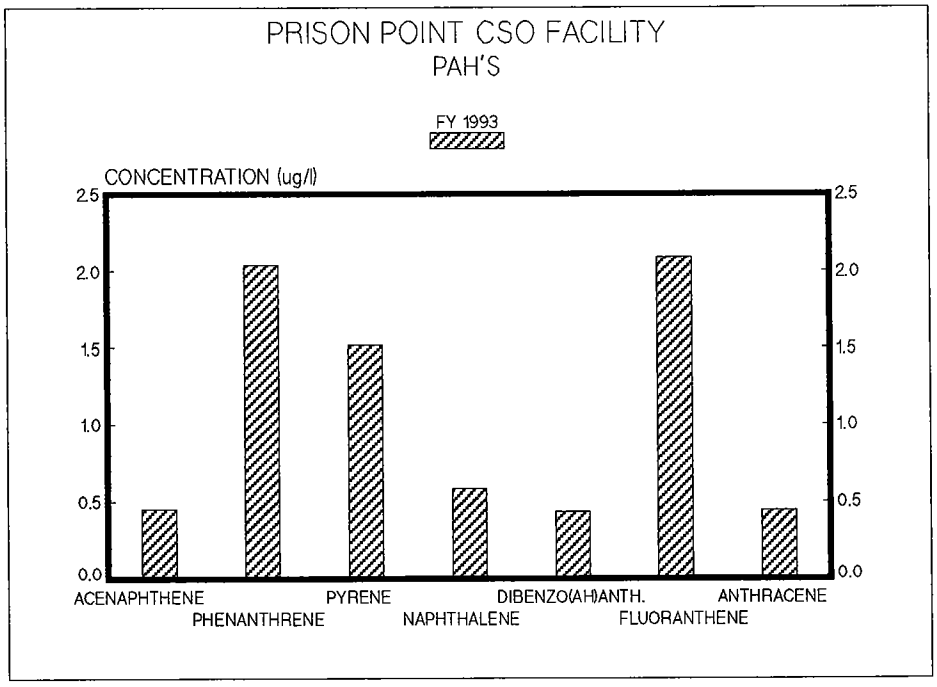


Figure II.D.4 Prison Point CSO, Priority Pollutant Concentrations, Compared

Chart 1

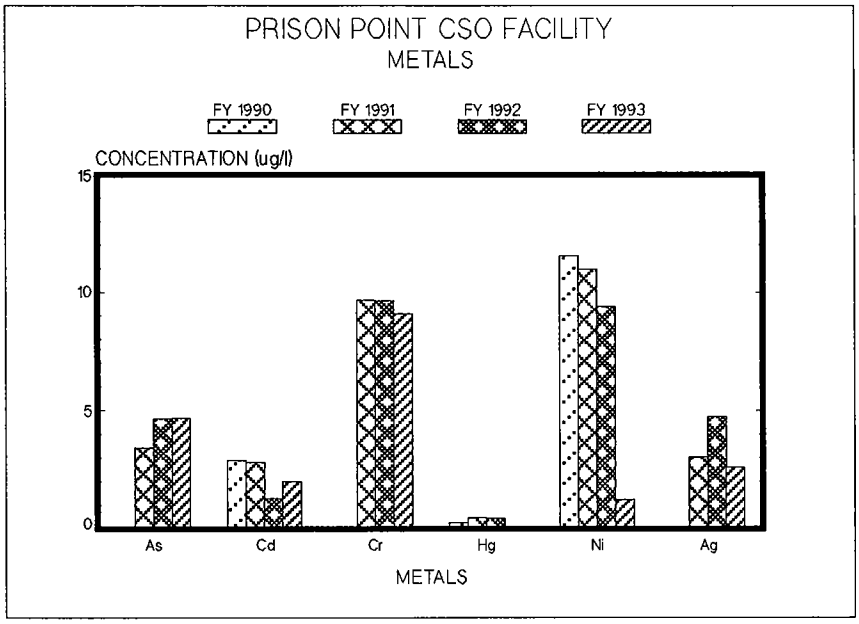


Chart 2

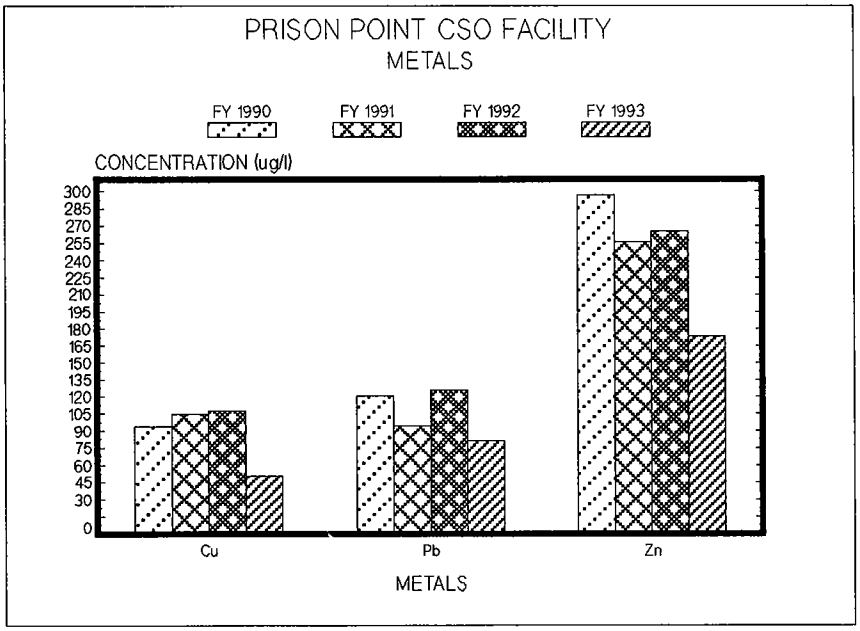
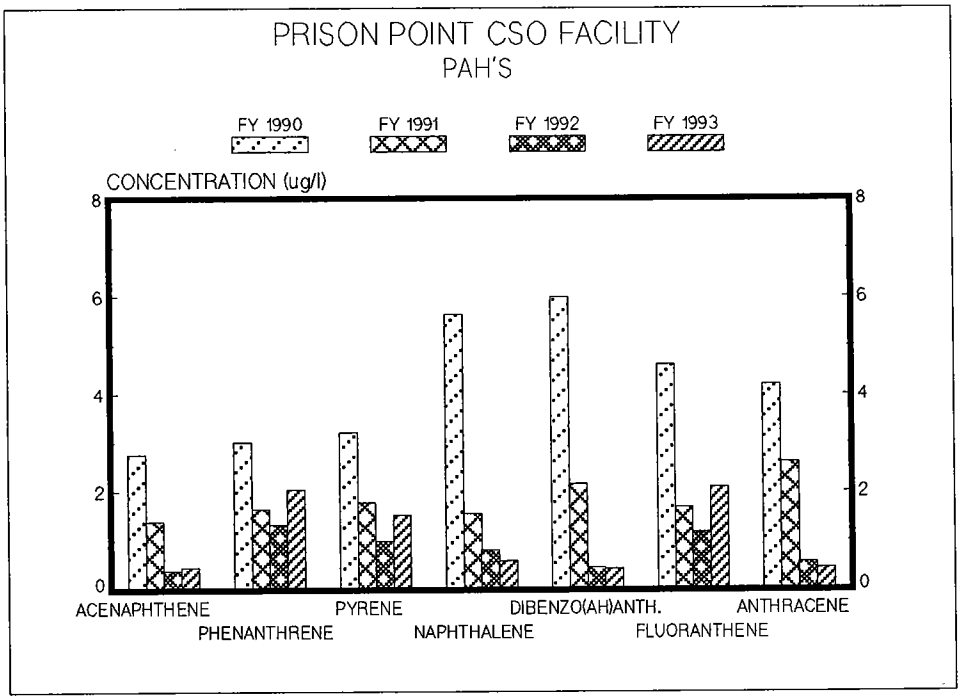


Figure II.D.4 Prison Point (Con't)

Chart 3



E. Somerville Marginal Combined Sewer Facility

Somerville Marginal CSO is an unmanned gravity facility with a design capacity of 245 MGD. Unlike Cottage Farm or Prison Point, this facility does not provide any detention capacity; treatment consists of screening and chlorination. The effluent is discharged to the lower Mystic River basin at outfall number MWR 205.

E.1 Activations

The majority of activations in FY93 occurred in the months of July and December. Figure II.E.1 graphs the activations in FY93 and is summarized in Table II.E.1. Figure II.E.2 graphs the activations from 1989 to 1993. The number of activations at Somerville Marginal increased from 1989 to 1990, but has since been decreasing.

Figure II.E.1 Somerville Marginal CSO Fiscal Year 1993 Activations

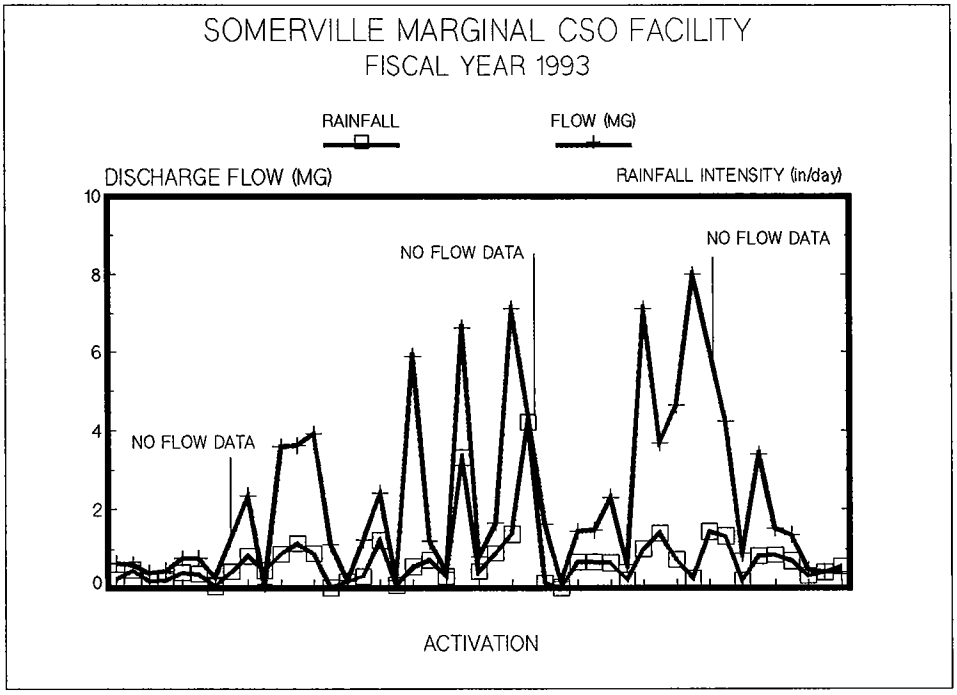


Figure II.E.2 Somerville Marginal CSO Activations FY89 to FY93

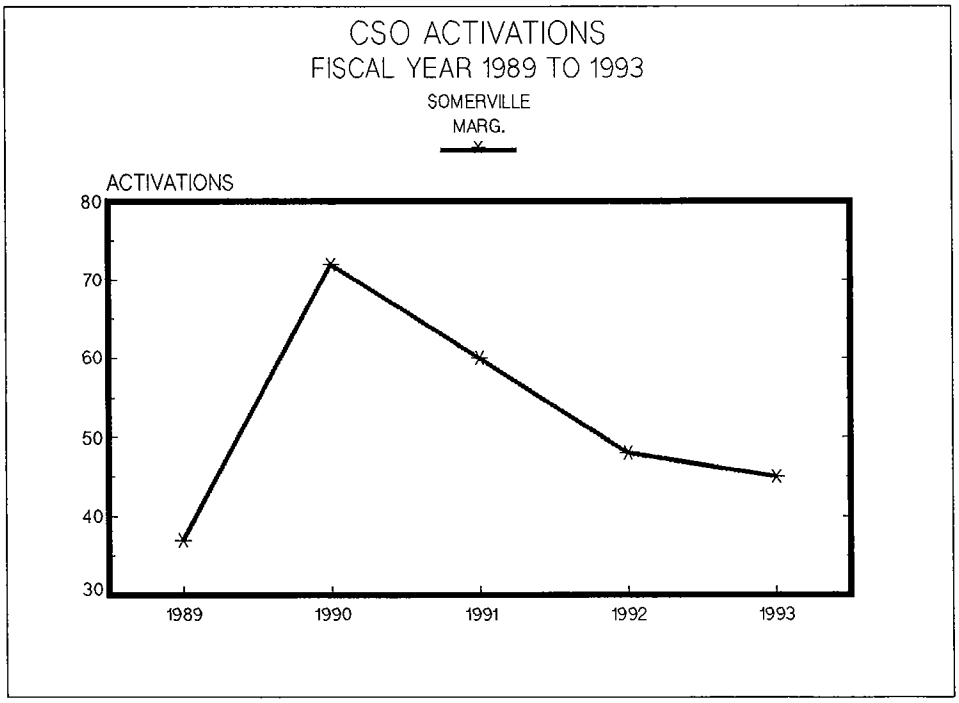


Table II.E.1 Somerville Marginal CSO FY93 Activations Summary

	FY92	FY93
Number of Activations	48	45
Total Volume Treated (MG)	89	90.22
Maximum Flow (MGD)	8.5	8
Minimum Flow (MGD)	0.003	0.101
Average Flow (MGD) *	1.85	2.1
Total Rainfall (in/year)	44.60	48.82

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

E.2 Conventional Parameters

The results of analyses for conventional pollutants in the influent and effluent are contained in Appendix E, Table E-1 and are summarized in Table II.E.2.

Table II.E.2 Somerville Marginal CSO Influent and Effluent Characteristics

	Concentration *					
Parameter	**Influent**			**Effluent**		
	Min	**Ave**	**Max**	**Min**	**Ave**	**Max**
TSS	21	156	916	10	112	687
BOD	10	81	292	10	63.9	291
Fecal Coliform (#/100 mL)		·		3	148	3900
pH (units)				6.38		8.28

* Concentration expressed in mg/L except for pH and Fecal Coliform

BOD and TSS There are no BOD or TSS numerical limits for CSO discharges. The ranges observed for these parameters were large for these parameters: BOD was 10 mg/L to 291 mg/L and TSS was 10 mg/L to 687 mg/L.

Fecal Coliform There was one fecal coliform violation in FY93. The highest fecal coliform reading was 3,900 colonies/100 ml, measured in June.

pH There was one pH violation in FY93. The low pH reading of 6.38 was below the acceptable low pH of 6.5 standard units.

E.3 Priority Pollutants

Results of analyses performed in FY93 are contained in Appendix E, Table E-2. Figure II.E.3 depicts the concentration of copper, lead, and zinc measured in the effluent. Figure II.E.4 compares the concentration of pollutants discharged from this facility from FY90 to FY93.

Metals Of the metals detected, cadmium, copper, lead, and zinc were present.

Cyanide and phenols Cyanide and phenols were detected 50 % of the time.

Organic Compounds Of the organic compounds, benzoic acid, fluoranthene, di-n-octylphthalate, and bis(2-ethylhexyl)phthalate were detected 50% or more of the time.

E.4 Loadings

Appendix E, Table E-3 shows the toxics loadings for each sampling event. The flows used to calculate the loadings were those measured during the time of sampling. Because only one storm per month was sampled for priority pollutants at each permitted CSO facility, the calculated loadings should not be used to project monthly or yearly loadings.

Figure II.E.3 Somerville Marginal CSO, Priority Pollutant Concentrations, FY93

Chart 1

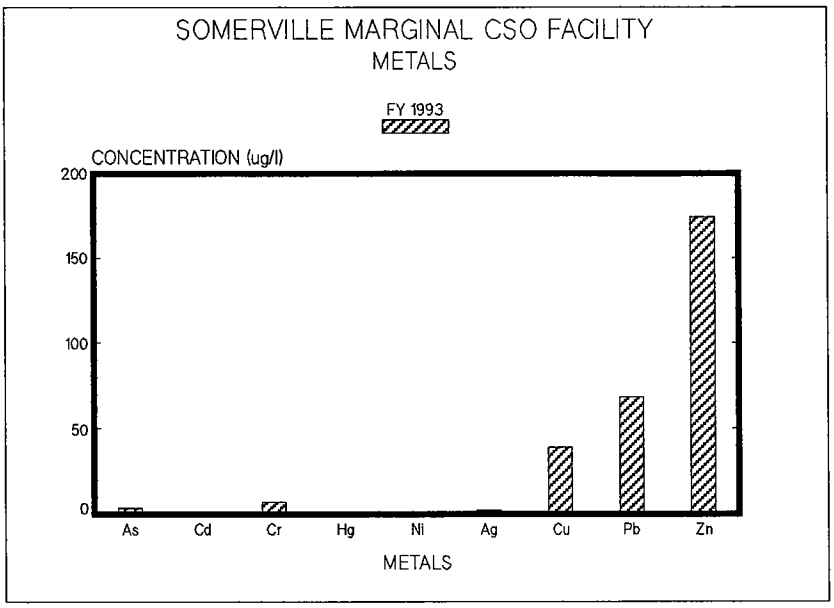


Chart 2

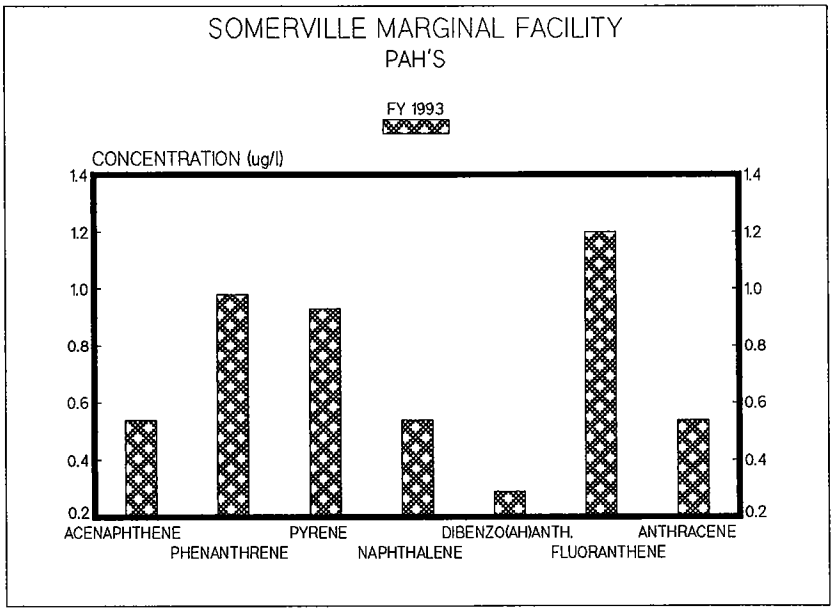


Figure II.E.4 Somerville Marginal CSO, Priority Pollutant Concentrations, Compared

Chart 1

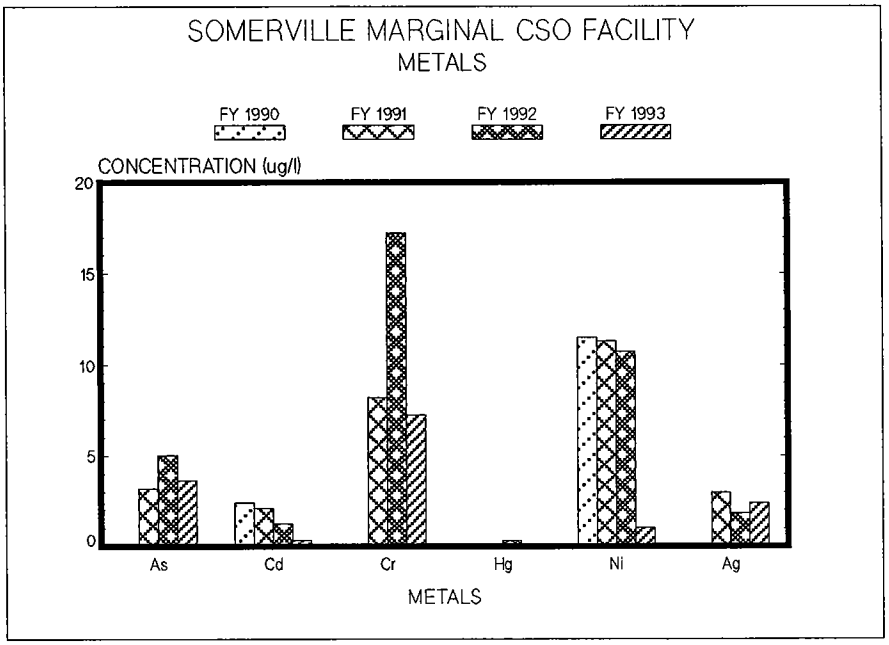


Chart 2

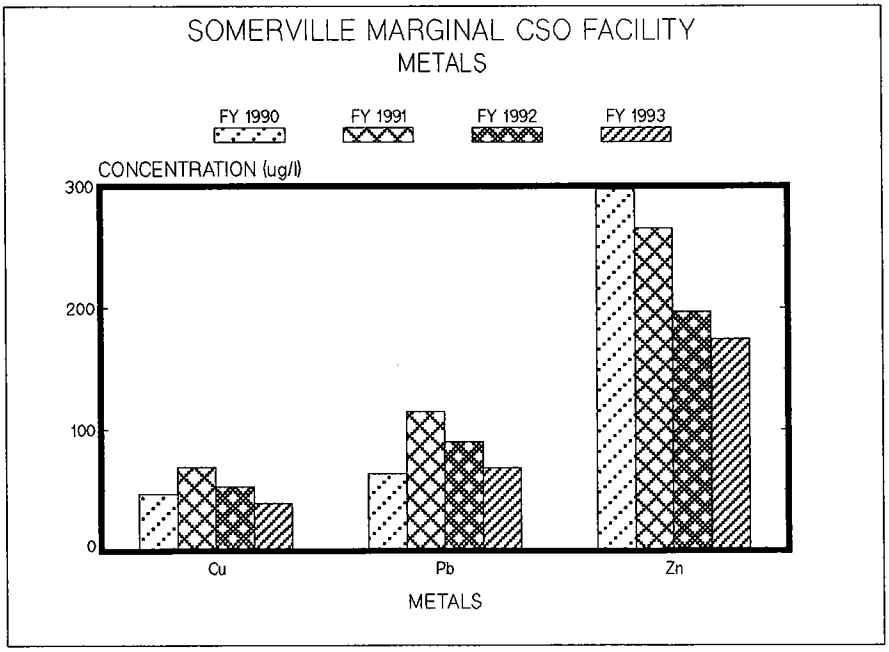
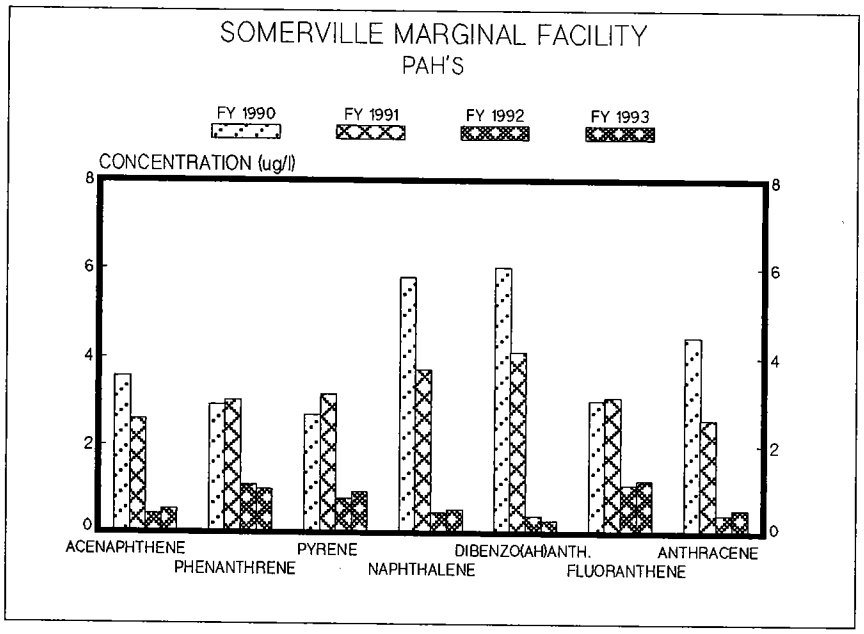


Figure II.E.4 Somerville Marginal (Con't)

Chart 3



F. Constitution Beach Combined Sewer Facility

Constitution Beach is an unmanned gravity facility with a design capacity of 20 MGD. Treatment includes screening and disinfection. The effluent is discharged to a BWSC line that ultimately discharges to Boston harbor through BOS002. Currently, the NPDES permit for this outfall is included in the BWSC permit.

F.1 Activations

Although the Constitution Beach CSO is not currently permitted to the MWRA, the MWRA collects operational to determine the facility performance. In FY93, there were four activations, which registered a total of 1.57 million gallons treated and discharged to the harbor.

This facility came on line in 1987 but no flow information is available because of malfunctioning flow meters. The flows presented are estimates based on 25% of the flows going through the Somerville Marginal facility. Appendix F, Table F-1 contains the facility's operations data and is summarized in Table II.F.1 Figure II.F.1 charts the activations in FY93; Figure II.F.2 depicts the number of yearly activations from FY90 to FY93.

Figure II.F.1 Constitution Beach CSO Fiscal Year 1993 Activations

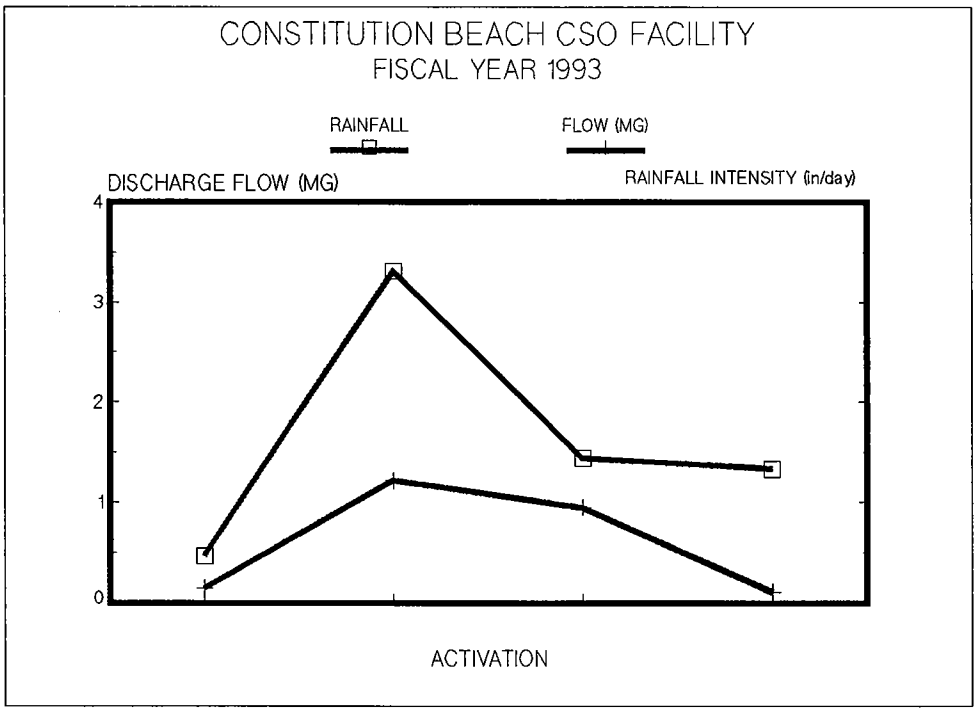


Figure II.F.2 Constitution Beach CSO Activations FY90 to FY93

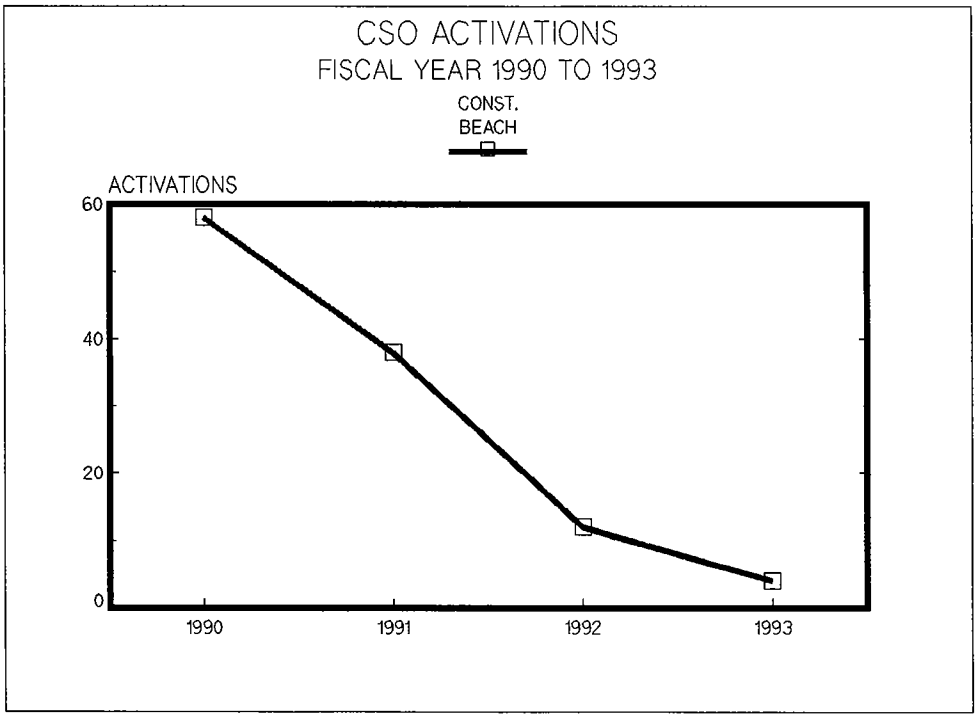


Table II.F.1 Constitution Beach CSO FY93 Activations Summary

	FY92	FY93
Number of Activations	12	4
Total Volume Treated (MG)	11	1.57
Maximum Flow (MGD)	5.7	1.22
Minimum Flow (MGD)	0.23	0.1
Average Flow (MGD) *	0.91	0.39
Total Rainfall (in/year)	44.60	48.82

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

Although the total rainfall in FY93 was higher than FY92 measurement, the total number of activations in FY93 decreased by 67%. Consequently, the total volume of chlorinated effluent discharge from this facility into the inner harbor was also significantly reduced.

F.2 Conventional Parameters

The results of analyses of conventional parameters are in Appendix F, Table F-1, Constitution Beach Operations Summary and are summarized in Table II.F.2

Although this facility is currently permitted to BWSC, the effluent quality met the limits required of other MWRA CSO facilities.

BOD and TSS There are no BOD or TSS numerical limits for CSO discharges. Thus, the range was large for these parameters: BOD was 8 mg/L to 24 mg/L and TSS was 14 mg/L to 178 mg/L.

Fecal Coliform The effluent fecal coliform counts were all less than 10 colonies/100 mL.

pH The pH observed at this facility ranged from 6.91 to 7.43, well within the range of 6.5-9.0 specified by the EPA.

Table II.F.2 Constitution Beach CSO Influent and Effluent Characteristics

Parameter	Concentration *					
	Influent			Effluent		
	Min	Ave	Max	Min	Ave	Max
TSS	30	111	207	14	67.8	178
BOD	6	24	55	8	16.3	24
Fecal Coliform (#/100 mL)				10	10	10
pH (units)				6.91		7.43

* Concentration expressed in mg/L except for pH and Fecal Coliform

G. Fox Point Combined Sewer Overflows Facility

Fox Point CSO came on line in 1989 and has a design capacity of 119 MGD. Operation of this facility is very similar to that of Constitution Beach CSO; treatment includes screening and disinfection. The effluent is discharged to a BWSC sewer line that ultimately discharges to the Dorchester Bay through BOS089.

G.1 Activations

Like Constitution Beach, Fox Point is not currently permitted to the MWRA. Appendix G presents the facility's operational data and is summarized in Table II.G.1 The only time that this facility did not activate was in the month of May.

In FY93, there was no significant change from FY92 in the number of activations or volume of discharge going through this facility from. Figure II.G.1 charts the activations in FY93; Figure II.G.2 depicts the activations experienced since 1990.

G.2 Conventional Parameters

The results of analyses for conventional pollutants in the influent and effluent are included in Appendix G-1, Fox Point Operations Summary and are summarized in Table II.G.2.

Figure II.G.1 Fox Point CSO Fiscal Year 1993 Activations

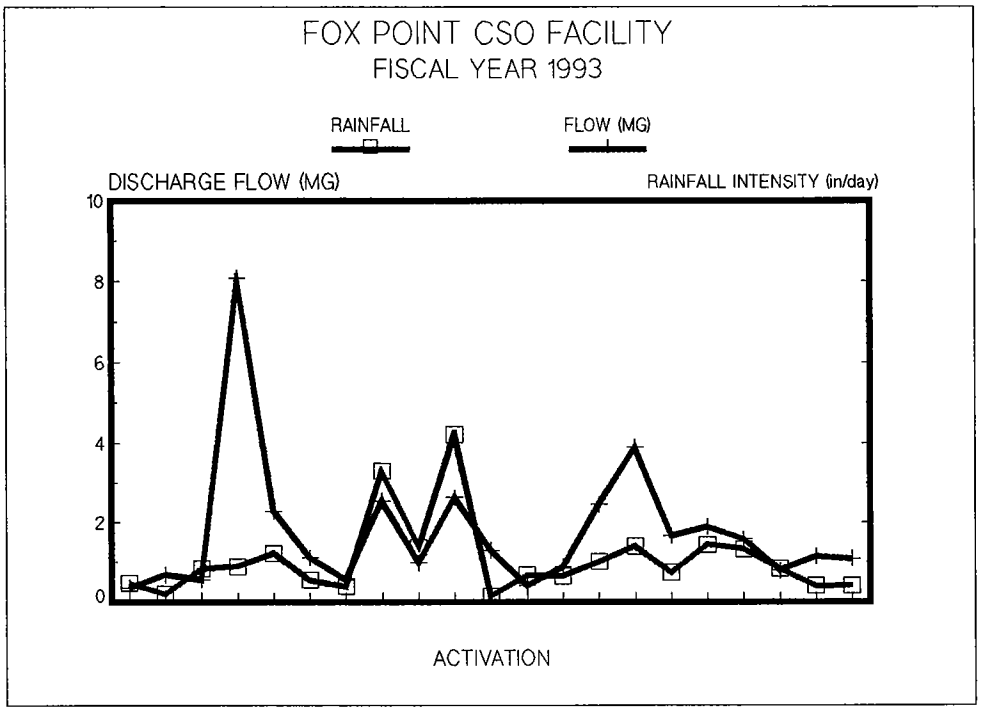


Figure II.G.2 Fox Point CSO Activations FY90 to FY93

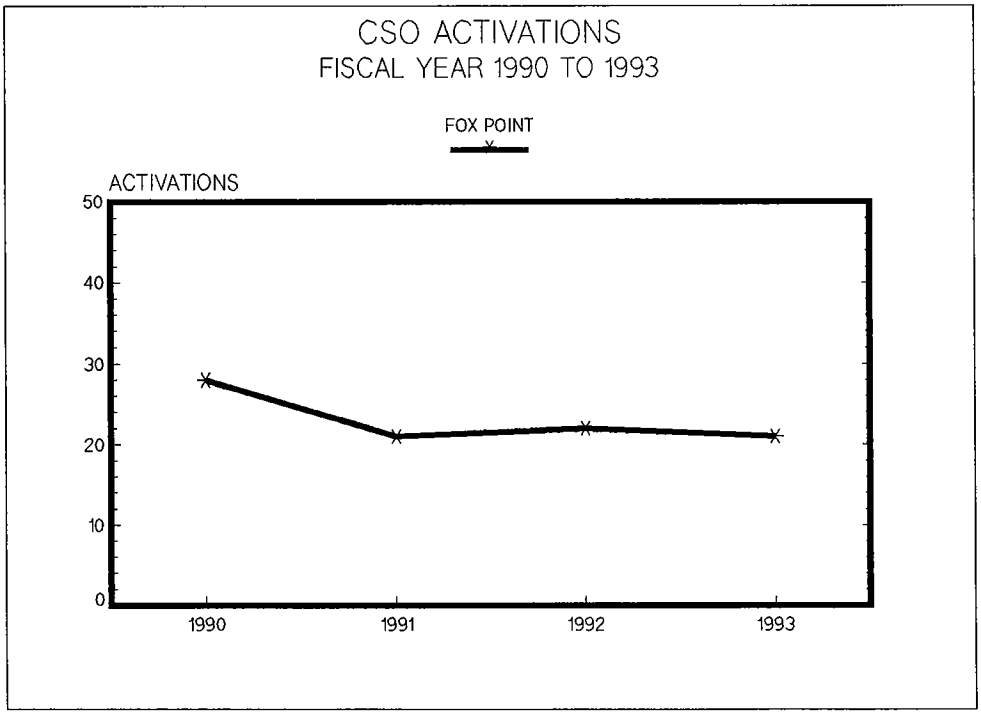


Table II.G.1 Fox Point CSO FY93 Activations Summary

	FY92	FY93
Number of Activations	22	21
Total Volume Treated (MG)	38	36.91
Maximum Flow (MGD)	5	8.08
Minimum Flow (MGD)	0.4	0.36
Average Flow (MGD)*	1.7	1.76
Total Rainfall (in/year)	44.6	48.82

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

Table II.G.2 Fox Point CSO Influent and Effluent Characteristics

Parameter	Concentration *					
	Influent			Effluent		
	Min	Ave	Max	Min	Ave	Max
TSS	10	107	214	10	150	388
BOD	20	60	170	16	66.4	291
Fecal Coliform (#/100 mL)				1	33.4	180
pH (units)				6.59		7.86

* Concentration expressed in mg/L except for pH and Fecal Coliform

Although this facility is currently permitted to BWSC, the effluent quality met the limits required of MWRA CSO facilities.

BOD and TSS The ranges observed for these parameters were large: BOD was 16 to 291 mg/L and TSS was 10 to 388 mg/L.

Fecal Coliform The effluent fecal coliform counts ranged from a low of one to a high of 180 colonies/100 mL.

pH The pH observed at this facility ranged from a low of 6.59 to a high of 7.86, well within the EPA limit range of 6.5 - 9.0

H. Commercial Point Combined Sewer Facility

Commercial Point is an unmanned gravity CSO with a design capacity of 194 MGD. Treatment includes screening and chlorination. Effluent is discharged to a BWSC line that ultimately discharges to the Dorchester Bay through BOS090. Few historical data are available because the facility only came on line in 1991.

H.1 Activations

Very low flows go through this facility with the majority of activations occurring in the months of September and December. Table II.H.1 summarizes Commercial Point activations in FY93.

Table II.H.1 Commercial Point CSO FY93 Activations Summary

	FY92	FY93
Number of Activations	33	28
Total Volume Treated (MG)	80	77.24
Maximum Flow (MGD)	11	9.84
Minimum Flow (MGD)	1	0.1
Average Flow (MGD) *	2.4	2.97
Total Rainfall (in/year)	44.6	48.82

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

When compared to last year's record, there is a minimal decrease in the number of activations. Consequently, the total volume of combined sewer discharged during FY93 decreased. Figure II.H.1 charts the activations in FY93 while Figure II.H.2 depicts the activations since FY91.

Figure II.H.1 Commercial Point CSO Fiscal Year 1993 Activations

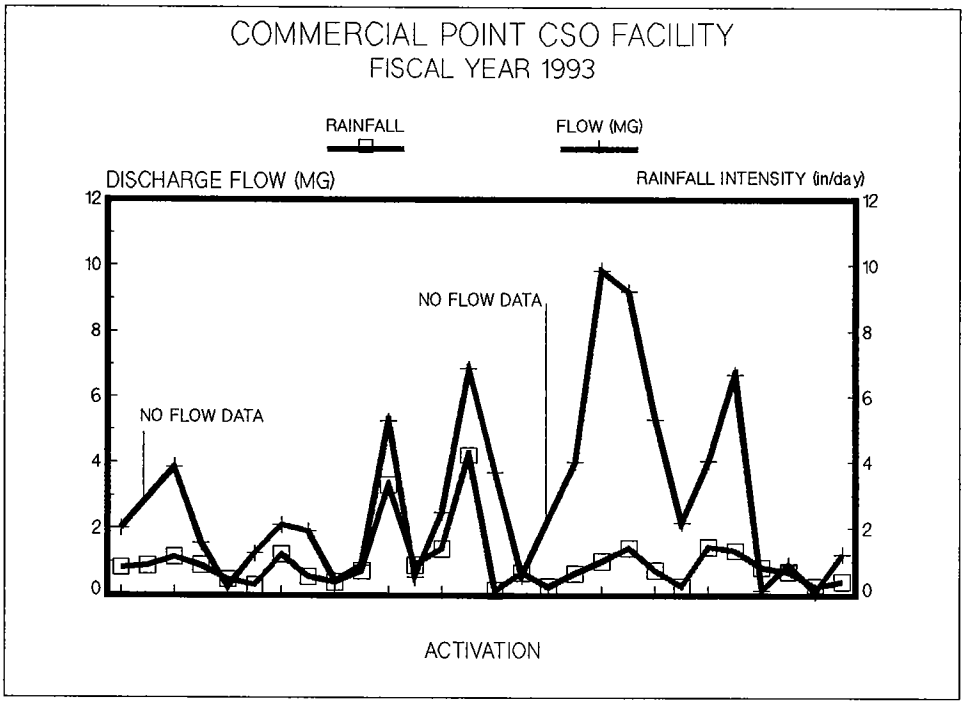
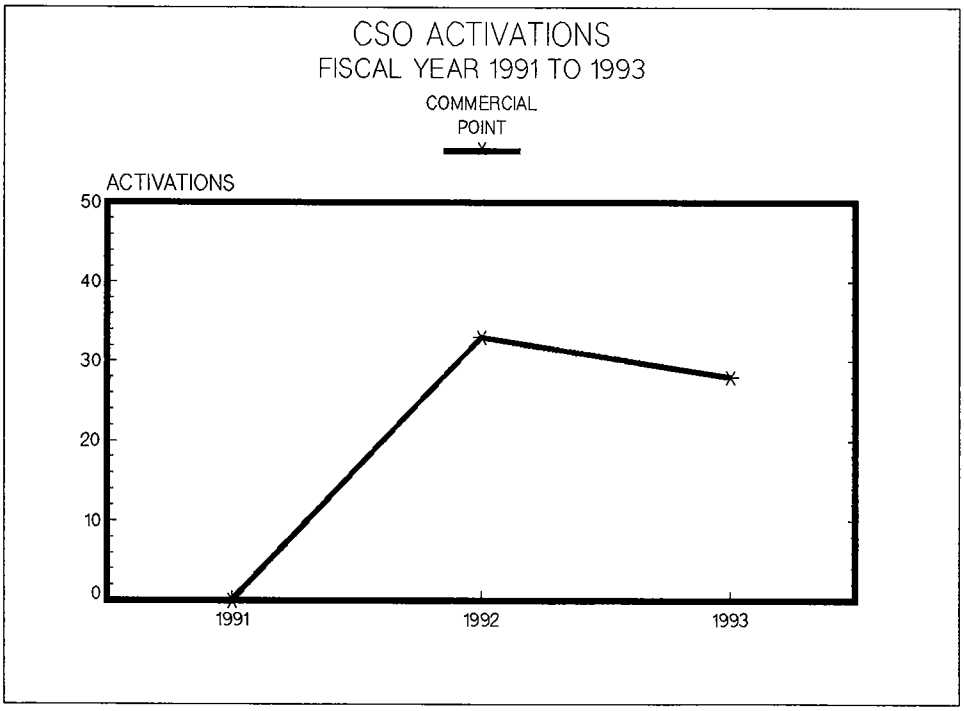


Figure II.H.2 Commercial Point CSO Activations FY91 to FY93



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 II.H.2.

Table II.H.2 Commercial Point CSO Influent and Effluent Characteristics

Parameter	Concentration *					
	Influent			Effluent		
	Min	Ave	Max	Min	Ave	Max
TSS	4	152	2058	13	87.6	470
BOD	11	40	145	12	40	154
Fecal Coliform (#/100 mL)				10	1602	42000
pH (units)				5.58		10.56

* Concentration expressed in mg/L except for pH and Fecal Coliform

BOD and TSS The range was large for these parameters: BOD was 12 mg/L to 154 mg/L and TSS was 13 mg/L to 470 mg/L.

Fecal Coliform The effluent fecal coliform counts ranged from a low of ten to a high of 42,000 colonies/100 mL.

pH The pH observed at this facility ranged from a low of 5.58 to a high of 10.56.

III. Effluent Toxics Issue

A. Effluent Characteristics Compared With Water Quality Standards

Almost all of the priority pollutant concentrations were reported as being below method detection limits. Some priority pollutants, however, were detected in the effluent at very low concentrations. Analytical results below the methods' quantitation limits are only estimates and are not reliable. Other parameters that have only been detected below their reporting limits are also questionable.

In order to compare our effluent concentrations with water quality standards, the geometric means were calculated for those constituents that were detected at least once during the fiscal year. For metals, cyanide, TPH, and surfactants, half the reporting limit was assigned for those measurements that were below detection. For organics, one tenth of the reporting limit was used. This assumption agreed with the Harbor Studies results conducted using analytical methods with very low detection levels (10 ng/L reporting limit).

A.1 Deer Island

Table III.A.1 compares the effluent maximum concentration observed and the calculated geometric mean concentrations of each pollutant with the pollutant concentration in Boston Harbor around the Deer Island outfall. The receiving water data were collected in the summer of 1987 when dilution of discharge was presumably at the seasonal lowest. Also shown in Table III.A.1 is the calculated critical dilution ratio required to meet water quality standards. The critical dilution required to meet acute criteria is the ratio of the maximum concentration observed to the water quality standard. To determine if the effluent quality meets chronic criteria, the ratio of the geometric mean to the water quality standard is calculated. Problematic parameters appear to be:

	Critical dilutions required to meet water quality	
	Acute Criteria	Chronic Criteria
Parameter		
copper	25 : 1	
cyanide	20 : 1	
dieldrin		8 : 1
chlordane		18 : 1

Table III.A.1 Deer Island Effluent Compared to Water Quality Standards

PARAMETERS METALS: (ug/l)	Boston Harbor (1)	Geometric Mean (2)	Maximum Concentration	Acute Criteria	Max Conc/ Acute Crit.(3)	Chronic Criteria	Geo Mean/ Chronic Crit.(3)
Arsenic		1.639	3.00	69		36	
Cadmium	0.0348	0.998	4.00	43		9.3	
Chromium	0.175	3.297	6.00	1100		50	
Copper	0.943	56.016	73.00	2.9	25 : 1		
Lead	0.0849	12.398	19.00	220		8.5	2 : 1
Mercury	<.0071	0.242	1.10	2.1		0.025	10 : 1
Nickel	0.53	< 7.076	< 20.00	75		8.3	
Selenium		< 1.411	2.00	300		71.0	
Silver		2.630	7.00	2.3	3 : 1		
Zinc	1.238	82.270	110.00	95	1 : 1	86	1 : 1
Cyanide (ug/l)		7.000	20.00	1	20 : 1		
PESTICIDES AND PCBs (ug/l)							
Aldrin	0.00005	0.009	0.024	1.300			
Lindane	0.00136	0.008	0.011	0.160			
4,4'DDT	0.00057	< 0.200	< 0.200	0.130		0.0010	
Heptachlor epoxide (4)		0.007	0.005	0.053		0.0036	2 : 1
Heptachlor	0.000084	0.009	0.034	0.053		0.0036	3 : 1
Endrin		< 0.100	< 0.100	0.037		0.0023	
Dieldrin	0.00062	0.016	0.031	0.710		0.0019	8 : 1
Chlordane (4)		0.072	0.015	0.090		0.0040	18 : 1
Toxaphene				0.210	3 : 1	0.0002	

(1) Data taken from Secondary Treatment Facilities Plan, Volume V, Appendix X.

(2) Geometric mean concentration, Fiscal Year 1993 NPDES data.

(3) Critical dilution required

(4) Geometric mean concentration artificially high, the max value reported are real measurements.

Critical dilution calculations are questionable in that they do not truly reflect constituent concentrations within the mixing zone, as evidenced by the data collected around the Deer Island outfall.

A.2 Nut Island

Table III.A.2 compares each pollutant's effluent geometric mean concentration with the concentrations of pollutants in Boston Harbor around the Nut Island outfall location. Also shown is the calculated dilution ratio required to meet the water quality standard.

As in the case of Deer Island, copper, cyanide, mercury, and chlordane appear to be problematic at Nut Island.

	Critical dilutions required to meet water quality	
	Acute Criteria	Chronic Criteria
Parameter		
copper	26 : 1	
cyanide	16 : 1	
chlordane		16 : 1
mercury		9 : 1

A.3 Combined Deer and Nut Island

Table III.A.3 compares the calculated concentrations in flow-weighted Deer and Nut Island combined effluents with water quality standards.

The monthly concentrations were derived by calculating the monthly loadings from each plant each month, adding the loadings, and dividing the total loadings by the total flow from each plant. The maximum and the geometric mean concentrations were then taken from the calculated combined concentration. The critical dilutions were found to be:

	Critical dilutions required to meet water quality,	
	Acute Criteria	Chronic Criteria
Parameter		
copper	27 : 1	
cyanide	19 : 1	
chlordane		15 : 1
mercury		10 : 1

TABLE III.A.2 NUT ISLAND EFFLUENT COMPARED TO WATER QUALITY STANDARDS

PARAMETERS METALS: (ug/L)	Boston Harbor (1)	Geo Mean Conc (2)	Maximum Concentration	Acute Criteria	Max Conc/ Acute Crit. (3)	Chronic Criteria	Geo Mean/ Chron Crit. (3)
Arsenic		1.510	3.000	69		36	
Cadmium	0.0249	< 1.000	< 6.000	43		9.3	
Chromium	0.325	5.040	11.000	1100.0		50.0	
Copper	0.818	58.590	91.000	2.9	26 : 1		
Lead	0.1078	9.120	11.000	220		8.5	1 : 1
Mercury	<0.0064	0.230	0.900	2.1		0.025	9 : 2
Nickel	0.454	8.650	25.000	75		8.3	
Selenium		1.330	2.000	300		71	
Silver		2.450	6.000	2.3	3 : 1		
Zinc	1.238	63.740	87.000	95		86	
Cyanide ug/l		10.000	17.000	1	16 : 1		
PESTICIDES AND PCBs (ug/l)							
Aldrin	0.00002	0.010	0.018	1.300			
Lindane	0.00109	0.010	0.180	0.160	1 : 1		
4,4'DDT	0.00012	< 0.100	< 0.100	0.130		0.0010	
Heptachlor epoxide		< 0.100	< 0.100	0.053		0.0036	
Heptachlor	0.00016	0.010	0.034	0.053		0.0036	3 : 1
Endosulfan sulfate		0.030	0.720	0.034	21 : 1	0.0087	4 : 1
Endosulfan I		< 0.100	< 0.100	0.034		0.0087	
Endrin		< 0.100	< 0.100	0.037		0.0023	
Dieldrin	0.0005	0.010	0.024	0.710		0.0019	5 : 1
Chlordane (4)		0.070	0.009	0.090		0.0040	16 : 1

(1) Data taken from the Secondary Treatment Facilities Plan, Volume V, Appendix X.

(2) Geometric mean concentration, Fiscal Year 1993 NPDES data.

(3) Critical dilution rerquired.

(4) Geometric mean concentration artificially high. The max imum value reported is the only hit during this period.

TABLE III.A.3 COMBINED DEER AND NUT ISLAND EFFLUENT CONCENTRATION COMPARED TO WQ STANDARDS

PARAMETERS METALS: (ug/L)	Geo Mean Conc	Maximum Concentration	Acute Criteria	Max Conc./ Acute Crit.	Chronic Criteria	Geo Mean Conc Chronic Crit.
Arsenic	1.60	3.00	69		36	0.0444
Cadmium	0.84	3.68	43		9.3	0.0899
Chromium	3.86	7.62	1100		50	0.0773
Copper	56.85	78.85	2.9	27 : 1		
Lead	11.33	16.40	220		8.5	1.3333
Mercury	0.24	1.04	2.1		0.025	9.5240
Nickel	4.86	14.87	75		8.3	0.5855
Selenium	0.90	2.00	300		71	0.0127
Silver	2.57	6.68	2.3	3 : 1		
Zinc	76.25	102.53	95	1 : 1	86	0.8866
Cyanide	7.97	19.03	1	19 : 1		
PESTICIDES AND PCBs (ug/l)						
Aldrin	0.01	0.02	1.300			
Lindane	0.01	0.07	0.160			
4,4'DDT			0.130		0.0010	
Heptachlor epoxide	0.02	0.02	0.053		0.0036	5 : 1
Heptachlor	0.01	0.03	0.053		0.0036	3 : 1
Endosulfan sulfate	0.04	0.27	0.034	8 : 1	0.0087	5 : 1
Endosulfan I			0.034		0.0087	
Endrin			0.037		0.0023	
Dieldrin	0.01	0.03	0.710		0.0019	7 : 1
Chlordane	0.06	0.01	0.090		0.0040	15 : 1

1. Plant loadings calculated from the NPDES data set, using the average daily flow (Deer Island = 268 MGD; Nut Island = 129 MGD)
2. Combined Deer and Nut Island effluent concentration backcalculated from the total loadings from each plant.

B. Toxics

B.1 Priority Pollutants

In past years, the data have indicated that most priority pollutants are not detected in the effluent. This past year's Deer and Nut Island effluent data followed the trend; monitoring did not detect most of the priority pollutants.

The majority of priority pollutants and hazardous substances tested either had concentrations below detection levels or had concentrations in the mixing zone well below any EPA water quality criteria. There were only a few parameters that appeared often enough or showed at least one high enough result to be of concern.

B.2 Parameters of Concern

Lead Although the concentration of lead in the effluent is low compared to the acute and chronic water quality criteria, it is a pollutant of concern and must be monitored closely. Surface runoff into the combined sewer system and lead pipes leading out of old houses into the collection system are suspected to be major sources of lead in the influent.

Copper The copper concentration in both Deer Island's and Nut Island's effluent was high; it required a critical dilution of 25 and 31 respectively. Most of the copper entering the sewer system is believed to come from households where it is leached from copper pipes by the slightly acidic water supply. By September 1995, the MWRA plans to adjust the pH of the water supply by adding a corrosion inhibitor. This step should reduce the corrosiveness of the water resulting in a lower household copper contribution.

Copper sulfate is added to the water at the Wachusett intake to control algal growth on an as-needed basis (mostly in the summer). However, the dosage is not high enough to cause an increase in copper concentration in the effluent.

Mercury The method detection limit for mercury is 0.2 ug/lL. Estimates of the actual concentration were taken as half of that limit (0.1 ug/L). This concentration of 0.1 ug/L, however, is still four times that of the chronic criterion prescribed by the EPA. Since all mercury FY93 detections were below reporting limits -and thus were considered "J" values (estimated values below quantitation limit), the estimated mecury values, 0.1 ug/L, were used as the actual concentrations. As a result, data were not indicative of an actual hazard to marine life and, instead, were reflective of the limitations of the EPA- approved methodology. Samples with chlorides, any organic materials that are not destroyed during digestion, and any organic materials that can absorb wavelengths will produce false positive results.

Cyanide Cyanide, most often associated with metal plating and processing industries, was detected a little more than half the time at both treatment plants. Since cyanide was detected in the effluent but never in the influent, cyanide data are questionable. Either a production of cyanide during treatment or false positives from interferences are responsible for the results.

Recent observations have detected cyanide in the pre-chlorinated influent identifying chlorination as the point in the treatment process where the constituents that interfere with cyanide analysis are introduced: thiocyanide, chloride, nitrate, and sulfides yield false positive results and chlorine residual lowers the results.

Chlordane Chlordane was detected in 8% of the samples at Deer Island and in 5% of the samples at Nut Island. Chlordane has been banned for use for quite some time. What is occasionally detected in the effluent is probably comes from within the sewer system.

Dieldrin Dieldrin was detected at Deer Island but not at Nut Island. Dieldrin, as chlordane, was banned from discharge into the sewer system. Dieldrin was detected only 5% of the time.

B.3 Earlier Projections Compared with More Current Data

In 1987, the concentrations of certain pollutants in primary and secondary effluent were projected. These numbers were derived by applying published chemical-specific removal rates to 1987 influent data. Data from FY93 revealed that the projections made earlier were indeed very high estimates.

Table III.B.1 and Figure III.B.1 compares FY93 combined Deer and Nut Island effluent concentration with the 1987 primary effluent projections.

As the data suggest, there were no significant changes between the FY92 and FY93 data. Earlier projections, however, appear to overestimate the pollutant loadings out of Deer Island and Nut Island.

Table III.B.1 Earlier Projections Compared to More Current Effluent Concentrations

PARAMETERS	Projected Primary Concentration	Existing Primary Geometric Mean Concentration	
METALS: (ug/L)	(1) (1987)	(2) (FY 92)	(3) (FY 93)
Arsenic	1.810	1.59	1.63
Cadmium	2.277	0.70	0.84
Chromium	16.890	4.30	3.86
Copper	82.265	58.00	56.85
Lead	11.940	10.13	11.33
Mercury	1.240	0.23	0.24
Nickel	21.380	8.87	4.83
Selenium	15.260	1.12	0.90
Silver	4.010	3.20	2.57
Zinc	165.300	70.76	76.25
PESTICIDES AND PCBs (ug/L)			
Aldrin	0.212	0.02	0.01
4,4'DDT	0.051	0.15	BDL
Heptachlor	0.242	0.02	0.01
Dieldrin	0.022	0.02	0.01
PCBs	1.011	BDL	BDL

(1) Projections contained in the SEIS document.

(2) Flow-weighted combined Deer Island and Nut Island1992 NPDES effluent data.

(3) Flow-weighted combined Deer Island and Nut Island1993 NPDES effluent data.

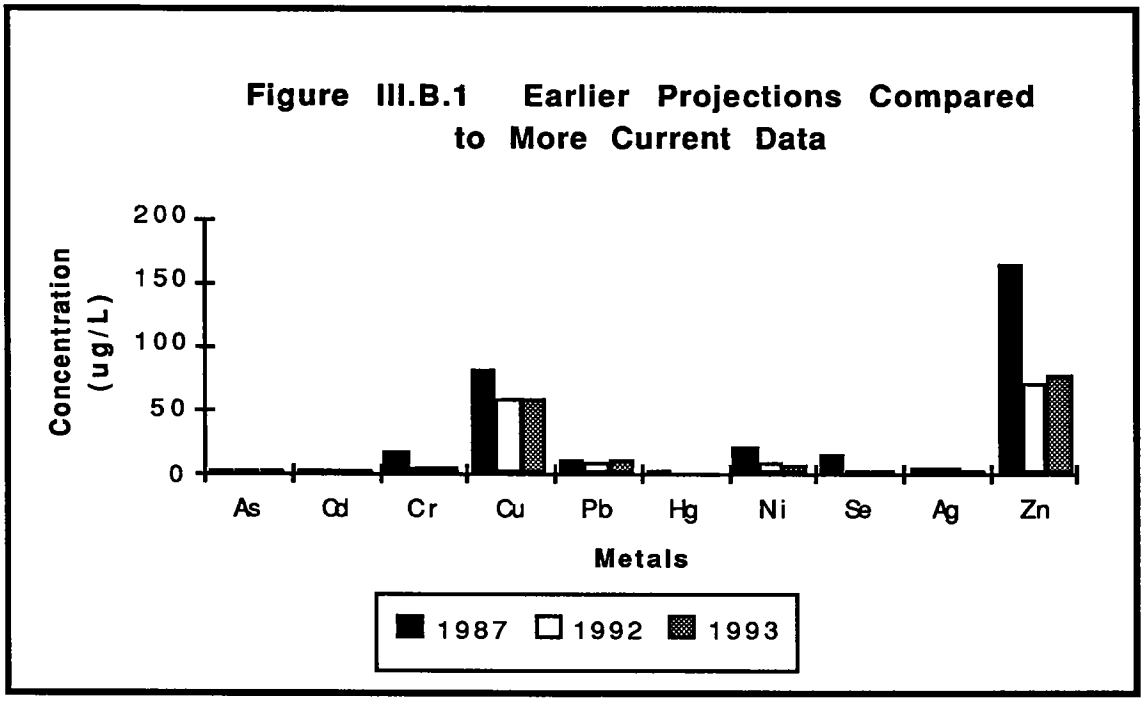


Table III.B.2 compares the earlier projections with new estimates. The new estimates are based on FY93 influent data using the same removal rates used in earlier estimates.

C. Toxicity

C.1 Whole Effluent Toxicity

The MWRA tests effluent toxicity every month at the Deer and Nut Island treatment plants. The results of toxicity testing in 1993 are consistent with previous years.

Three tests are used: 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 algae, Champia parvula. Current NPDES permit limits for the toxicity tests are: a No Observed Effect Concentration (NOEC) of 20 % for the acute test and 10% for the chronic tests.

Table III.B.2 Primary and Secondary Effluent Projections

Parameter	Primary Effluent Projections (ug/L) (SEIS)	(FY92)	(FY93)	Secondary Effluent Projections (ug/L) (SEIS)	(FY92)	(FY93)
Arsenic	1.810	1.560	1.500	1.17	1.040	1.040
Cadmium	2.277	1.624	2.550	1.29	0.955	0.955
Chromium	16.890	4.794	4.200	6.53	1.918	1.918
Copper	82.265	57.629	57.085	22.13	15.959	15.959
Lead	11.940	5.886	9.734	9.19	4.687	4.687
Mercury	1.240	0.187	0.464	0.38	0.060	0.060
Nickel	21.380	9.631	8.776	16.54	7.704	7.704
Selenium	15.260	1.548	1.800	8.19	0.860	0.860
Silver	4.010	4.424	3.727	0.55	0.632	0.632
Zinc	165.300	81.870	80.175	63.91	32.748	32.748

Notes:

(1) SEIS taken from Table 6.4.4.a, page 6.10, Supplement Envionmental Impact Statement, EPA, 1988
(2) FY92 data based on Influent Data collected during FY 92, and applying removal efficiencies used in the SEIS docu
(3) FY93 data based on Influent Data collected during FY 93, and applying removal efficiencies used in the SEIS docu

Table III.C.1 summarizes the results of toxicity tests conducted during FY93. The results for the sheepshead minnow test were in compliance 11 out of 12 months at each plant. The one failure was due to a high concentration of ammonia in the wastestream. The mysid acute test was in compliance 42% of the time at both plants. Concentrations of surfactants in the effluent from the two plants are consistent with concentrations that would cause mysid toxicity. The results of the Champia test were never in compliance at Nut Island and in compliance once at Deer Island. The EPA has concluded that using Champia for toxicity compliance is compromised by its ultrasensitive and inconsistent results; thus, it has been withdrawn as a test species in permit renewals.

C.2 Toxicity Identification and Evaluation

The EPA found that the probable cause of most **acute** toxicity in Deer Island's wastestream was surfactants (Toxicity Identification Evaluation with Deer Island Effluent, EPA, August 1989). No **acute** toxicity could be attributed to metals or pesticides. Currently, concentrations of surfactants in the effluent from the two plants are consistent with the concentrations which could cause the observed mortality. The study further concluded that surfactants will be readily biodegraded with secondary treatment.

D. 1992 BIOACCUMULATION STUDY, BOSTON HARBOR

Bioaccumulation studies measure the potential for long-term accumulation of pollutants in aquatic species. In the summer of 1992 under an arrangement with EPA, the MWRA conducted a study comparable to that conducted in 1987 as part of its Secondary Treatment Facilities Plan (STFP). The study was designed to improve the detection limits beyond EPA's standard methods. The results of the study indicated that the mussels were continuing to bioaccumulate several contaminants, but at lower rates than in previous years.

The mussels used during 1992 were collected from Gloucester and were used to determine how other sources were impacting the harbor. The mussels were deployed for 60 days at three sites: Deer Island discharge, the new outfall site in Massachusetts Bay (clean control), and the New England Aquarium in Boston's Inner Harbor (dirty control). Mussels deployed offshore had similar or lower body burdens than the Gloucester mussels. The ones deployed at Deer Island showed significant bioaccumulation of PAHs, PCBs, DDTs, alpha-chlordane, and trans-nonachlor. Most compounds, however, were measured in lower concentrations in 1992 than in 1987 and 1991. Table III.D.1 compares the 1992 study with the 1991 and 1987 studies.

Table III.C.1 Results of Toxicity Testing On Deer Island and Nut Island Effluent, FY93

	Mysid acute		Cyprinodon chronic		Champia chronic
	LC50	NOEC	Survival NOEC	Growth NOEC	NOEC
Limits (%)	None	20	10	10	10
Deer Island					
July	29	20	20	10	2.0
August	21	10	20	10	2.0
September	56	20	60	20	7.0
October	24	5	20	5	7.0
November	21	10	40	10	<.0.2
December	20	5	40	20	2.0
January	32	5	60	40	*
February	32	20	40	20	2.0
March	17	5	40	20	10.0
April	74	20	60	10	2.0
May	34	20	60	10	<.0.2
June	16	10	20	20	0.7
Average	31	13	40	16	3.2
Nut Island					
July	28	10	20	10	2
August	22	10	10	10	0.7
September	50	20	40	20	2
October	20	5	20	5	2
November	15	10	20	10	<.0.2
December	14	5	40	20	0.7
January	25	10	60	40	*
February	30	20	40	10	0.7
March	16	5	40	20	2
April	56	20	60	20	0.7
May	51	20	60	40	2
June	30	20	40	40	0.7
Average	30	13	38	20	1.2

* Tests invalid due to failure of controls to meet acceptability requirements.

Table III.D.1 Concentration of Contaminants Bioaccumulating in Boston Harbor Mussels

	Pre-Deployment	Clean Control	Dirty Control	Deer Island	Nut Island
Copper (ug/g)					
1987	6.6	7.1		9.5**	8.8**
1991	8.8	7.4	12.7**	9.3	
Lead (ug/g)					
1987	2.8	3.1		6.7**	8.3**
1991	6.5	5	6.4	5.9	
Zinc (ug/g)					
1987	83	92		152**	143**
1991	148	173	220**	143	
Total PAH's (ng/g)					
1987	581	465		2363**	683
1991	217	228	2570**	1207**	
1992	216	129**	3545**	1934**	
Total PCB's (ng/g)					
1987	317	227		630**	604**
1991	77	77	477**	199**	
1992	65	44**	652**	133**	
Total DDT's (ng/g)					
1987	52	30		63	51
1991	28	28	94**	48**	
1992	15	12	103	25**	
Alpha-Chlordane (ng/g)					
1987	8.7	6.7		21.5**	19.5**
1991	2.4	2.5	19**	10.3**	
1992	1.9	1.7	19**	6.9**	
Dieldrin (ng/g)					
1987	6.6	3.6		11.4	7.6
1991	< 1.4	2.3	9**	2.9	
1992	< 1.0	1.2	6.7**	2.7	
Lindane (ng/g)					
1987	1.8	0.8		5.5	0.8
1991	< 1.5	< 2.2	< 3.2	< 2.5	
1992	< 1.0	< 1.0	< 1.9	< 1.3	
Trans-nonachlor (ng/g)					
1987	7.7	6.2		18**	15.8**
1991	< 1.4	< 1.5	< 2.5	8.9**	
1992	2.1	2.5	21.3**	8.3**	

Hexachlorobenzene, heptachlor, aldrin, heptachlor epoxide, mirex were not detected at any station in any year. Mussels were collected from Barnstable in 1987 and Gloucester in 1991 and 1992. Clean control at proposed offshore discharge in 1987 and 1992 and in Gloucester in 1991. Dirty control at the New England Aquarium.

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

Only concentrations of high molecular weight (HMW) PAHs increased in FY93 to levels higher than those observed in previous studies. High molecular weight compounds are commonly associated with a number of contaminant sources including: sediments, atmospheric deposition, and the combustion of gasoline and oil products. The range of HMW PAHs sources suggests that the Deer Island discharge is not the predominant source of the HMW PAHs in the mussels.

E. Metals Criteria

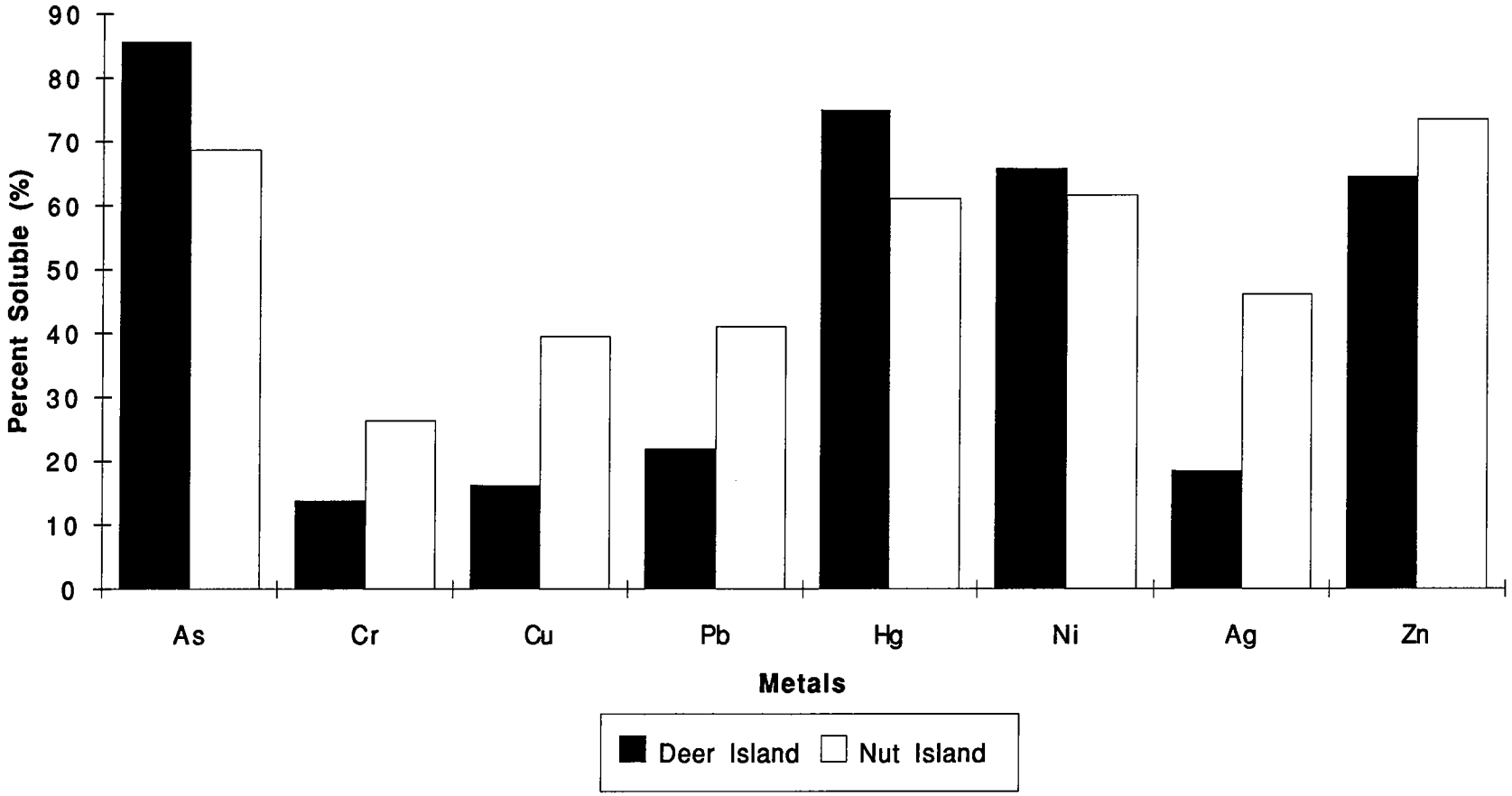
The Water Quality Criteria were developed to regulate metal discharges measured by the **total recoverable procedure.** This measurement includes metals that are attached to particles and not readily available to animals and plants and metals in dissolved states, which are the source of most toxicity. Current NPDES and Local Limits program monitoring procedures require the analyses of metals with the **total metals procedure**. Both the total recoverable and total metals procedures, expressed as "total metals," measures all metals that can be dissolved in hot acid. The difference between the two procedures is that the total metals procedure requires a longer, hotter, and more acidic digestion period than the total recoverable procedure.

EPA recognizes that total or total recoverable metals measurements may be overly protective since a metallic toxicant must be in the dissolved state to pass through biological membranes and react chemically. Thus, the more appropriate metal measurement would be another procedure, the **dissolved metal procedure.**

Yet another procedure, the **acid soluble procedure,** measures metals that can be dissolved at pH 1.5 - 2.0 at room temperature. The mild extraction conditions are intended to measure less particulate metal than the total or total recoverable procedures. Although not formally approved by EPA, recent criteria documents have expressed metal limits in terms of the acid soluble procedure.

In 1987, limited sampling was conducted at the Deer Island and Nut Island plants specifically to measure the soluble fraction of metals present in the effluent. Figure III.E.1 illustrates the percentage of soluble fraction over total metals. As shown, the percentage of soluble metals in our effluent is only half of the total suggesting that only half of the discharged metals are in the toxic form.

FIGURE III.E.1 Ratio of Soluble To Total Metals in Combined Deer Island and Nut Island Effluents



Appendix A

Appendix A Table A-1 Deer Island Treatment Plant Operations Summary, Fiscal Year 1993

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	YEARLY MIN VALUE	YEARLY AVE VALUE	YEARLY MAX VALUE
FLOW (MGD)															
AVERAGE	218	241	224	213	238	322	262	266	350	394	246	218		268	
MINIMUM	174	193	189	187	189	223	224	213	239	284	199	197	174		
MAXIMUM	282	452	307	309	474	532	363	463	628	593	297	305			628
PEAK FLOW	537	660	644	579	672	632	649	620	661	688	521	511			688
TEMP (DEG F)	69	71	70	68	63	57	54	53	53	53	61	67		62	
EFFLUENT pH															
MINIMUM	6.6	6.7	6.8	6.9	7.0	6.6	7.0	7.0	6.7	6.9	6.9	6.8	6.60		
MAXIMUM	7.2	7.2	7.2	7.3	7.6	7.4	7.4	7.3	7.4	7.3	7.4	7.2			7.60
CONVENTIONAL PARAMETERS (mg/l)															
SETTLEABLE SOLIDS															
INFLUENT	4.2	5	4.3	4.6	4.9	3.2	3.5	3.3	2.3	1.4	3.7	4.1	1.40	3.71	5.00
EFFLUENT	0.4	0.3	0.3	0.2	0.3	0.3	0.3	0.5	0.2	0.1	0.4	0.2	0.10	0.29	0.50
BIOCHEMICAL OXYGEN DEMAND															
INFLUENT	142	147	186	177	162	150	152	168	128	123	183	190	123	159	190
EFFLUENT	130	130	152	147	144	116	121	136	114	89	117	139	89	128	152
TOTAL SUSPENDED SOLIDS															
INFLUENT	137	164	224*	135	188	135	153	144	121	130	193	187	121	153	193
EFFLUENT	69	72	77	76	73	66	64	73	66	58	71	76	58	70	77
OIL AND GREASE															
INFLUENT	33.4	83.7	42.2	46.1	47.2	39.2	59.1	26.3	23.3	20.4	47.0	44.3	20.4	42.7	83.7
EFFLUENT	27.5	27.3	31.1	34.5	31.2	24.5	29.8	19.1	15.0	15.3	37.0	27.3	15.0	26.6	37.0
TOTAL COLIFORMS															
INFLUENT (E+06)	51.54	36.3	35.6	46.41	31.37	1.98	10.3	7.53	1.78	1.08	20.91	35.66	1.08	23.4	51.54
EFFLUENT	278	859	750	482	671	326	853	638	586	459	775	809	278	624	859

Appendix A Table A-1, Deer Island Treatment Plant

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN VALUE	AVE VALUE	MAX VALUE
FECAL COLIFORM															
INFLUENT (E+06)	5.33	3.94	4.09	4.1	2.4	14	0.88	0.85	0.16	0.08	1.69	3.58	0.08	3.43	14.00
EFFLUENT	15	28	29	15	26	15	17	18	19	14	17	23	14	20	29
RESIDUAL CHLORINE	1.9	1.98	1.85	2.15	1.81	1.99	1.98	2.2	1.92	2.03	2.05	2.23	1.81	2.01	2.23
CHLORIDES	1300	1000	900	952	780	623	736	924	744	579	907	1319	579.00	897	1319.00
METALS (mg/l)															
ARSENIC															
INFLUENT	<.005	<.005	< 0.005	< 0.005	0.008	0.002	0.005	0.006	< 0.005	< 0.001	< 0.001	0.011	< 0.001	0.006	0.01
EFFLUENT	<.005	<.005	< 0.005	< 0.005	0.009	< 0.001	0.008	0.003	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	0.007	0.01
CHROMIUM															
INFLUENT	0.006	0.064	0.063	0.016	0.089	< 0.003	0.003	0.006	0.020	0.012	0.020	0.018	< 0.003	0.029	0.09
EFFLUENT	0.008	0.003	0.011	0.006	0.016	< 0.003	0.004	0.011	0.020	0.015	0.013	0.010	< 0.003	0.011	0.02
COPPER															
INFLUENT	0.066	0.170	0.170	0.052	0.140	0.060	0.069	0.061	0.069	0.055	0.069	0.085	0.05	0.089	0.17
EFFLUENT	0.072	0.066	< 0.05	0.051	0.070	0.048	0.057	0.058	0.055	0.042	0.051	0.060	< 0.05	0.057	0.07
CADMIUM															
INFLUENT	<.001	0.001	0.001	< 0.001	< 0.005	0.001	0.002	0.001	< 0.005	0.001	0.001	0.001	< 0.001	0.001	0.00
EFFLUENT	<.001	<.001	< 0.001	0.001	< 0.005	0.001	0.001	0.003	< 0.005	0.001	0.001	0.001	< 0.001	0.001	0.00
IRON															
INFLUENT	ND	ND	ND	ND	1.670	2.273	1.488	1.290	2.100	1.760	1.770	2.720	1.29	1.884	2.72
EFFLUENT	ND	ND	ND	ND	0.958	1.134	1.044	0.521	1.800	1.412	1.160	1.671	0.52	1.213	1.80
LEAD															
INFLUENT	0.017	0.110	0.160	0.017	0.107	0.021	0.019	0.014	< 0.03	0.022	0.020	0.024	0.01	0.048	0.16
EFFLUENT	0.009	0.012	0.037	0.013	0.014	0.015	0.014	0.013	< 0.03	0.014	0.010	0.013	0.01	0.015	0.04
MERCURY															
INFLUENT	0.0017	0.0085	0.0005	0.0022	0.0004	0.0002	0.0003	< 0.0007	< 0.0005	< 0.0002	0.00079	0.0004	< 0.0002	0.0017	0.0085
EFFLUENT	0.0002	0.0002	0.0004	< 0.0002	0.0004	< 0.0002	0.0002	< 0.0002	< 0.0005	< 0.0002	0.00021	< 0.0002	< 0.0002	0.0003	0.0004
NICKEL															
INFLUENT	0.009	0.070	0.050	0.012	0.044	0.008	0.004	0.008	< 0.02	0.011	0.011	0.012	< 0.02	0.022	0.07
EFFLUENT	0.008	0.008	0.005	0.006	0.006	0.005	0.007	0.023	0.030	0.021	0.022	0.012	0.01	0.013	0.03

Appendix A Table A-1, Deer Island Treatment Plant

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN VALUE	AVE VALUE	MAX VALUE
SILVER															
INFLUENT	0.005	0.009	0.009	0.003	0.008	0.005	0.003	0.004 < 0.007		0.004	0.006	0.007	< 0.007	0.006	0.009
EFFLUENT	0.004	0.004	0.005	0.002	0.015	0.004	0.003	0.004 < 0.007		0.002	0.004	0.004	< 0.007	0.005	0.015
ZINC															
INFLUENT	0.079	0.120	0.240	0.066	0.190	0.211	0.126	0.114	0.140	0.128	0.167	0.318	0.07	0.158	0.32
EFFLUENT	0.078	0.080	0.070	0.044	0.084	0.103	0.081	0.088	0.120	0.103	0.096	0.096	0.04	0.087	0.12
EFFLUENT NUTRIENTS (mg/l)															
TKN	21.730	21.800	25.200	26.208	19.740	17.140	23.168	24.304	25.480	14.875	21.588	24.584	14.88	22.151	26.21
AMMONIA	13.800	15.700	13.050	12.712	10.472	12.570	12.320	12.600	8.540	7.588	13.564	15.232	7.59	12.346	15.70
NITRATES	0.522	0.914	1.213	1.238	0.048	0.288	1.625	0.418	0.180	0.477	0.819	0.122	0.05	0.655	1.63
NITRITE	0.208	0.322	0.130	0.363	0.016	0.083	0.484	0.073	0.029	0.124	0.077	0.024	0.02	0.161	0.48
ORTHOPHOSPHORUS	2.650	2.960	3.592	3.000	1.810	1.220	2.200	2.102	0.983	1.600	2.300	2.824	0.98	2.270	3.59
TOTAL PHOSPHORUS	4.063	3.562	4.063	3.986	3.250	3.200	3.650	2.973	2.031	3.623	4.710	4.528	2.03	3.637	4.71
PRIMARY SLUDGE															
FLOW (MGD)	0.267	0.233	0.258	0.248	0.265	0.240	0.234	0.216	0.187	0.214	0.325	0.205	0.187	0.241	0.325
SCUM (MGD)	0.013	0.010	0.016	0.010	0.012	0.017	0.012	0.014	0.021	0.021	0.007	0.006	0.006	0.013	0.021
pH															
MINIMUM	5.4	5.3	5.5	5.3	5.5	5	5.4	5.4	5.4	5.4	5.3	5.3	5.00	5.35	5.50
MAXIMUM	6	6	6.1	5.9	6	6	5.9	5.9	6.1	6	5.9	5.9	5.90	5.98	6.10
SOLIDS (%)	7.44	8.23	8.31	8.12	8.27	7.5	8.6	7.9	9.48	7.41	6.3	6.78	6.30	7.86	9.48
VOLATILE SOLIDS (%)	81	80	82	85	84	83	87	86	84	78	83	83	78	83	87
GREASE (%)	13.7	14.3	14.2	13.3	11.2	14.7	12.8	7.2	7.3	9.8	10.6	16.9	7.20	12.17	16.90
DIGESTED SLUDGE															
FLOW(MGD)	0.137	0.122	0.196	0.215	0.245	0.173	0.152	0.160	0.153	0.136	0.213	0.302	0.12	0.184	0.30
pH															
MINIMUM	7.1	7.1	7.2	7.0	7.1	7.1	7.2	7.2	7.1	7.1	7.1	7.1	7.00		
MAXIMUM	7.6	7.4	7.4	7.4	7.5	7.5	7.4	7.4	7.4	7.3	7.4	7.4			7.60
TOTAL SOLIDS (%)	3.88	4.35	2.69	4.00	3.40	3.55	3.42	3.56	2.75	4.47	3.97	3.47	2.69	3.63	4.47

Appendix A Table A-1, Deer Island Treatment Plant

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN VALUE	AVE VALUE	MAX VALUE
Digested Sludge (con't)															
VOLATILE SOLIDS (%)	57	56	55	58	58	60	61.0	61	56	55	56	60	55	58	61
GREASE (%)	7.60	7.40	4.90	6.90	5.10	8.10	4.70	6.10	3.30	3.50	3.30	2.00	2.00	5	8.10
METALS (mg/l)															
ARSENIC	0.150	0.140	0.400	0.22	0.190	0.255	< 0.001	0.200	0.096	0.098	0.053	0.097	0.05	0.173	0.40
CHROMIUM	2.910	3.950	2.660	3.020	ND	1.928	2.848	3.332	1.782	5.508	4.102	2.974	1.78	3.183	5.51
COPPER	29.400	33.200	31.400	27.600	25.140	19.440	24.400	25.600	12.210	34.320	39.200	27.080	12.21	27.416	39.20
CADMIUM	0.170	0.210	0.210	0.190	0.182	0.157	0.202	0.220	0.136	0.275	0.181	0.177	0.14	0.193	0.28
IRON	ND	ND	ND	ND	406	432	571	549	296	764	640	525	296	523	764
LEAD	12.000	14.600	14.700	11.200	9.290	8.230	10.220	9.590	4.620	15.710	13.660	13.310	4.62	11.428	15.71
MERCURY	0.089	0.057	0.094	0.130	0.053	0.0790	0.044	0.073	0.163	0.243	0.246	0.267	0.04	0.128	0.27
NICKEL	1.750	2.110	1.640	1.280	1.038	0.903	1.037	1.215	0.749	2.005	1.311	1.176	0.75	1.351	2.11
SILVER	0.490	1.310	0.810	0.080	0.021	0.056	0.026	0.088	0.957	0.044	0.065	0.064	0.02	0.334	1.31
ZINC	41.400	43.300	42.700	34.900	34.600	29.000	38.400	36.000	19.140	50.100	39.800	37.900	19.14	37.270	50.10
NUTRIENTS (mg/l)															
TKN	3202	4318	2089	2810	3068	2660	3735	2794	2223	1935	2326	1866	1866	2752	4318
AMMONIA	756	1176	453	829	1002	951	845	1053	1657	538	760	676	453	891	1657
ORTHOPHOSPHORUS	63	78	49	70	52	28	52	83	43	28	47	23	23	51	83
TOTAL PHOSPHORUS	681	1380	681	629	331	1943	795	937	927	761	593	445	331	842	1943
GAS PRODUCED (E+03 cu ft)															
WASTED	133	110	694	911	830	788	915	1091	921	874	957	0	0.00	685	1091.00
USED	889	908	220	249	218	225	206	152	131	129	197	620	129.00	345	908.00
TOTAL	1022	1018	914	1160	1048	1013	1121	1243	1052	1003	1154	620	620.00	1031	1243.00

NOTES:

1. ND No Data.
2. Monthly values of flows, temperature, and other conventional parameters are summary values of daily results. Yearly values are calculated from the daily results.
3. Data reduced from Deer Island Treatment Plant Monthly Operation Logs. All chemical analyses were conducted by Deer Island Laboratory.
4. * Sampler clogged in September. TSS data is suspect and is not included in yearly summary calculations.

Appendix A Table A-2 Deer Island Influent Characterization, Priority Pollutants, Local Limits Study, FY93

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	GEO MEAN	MAX	TIMES DETECTED
Metals (mg/L)																
ALUMINUM												**0.832**	**0.700**	0.832	0.900	2 of 2
ANTIMONY (TOTAL)	**0.076**	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	0.042	0.180	3 of 36
ARSENIC (TOTAL)	**0.003**	<0.002	< 0.002	**0.002**	**0.001**	**0.001**	< 0.003	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.002	0.002	0.006	5 of 36
BORON		**0.290**	**0.360**	**0.380**	**0.446**	**0.310**	**0.284**	**0.343**	**0.296**	**0.246**	**0.291**	**0.389**	0.200	0.422	0.446	45 of 45
CADMIUM	**0.003**	< 0.005	**0.003**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.003	0.008	3 of 36
CHROMIUM (TOTAL)	**0.007**	**0.007**	**0.011**	< 0.01	**0.007**	**0.007**	**0.007**	**0.006**	**0.006**	< 0.01	< 0.01	**0.010**	< 0.003	0.007	0.031	13 of 36
COPPER (TOTAL)	**0.117**	**0.090**	**0.104**	**0.063**	**0.096**	**0.072**	**0.070**	**0.080**	**0.070**	**0.052**	**0.079**	**0.107**	0.042	0.081	0.260	36 of 36
LEAD (TOTAL)	**0.019**	**0.030**	**0.020**	**0.019**	**0.027**	**0.015**	**0.021**	< 0.003	< 0.003	**0.020**	**0.020**	**0.015**	< 0.003	0.019	0.078	16 of 36
MERCURY (TOTAL)	**0.0005**	< 0.001	**0.0003**	< 0.001	**0.0005**	**0.0007**	< 0.0005	< 0.001	**0.0003**	< 0.001	< 0.001	< 0.001	< 0.0005	0.0004	0.1100	8 of 36
NICKEL	**0.012**	< 0.020	< 0.020	**0.014**	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.010	0.028	4 of 36
SELENIUM (TOTAL)	**0.001**	< 0.010	< 0.002	< 0.002	**0.002**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.010	< 0.005	< 0.002	0.002	0.003	2 of 36
SILVER (TOTAL)	**0.006**	< 0.004	**0.010**	0.006	0.006	0.009	< 0.007	< 0.007	< 0.007	**0.005**	< 0.007	< 0.007	< 0.007	0.005	0.010	11 of 36
ZINC	**0.203**	**0.146**	**0.108**	**0.116**	**0.140**	**0.134**	**0.117**	**0.122**	**0.123**	**0.123**	**0.131**	**0.145**	< 0.100	0.132	0.460	35 of 36
CYANIDE (mg/L)	**0.003**	< 0.010	< 0.010	< 0.010	< 0.010	**0.002**	< 0.010	< 0.010	**0.002**	< 0.010	**0.002**	< 0.010	< 0.01	0.001	0.020	8 of 55
OIL AND GREASE (mg/L)	**9.92**	**23.15**	**5.89**	**12.04**	**12.15**	**2.11**	**16.13**	**10.93**	**4.82**	**3.78**	**7.34**	**10.48**	5.00	8.54	110.00	40 of 45
SURFACTANTS (mg/L)	**3.918**	**3.226**	**6.378**	**4.957**	**4.399**	**3.683**	**3.071**	**4.286**	**3.619**	**2.453**	**3.519**	**6.309**	1.840	4.034	7.660	34 of 34
Pesticides/PCBs (ug/L)																
ALPHA-BHC	< 0.100	< 0.300	< 0.300	< 0.100	< 0.100	**0.011**	**0.014**	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.010	0.100	2 of 36
BETA-BHC	< 0.100	< 0.300	< 0.300	< 0.100	< 0.100	**0.018**	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.010	0.300	1 of 36
BETA-ENDOSULFAN	< 0.100	< 0.630	< 0.058	< 0.200	< 0.100	< 0.100	**0.100**	< 0.100	< 0.200	< 0.100	< 0.100	< 0.100	< 0.100	0.020	0.100	1 of 36
4,4'-DDD (P,P'TDE)	< 0.100	< 0.630	< 0.600	< 0.200	< 0.100	< 0.100	< 0.200	**0.018**	< 0.200	< 0.100	< 0.100	< 0.100	< 0.100	0.020	0.100	1 of 36
4,4'-DDT	< 0.100	< 0.630	< 0.058	< 0.200	< 0.100	< 0.100	< 0.200	< 0.100	< 0.200	**0.019**	< 0.100	< 0.100	< 0.100	0.020	0.100	1 of 36
DELTA-BHC	< 0.100	**0.035**	**0.118**	< 0.100	< 0.100	< 0.100	**0.058**	**0.020**	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.010	0.700	7 of 36
DIELDRIN	< 0.100	< 0.630	**0.103**	< 0.200	< 0.100	**0.017**	< 0.200	< 0.100	< 0.200	< 0.100	< 0.100	< 0.100	< 0.100	0.020	0.300	3 of 36
GAMMA-BHC	**0.010**	< 0.300	**0.109**	< 0.100	**0.010**	< 0.100	< 0.100	< 0.100	< 0.200	< 0.100	**0.020**	**0.010**	< 0.100	0.010	0.500	7 of 36
HEPTACHLOR	< 0.100	< 0.300	**0.093**	< 0.100	< 0.100	< 0.100	**0.020**	< 0.100	< 0.100	< 0.100	**0.075**	< 0.100	< 0.100	0.010	0.400	5 of 36
TOXAPHENE	< 1.000	**6.786**	**13.572**	< 1.000	< 1.000	< 0.500	< 1.000	< 0.500	< 0.866	< 0.500	< 0.500	<0.57	< 0.100	0.850	50.000	3 of 36

Appendix A Table A-2, Deer Island Treatment Plant

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	GEO MEAN	MAX	TIMES DETECTED
Semi-volatile Organics (ug/L)																
BENZOIC ACID	**13.0**	< 18.20		**262.7**	**239.6**	**129.1**	**12.8**	**156.4**	**73.4**	**14.4**	**202.6**	**223.4**	< 2.00	69.6	370.0	27 of 33
4-METHYLPHENOL (P-CRESO	**4.99**	**22.27**	**58.04**	**43.36**	**48.40**	**22.85**	< 50.0	**28.48**	**21.90**	**1.15**	**44.01**	**40.66**	< 2.00	18.82	80.00	29 of 36
PHENOL	**0.68**	< 73.70	< 100.0	**14.23**	**10.26**	< 50.00	< 50.00	< 50.00	**5.23**	**0.79**	**23.39**	**34.18**	< 2.00	6.17	83.00	15 of 36
2,4,5-TRICHLOROPHENOL	< 2.00	< 18.42	< 250.0	< 130.0	< 130.0	< 130.0	< 130.0	< 130.0	< 25.65	**5.91**	< 39.69	< 53.13	< 2.00	6.86	1.00	1 of 36
BENZO(B)FLUORANTHENE	< 2.00	< 73.68	< 100.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 10.32	< 7.94	< 15.87	**1.69**	< 2.00	2.61	1.00	1 of 36
BENZO(K)FLUORANTHENE	< 2.00	< 73.68	< 100.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 10.32	< 7.94	< 15.87	**1.69**	< 2.00	2.61	1.00	1 of 36
BENZO(A)PYRENE	< 2.00	< 73.68	< 100.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 10.32	< 7.94	< 15.87	**2.13**	< 2.00	2.66	2.00	1 of 36
BENZO(GHI)PERYLENE	< 2.00	< 73.68	< 100.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 10.32	< 7.94	< 15.87	**2.89**	< 2.00	2.73	5.00	1 of 36
BENZYL ALCOHOL	**9.28**	< 73.68	**12.77**	**20.74**	**15.82**	< 50.0	< 50.0	**14.91**	**8.76**	**1.15**	**15.18**	**16.07**	< 2.00	8.94	49.00	24 of 36
BIS(2-ETHYLHEXYL) PHTHAL	**4.31**	**22.87**	**15.61**	**8.65**	**12.43**	**8.77**	**8.32**	**9.44**	**13.78**	**5.24**	**15.62**	**19.79**	< 2.00	10.81	46.00	32 of 36
BUTYL BENZYL PHTHALATE	**0.49**	**13.39**	< 100.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	**2.29**	**1.59**	**6.21**	**2.68**	< 2.00	3.90	8.00	11 of 36
DI-N-BUTYL PHTHALATE	**0.49**	**7.37**	< 100.0	< 50.0	**5.95**	< 50.0	< 50.0	< 50.0	**2.76**	**2.29**	**3.63**	**3.07**	< 2.00	3.82	8.00	12 of 36
DI-N-OCTYL PHTHALATE	< 2.00	< 73.68	< 100.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	**1.03**	< 7.94	< 15.87	< 21.25	< 2.00	2.66	1.00	1 of 36
DIBENZO(A,H)ANTHRACENE	< 2.00	< 73.68	< 100.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 10.32	< 7.94	< 15.87	**2.68**	< 2.00	2.72	4.00	1 of 36
1,4-DICHLOROBENZENE	< 3.55	**9.28**	< 100.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 10.32	**0.79**	< 15.87	< 21.25	< 2.00	2.21	2.00	2 of 41
DIETHYL PHTHALATE	< 2.00	**11.70**	**10.32**	**7.27**	**8.90**	**6.46**	**6.32**	**8.00**	**7.96**	**4.64**	**9.52**	**9.32**	< 2.00	5.87	12.00	28 of 36
INDENO(1,2,3-CD)PYRENE	< 2.00	< 73.68	< 100.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 10.32	< 7.94	< 15.87	**2.68**	< 2.00	2.72	4.00	1 of 36
2-METHYLNAPHTHALENE	**6.08**	**10.26**	< 100.0	< 50.0	**6.84**	< 50.0	< 50.0	< 50.0	**1.26**	**1.26**	**2.00**	**1.69**	< 50.0	3.95	54.00	15 of 36
NAPTHALENE	**3.56**	**11.70**	< 100.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	**1.03**	**1.00**	**2.00**	**1.69**	< 2.00	3.59	5.00	9 of 36
PHENANTHRENE	< 2.00	< 73.68	< 100.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 10.32	**0.84**	< 15.87	< 21.25	< 2.00	2.68	1.00	2 of 36
Volatile Organics (ug/L)																
ACETONE	**68.13**	**24.36**	**97.53**	**103.37**	**116.63**	**50.00**	**127.75**	**52.64**	**73.71**	**95.28**	**81.18**	**90.00**	24.00	73.79	260.00	42 of 43
BENZENE	< 5.00	**1.41**	**1.19**	**1.19**	**1.41**	**1.57**	**1.68**	**2.00**	**2.00**	**2.29**	**2.00**	**1.00**	< 5.00	1.38	3.00	35 of 43
BROMOFORM	< 5.00	< 10.00	< 10.00	< 10.00	< 10.00	**1.82**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	0.98	1.82	1 of 43
2-BUTANONE	< 5.00	11.12	1.73	3.06	3.66	2.63	< 10.00	6.47	3.04	< 10.00	< 10.00	3.00	< 10.00	2.20	23.00	17 of 43
CARBON DISULFIDE	**3.63**	**4.19**	**2.14**	**1.97**	**1.78**	**1.68**	**1.19**	**3.71**	< 10.00	< 10.00	**1.44**	**6.00**	< 10.00	2.06	22.00	19 of 43
CHLOROFORM	< 5.00	**3.83**	**4.00**	**4.23**	**3.36**	**4.53**	**2.71**	**3.46**	**4.58**	**3.00**	**4.58**	**17.00**	< 5.00	3.08	17.00	38 of 43
DIBROMOCHLOROMETHANE	< 5.00	< 10.00	< 10.00	< 10.00	< 10.00	**2.00**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 5.00	0.98	8.00	2 of 43

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	GEO MEAN	MAX	TIMES DETECTED
Volatile Organics (ug/L)																
DICHLOROBROMOMETHANE	< 5.00	< 10.00	< 10.00	< 10.00	< 10.00	**2.21**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 5.00	0.99	6.00	2 of 43
T-1,2-DICHLOROETHYLENE	< 5.00	**3.13**	**1.86**	**2.45**	**2.71**	**2.06**	**1.57**	**1.86**	**2.00**	**2.00**	**2.62**	**3.00**	< 5.00	2.12	16.00	32 of 39
ETHYLBENZENE	< 5.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	**1.00**	**1.59**	**1.00**	**1.00**	< 5.00	0.95	2.00	7 of 43
METHYLENE CHLORIDE	< 5.00	**6.34**	**4.93**	**4.05**	**6.58**	**3.13**	**4.24**	**3.83**	**3.92**	**9.93**	**4.58**	**12.00**	< 5.00	3.95	45.00	37 of 41
TETRACHLOROETHYLENE	**0.91**	**6.24**	**3.94**	**3.72**	**7.36**	**4.79**	**4.95**	**3.94**	**3.30**	**10.10**	**6.84**	**5.00**	< 5.00	4.19	63.00	38 of 43
TOLUENE	**2.46**	**3.06**	**4.73**	**4.23**	**5.64**	**4.90**	**4.43**	**5.23**	**4.00**	**5.65**	**6.95**	**8.00**	< 5.00	4.44	11.00	40 of 43
TOTAL XYLENES		**3.46**	**3.56**	< 10.00	< 10.00	**2.45**	**2.99**	**3.94**	**4.58**	**8.57**	**5.77**	**4.00**	< 10.00	2.95	10.00	25 of 38
1,1,1-TRICHLOROETHANE	< 5.00	**1.19**	**1.57**	**1.19**	**1.32**	**1.19**	**1.41**	**1.19**	**1.26**	**1.82**	**1.00**	**1.00**	< 5.00	1.15	6.00	20 of 43
TRICHLOROETHYLENE	< 5.00	**7.08**	**3.46**	**3.56**	**2.78**	**2.28**	**3.46**	**3.22**	**3.00**	**4.00**	**4.58**	**3.00**	< 5.00	2.82	93.00	36 of 43
VINYL ACETATE	< 5.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	**1.32**	< 10.00	< 10.00	< 10.00	< 10.00	< 5.00	0.95	3.00	1 of 43

Notes:

1. Monthly values were derived from back-calculating the geometric mean loadings from three data points to the monthly geometric mean concentrations. Loadings were calculated using flows during the sampling events.
2. To calculate monthly geometric mean concentrations, values below detection levels were assigned half the method detection limit.

Appendix A Table A-3 Deer Island Effluent Characterization, Priority Pollutants, NPDES Program, FY 1993

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	GEO MEAN	MAX	TIMES Detected
METALS (ug/L)																
Antimony	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	< 80	< 80	< 80	< 5	< 5	5.378	6.0	1 of 12
Arsenic	3	2	< 2	2	< 2	< 2	< 2	< 2	< 5	< 5	< 5	2	< 2	1.639	3.0	3 of 12
Beryllium	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 4	< 4	< 4	< 4	< 1	0.794	< 4.0	0 of 12
Boron	348	267	327	359	302	279	242	332	310	260	320	330	242	304	359	12 of 12
Cadmium	< 1	< 1	< 1	4	1	1	< 1	< 1	< 5	< 5	< 5	< 1	< 1	0.998	4.0	3 of 12
Chromium (Hex)	< 5	< 5	< 5	< 5	< 5	< 5	< 6	< 6	< 5	< 5	< 5	< 5	0	2.577	< 6.0	0 of 12
Chromium (Total)	< 5	6	< 5	< 5	< 5	< 5	< 6	< 6	< 10	< 10	< 10	< 5	< 5	3.297	6.0	1 of 12
Copper	73	55	63	63	49	56	48	51	55	43	58	65	43	56.016	73.0	12 of 12
Lead	17	13	7.9	19	16	5	9.2	10	< 30	< 30	< 30	16	5	12.398	19.0	9 of 12
Mercury	0.4	0.3	1.1	< 0.2	< 0.2	< 0.2	0.5	< 0.2	< 0.5	< 1	< 1	< 0.2	0.3	0.242	1.1	4 of 12
Molybdenum	17	< 8	17	14	16	8	< 8	< 8	< 80	< 80	< 80	27	8	14.012	27.0	6 of 12
Nickel	< 12	< 12	< 12	< 12	< 12	< 12	< 15	< 15	< 20	< 20	< 20	< 12	< 12	7.076	< 20	0 of 12
Selenium	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 5	< 5	< 10	2	2	1.411	2.0	1 of 12
Silver	7	< 3	4	< 3	< 3	< 3	< 4	6	< 7	< 7	< 7	< 3	< 3	2.630	7.0	3 of 12
Thallium	< 2	3	< 2	< 2	< 2	< 2	2	2	< 5	< 5	< 5	< 2	< 2	1.547	3.0	3 of 12
Zinc	96	91	78	80	61	74	74	60	110	100	80	100	60	82.270	110.0	12 of 12
Cyanide (mg/L)	< 0.03	0.006	0.011	0.005	< 0.025	< 0.025	0.007	0.01	< 0.1	0.01	0.02	< 0.1	0.005	0.007	0.020	7 of 12
Phenols (mg/L)	0.026	0.026	0.034	0.02	0.02	0.025	0.011	0.11	0.013	0.012	0.02	0.022	0.011	0.023	0.110	12 of 12
PHC (mg/L)	< 2	4.40	< 2	2.6	< 2	3.5	1.25	3	1.2	1.4	2.825	3.14	1.2	1.902	4.400	9 of 12
ORGANOCHLORINE PESTICIDES AND PCBs (ug/L)																
4,4'DDD	< 0.2	< 0.2	< 0.2	0.1	< 0.2	< 0.2	< 0.2	0.014	0.035	< 0.2	< 0.2	< 0.2	0.014	0.024	0.100	3 of 12
4,4'DDE	< 0.2	0.03	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.03	0.015	0.030	1 of 12
a-BHC	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.018	< 0.05	< 0.05	< 0.05	0.018	0.011	0.100	2 of 12
aldrin	< 0.1	< 0.1	< 0.1	< 0.1	0.018	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	0.024	0.018	0.009	0.024	2 of 12
b-BHC	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.034	< 0.05	< 0.05	< 0.05	0.038	< 0.05	0.034	0.010	0.038	2 of 12
Chlordane	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.015	0.0085	< 2.00	< 2.00	< 2.00	< 2.00	0.0085	0.072	0.015	2 of 12
d-BHC	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.014	0.048	< 0.05	< 0.05	0.041	0.085	0.54	0.014	0.020	0.540	5 of 12
Dieldrin	< 0.2	< 0.2	< 0.2	0.031	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.031	0.016	0.031	1 of 12
Endosulfan Sulfate	< 0.2	0.55	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	0.078	0.25	0.078	0.031	0.550	3 of 12
g-BHC	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.011	< 0.05	< 0.05	< 0.05	< 0.05	0.011	0.010	0.011	1 of 12
Heptachlor	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.034	0.012	< 0.05	< 0.05	< 0.05	< 0.05	0.012	0.072	0.034	2 of 12
Heptachlor epoxide	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.005	< 0.05	< 0.05	< 0.05	< 0.05	0.005	0.020	0.005	1 of 12

Appendix A Table A-3, Deer Island Treatment Plant

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	GEO MEAN	MAX	TIMES Detected
SEMIVOLATILE ORGANICS (ug/L)																
2-methylnaphthalene	3	3	2	1	< 10	< 10	< 10	< 5	1	< 20	< 10	< 5	1.00	1.455	3.000	5 of 12
4-Methyl phenol	18	17	30	35	36	24	16	30	31	11	14	51	11.00	23.764	51.000	12 of 12
Benzoic acid	72	5	120	200	160	120	64	140	100	110	62	310	5.00	90.804	310.000	11 of 12
Benzyl alcohol	17	11	14	24	66	< 10	8	15	12	7	8	< 50	7.00	10.438	66.000	10 of 12
bis(2-ethylhexyl)pthalate	11	13	9	7	13	11	8	10	8	4	5	8	4.00	8.447	13.000	12 of 12
Butylbenzyl phthalate	3	3	3	2	3	< 10	3	3	4	< 4	1	< 50	1.00	2.495	4.000	9 of 12
Di-n-butylpthalate	6	9	4	3	4	3	5	4	3	< 4	3	< 50	3.00	3.940	9.000	10 of 12
Di-n-octylphthalate	< 10	< 10	2	< 5	3	6	< 10	< 5	< 5	< 4	< 10	< 50	2.00	1.373	6.000	3 of 12
Diethyl pthalate	7	7	7	7	5	< 10	7	6	7	5	3	11	3.00	5.376	11.000	11 of 12
Naphthalene	3	< 10	< 10	1	< 10	< 10	< 10	1	1	< 4	< 10	< 50	1.00	1.328	3.000	4 of 12
Phenol	< 10	< 10	< 10	< 5	< 10	< 10	< 10	< 5	4	< 4	< 10	< 50	4.00	1.212	4.000	1 of 12
VOLATILE ORGANICS (ug/L)																
1,1,1-trichloroethane	< 5	1	2	0.67	1.67	1.17	1.67	1.33	1.7	1.67	< 10	1.33	0.67	1.205	1.667	10 of 12
1,1,2-trichloroethane	< 5	< 5	< 5	< 5	< 5	2.33	< 5	< 5	< 10	< 10	< 10	< 10	2.33	0.716	2.333	1 of 12
1,2-dichloroethene	2	3	3	1.83	1.83	2.00	1.37	1.67	2	2	2.33	2.33	1.37	2.051	2.667	12 of 12
2-butanone	3	< 10	< 10	7.33	7.67	2.00	1.77	8.67	3	< 10	< 10	3.33	1.77	2.446	8.667	8 of 12
Acetone	76	68	147	160	100	80	133	161	102	90	126	183	67.67	113.058	183	12 of 12
Benzene	2	2	1	1.17	0.67	1.33	2.33	1.67	2	2.33	2	1	0.67	1.473	2.333	12 of 12
Bromodichloromethane	1	0.7	2	1.50	1.00	3.17	< 10	< 10	< 10	< 10	< 10	< 10	0.67	1.071	3.167	6 of 12
Bromoform	< 5	< 5	< 5	< 5	< 5	6.33	< 5	< 5	< 10	< 10	< 10	< 10	6.33	0.778	6.333	1 of 12
Bromomethane	< 10	< 10	3	1.33	1.00	1.00	< 10	< 10	< 10	< 10	< 10	< 10	1.00	1.150	3.333	4 of 12
Carbon disulfide	6	9	6	2.67	3.67	1.50	0.70	1.80	< 10	< 10	1.33	3	0.70	2.306	9.000	10 of 12
Chloroform	8	6	12	10.30	7.00	6.00	4.33	5.00	6	5	10	14.33	4.33	7.366	14.333	12 of 12
Chloromethane	3	1	13	11.33	3.00	< 10	< 10	< 10	< 10	< 10	1.67	1	1.00	1.962	13.333	7 of 12
Dibromochloromethane	< 5	< 5	< 5	< 5	< 5	4.00	< 5	< 5	< 10	< 10	< 10	< 10	< 5	0.749	4.000	1 of 12
Ethyl benzene	1	< 5	< 5	< 5	< 5	< 5	< 5	< 5	0.7	1.33	1	< 10	< 5	0.672	1.333	2 of 12
Methylene chloride	7.00	4.00	8.33	4.67	6.33	5.33	5.33	4.67	4.33	11.00	9.00	10.00	4.00	6.302	11.000	12 of 12
Tetrachloroethene	7	7	6	5.00	9.33	4.00	4.33	5.00	3	6.67	6.67	9	3.00	5.818	9.333	12 of 12
Toluene	7	6	5	4.33	5.67	5.00	5.00	4.33	5	5.67	7.67	9	4.33	5.685	9.000	12 of 12
Trichloroethene	3	3	3	3.33	2.67	2.33	2.53	3.00	2	3.33	3.33	3	2.00	2.859	3.333	12 of 12
Vinyl Acetate	< 10	< 10	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.041	1.000	1 of 12
Xylene	7	4	5	1.67	< 5	2.00	3.87	2.17	5.3	6.67	5	2.67	< 5	3.114	6.833	11 of 12

Notes:

1. Geometric mean concentrations were calculated by assigning half the method detection limit for those results that were below detection.

Appendix A Table A-4 Deer Island Effluent Characterization, Local Limits Study, Fiscal Year 1993

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	GEOMETRIC MIN	GEOMETRIC MEAN	GEOMETRIC MAX	TIMES DETECTED
METALS (mg/L)																
ANTIMONY (TOTAL)	**0.041**	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	0.040	0.041	3 of 36
ARSENIC (TOTAL)	**0.003**	< 0.010	< 0.002	**0.002**	**0.002**	**0.001**	< 0.002	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.002	0.002	0.004	6 of 36
BORON		**0.280**	**0.367**	**0.416**	**0.449**	**0.315**	**0.299**	**0.356**	**0.357**	**0.250**	**0.330**	**0.369**	0.230	0.483	0.449	35 of 35
CADMIUM	< 0.002	< 0.005	< 0.005	< 0.005	**0.003**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.002	0.002	0.006	1 of 36
CHROMIUM (TOTAL)	**0.006**	< 0.010	**0.007**	< 0.010	< 0.010	< 0.010	**0.007**	< 0.010	< 0.010	**0.007**	< 0.010	**0.009**	< 0.010	0.006	0.015	10 of 36
COPPER (TOTAL)	**0.079**	**0.065**	**0.076**	**0.058**	**0.062**	**0.051**	**0.062**	**0.055**	**0.066**	**0.046**	**0.061**	**0.069**	0.044	0.062	0.083	36 of 36
LEAD (TOTAL)	**0.004**	< 0.030	**0.010**	**0.014**	**0.013**	< 0.030	**0.023**	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	0.013	0.052	12 of 36
MERCURY (TOTAL)	< 0.0002	< 0.001	**0.0003**	< 0.001	< 0.001	< 0.001	**0.0004**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.0002	0.0004	0.001	3 of 36
NICKEL	**0.009**	< 0.020	< 0.020	< 0.020	**0.013**	< 0.020	< 0.020	< 0.020	**0.013**	< 0.020	< 0.020	< 0.020	< 0.020	0.010	0.020	5 of 36
SELENIUM (TOTAL)	< 0.002	< 0.010	< 0.002	< 0.002	**0.001**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.010	< 0.005	< 0.005	0.002	0.003	1 of 36
SILVER (TOTAL)	**0.004**	**0.005**	**0.010**	**0.008**	**0.005**	**0.007**	< 0.050	< 0.050	**0.006**	**0.005**	< 0.050	**0.005**	< 0.003	0.005	0.014	16 of 36
ZINC	0.116	0.089	0.080	0.087	0.124	0.093	0.105	0.083	0.113	0.106	0.095	0.088	0.071	0.097	0.190	36 of 36
CYANIDE (mg/L)	**0.013**	**0.004**	**0.012**	**0.005**	**0.008**	**0.008**	**0.017**	**0.003**	**0.016**	**0.013**	**0.006**	**0.019**	< 0.010	0.009	0.044	34 of 45
OIL AND GREASE (mg/L)	**8.907**	**18.108**	**1.968**	**3.058**	**3.708**	**0.967**	**1.207**	**4.461**	**1.481**	**0.500**	**1.145**	**2.466**	< 5.00	2.644	21.00	26 of 45
SURFACTANTS (mg/L)	**3.764**	**3.732**	**6.213**	**5.083**	**5.195**	**3.871**	**2.786**	**4.841**	**3.378**	**2.671**	**3.422**	**5.735**	1.580	4.136	8.520	34 of 34
PESTICIDES/PCBs (ug/L)																
4,4'-DDD (P,P'TDE)	< 0.100	< 1.00	**0.109**	< 0.200	< 0.130	< 0.170	< 0.160	< 0.100	< 0.017	< 0.100	< 0.110	< .0100	< 0.100	0.017	0.109	1 of 36
ALDRIN	< 0.100	< 0.500	**0.041**	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	0.009	0.041	1 of 36
ALPHA-BHC	< 0.100	**0.032**	< 0.290	**0.027**	< 0.060	**0.053**	< 0.080	< 0.050	< 0.090	< 0.050	< 0.050	< 0.050	< 0.050	0.011	0.053	4 of 36
ALPHA-ENDOSULFAN	< 0.100	< 0.250	**0.081**	< 0.100	< 0.060	< 0.090	< 0.080	< 0.050	< 0.090	< 0.050	< 0.050	< 0.050	< 0.050	0.009	0.081	1 of 36
BETA-BHC	**0.017**	**0.032**	**0.060**	< 0.100	< 0.060	< 0.090	< 0.080	< 0.050	< 0.090	< 0.050	< 0.050	< 0.050	< 0.050	0.010	0.060	4 of 36
BETA-ENDOSULFAN	< 0.100	< 1.000	< 0.580	< 0.200	< 0.130	**0.029**	< 0.160	< 0.100	< 0.170	< 0.100	< 0.100	< 0.100	< 0.100	0.017	0.029	1 of 36
CHLORDANE	< 1.000	< 1.160	< 0.390	< 0.220	< 0.060	**0.012**	< 0.080	< 2.00	< 1.000	< 1.000	< 1.000	< 1.000	< 0.103	0.042	0.012	1 of 35
DELTA-BHC	**0.019**	**0.032**	< 0.103	< 0.100	< 0.060	< 0.090	**0.021**	< 0.090	< 0.090	**0.009**	< 0.050	< 0.050	< 0.050	0.012	0.032	6 of 36
DIELDRIN	< 0.100	< 0.500	**0.061**	< 0.200	< 0.130	< 0.170	< 0.160	< 0.100	< 0.017	< 0.100	< 0.110	< .0100	< 0.100	0.017	0.061	1 of 36
ENDOSULFAN SULFATE	< 0.100	< 0.500	< 0.580	< 0.200	< 0.130	**0.065**	< 0.160	< 0.100	< 0.017	< 0.100	< 0.110	< .0100	< 0.100	0.018	3.000	1 of 36

Appendix A Table A-4, Deer Island Plant

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	GEOMETRIC MIN	GEOMETRIC MEAN	MAX	TIMES DETECTED
PESTICIDES/PCBs (cont)																
GAMMA-BHC	**0.021**	< 0.250	< 0.290	< 0.100	< 0.060	< 0.090	< 0.080	< 0.050	**0.015**	< 0.050	**0.010**	< 0.050	< 0.050	0.010	0.021	3 of 36
HEPTACHLOR	**0.036**	< 0.250	**0.073**	< 0.100	**0.024**	< 0.090	**0.035**	< 0.050	< 0.090	< 0.050	**0.085**	< 0.050	< 0.050	0.017	0.073	9 of 36
HEPTACHLOR EPOXIDE	< 0.100	< 0.250	< 0.290	< 0.100	< 0.060	< 0.090	< 0.080	< 0.050	**0.017**	< 0.050	< 0.050	< 0.050	< 0.050	0.009	0.017	1 of 36
METHOXYCHLOR		< 0.003	**0.302**	< 1.000	< 1.000	< 1.000	< 1.000	< 1.000					< 1.000	0.114	0.302	1 of 20
TOXAPHENE	< 1.000	< 25.00	**13.572**	< 10.00	< 6.300	< 8.550	< 7.940	< 5.000	< 8.555	< 5.000	< 5.39	< 5.000	< 1.000	0.817	50.00	2 of 36
SEMI-VOLATILE ORGANICS (ug/L)																
1,3-DICHLOROBENZENE	< 3.60	< 73.68	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 13.57	**2.00**	**2.00**	< 2.00	2.282	2.000	2 of 41
1,4-DICHLOROBENZENE	< 3.60	< 73.68	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	**1.59**	< 15.87	< 20.00	< 2.00	2.269	1.000	1 of 41
2,4,5-TRICHLOROPHENOL	< 2.00	< 184.2	< 250.0	< 130.0	< 130.0	< 130.0	< 130.0	< 130.0	< 25.30	**10.34**	< 39.70	< 50.30	< 2.00	7.151	34.00	1 of 36
2-METHYLNAPHTHALENE	**4.00**	**9.28**	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	**1.00**	**2.15**	**2.00**	**1.59**	< 2.00	3.758	4.000	10 of 36
2-METHYLPHENOL	< 2.00	< 73.68	< 100.0	< 50.00	**9.83**	< 50.00	< 50.00	< 50.00	< 10.00	< 13.57	< 15.87	< 20.00	< 2.00	2.924	38.00	1 of 36
BENZO(B)FLUORANTHENE	< 2.00	< 73.68	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 13.57	< 15.87	**1.59**	< 2.00	2.711	1.000	1 of 36
4-METHYLPHENOL	**25.72**	**52.32**	**48.93**	**43.76**	**23.13**	**21.43**	**8.32**	**39.58**	**29.55**	**14.52**	**43.20**	**49.19**	0.01	29.47	110	33 of 36
BENZO(A)PYRENE	< 2.00	< 73.68	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 13.57	< 15.87	< 20.00	0.00	2.764	0.000	0 of 36
BENZO(GHI)PERYLENE	< 2.00	< 73.68	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 13.57	< 15.87	**2.52**	< 2.00	2.817	4.000	1 of 36
BENZO(K)FLUORANTHENE	< 2.00	< 73.68	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 13.57	< 15.87	**1.59**	< 2.00	2.711	1.000	1 of 36
BENZOIC ACID	**189.5**	**18.4**	**0.0**	**317.2**	**226.5**	**132.5**	**85.6**	**218.6**	**91.6**	**127.2**	**181.7**	**375.5**	< 500.0	142.5	530.0	30 of 33
BENZYL ALCOHOL	**12.60**	< 73.68	**13.08**	**18.16**	**12.56**	< 50.00	< 50.00	**15.28**	**11.29**	**9.81**	**18.47**	**20.91**	< 10.00	11.341	37.00	26 of 36
BIS(2-ETHYLHEXYL) PHTHALAT	**4.38**	**18.41**	**12.81**	**11.35**	**7.65**	**5.85**	**5.31**	**9.32**	**16.29**	**5.94**	**21.65**	**18.05**	< 2.00	9.986	52.00	29 of 36
BUTYL BENZYL PHTHALATE	< 2.00	**9.28**	< 100.0	**5.31**	< 50.00	< 50.00	< 50.00	< 50.00	**4.64**	**2.71**	**6.54**	**2.52**	< 2.00	3.911	10.00	11 of 36
DI-N-BUTYL PHTHALATE	< 2.00	**11.70**	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	**4.93**	**2.71**	**2.29**	**4.38**	< 2.00	3.825	7.000	9 of 36
DI-N-OCTYL PHTHALATE	< 2.00	**7.37**	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 13.60	**1.59**	< 20.0	< 2.00	2.764	1.000	2 of 36
DIBENZO(A,H)ANTHRACENE	< 2.00	< 73.68	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	**1.26**	< 15.87	**2.29**	< 2.00	2.778	3.000	2 of 36
DIETHYL PHTHALATE	< 2.00	**14.10**	**10.63**	**7.65**	**8.57**	**5.59**	**6.60**	**7.96**	**8.65**	**5.31**	**9.62**	**10.29**	< 2.00	6.095	12.00	27 of 36
INDENO(1,2,3-CD)PYRENE	< 2.00	< 73.68	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	**1.26**	< 15.87	**2.52**	< 2.00	2.800	4.000	2 of 36
N-NITROSODIMETHYLAMINE	< 2.00	< 73.68	**31.41**	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 13.57	< 15.87	< 20.00	< 2.00	3.040	310.0	1 of 36
NAPTHALENE	**3.00**	**7.37**	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	**2.15**	**2.00**	**2.00**	< 2.00	3.669	3.000	10 of 36
PHENANTHRENE	< 2.00	< 73.68	< 100.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	**1.26**	< 15.87	< 20.00	< 2.00	2.746	1.260	1 of 36
PHENOL	< 2.00	**9.44**	< 100.0	**11.50**	**10.63**	< 50.00	< 50.00	**5.59**	**4.64**	**4.22**	**12.60**	**15.30**	< 2.00	5.716	42.00	19 of 36

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	GEOMETRIC MIN	GEOMETRIC MEAN	MAX	TIMES DETECTED
SEMI-VOLATILE ORGANICS (cont)																
1,1,1-TRICHLOROETHANE	< 5.000	**1.189**	**1.414**	**1.414**	**1.189**	**1.414**	**1.414**	**1.189**	**1.260**	**1.587**	< 10.00	**1.000**	< 5.00	1.152	4.00	26 of 44
2-BUTANONE	< 5.000	< 10.00	< 10.00	**5.045**	< 10.00	< 10.00	< 10.00	**5.209**	**2.924**	< 10.00	< 10.00	**3.162**	< 5.00	1.410	32.00	9 of 44
4-METHYL-2-PENTANONE (MIBI	< 5.000	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	**1.414**	< 5.00	0.939	2.00	1 of 44
ACETONE	**13.7**	**95.8**	**130.4**	**138.2**	**89.6**	**76.0**	**151.4**	**78.9**	**109.7**	**98.3**	**107.2**	**96.4**	< 5.00	83.0	290.0	42 of 44
BENZENE	< 5.000	**1.414**	**1.000**	**1.000**	**1.000**	**1.189**	**2.000**	**2.000**	**2.000**	**2.621**	**2.000**	**1.000**	< 5.00	1.290	3.00	36 of 44
BROMOFORM	< 5.000	< 10.00	< 10.00	< 10.00	< 10.00	**2.397**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 5.00	1.001	33.00	1 of 44
CARBON DISULFIDE	**2.569**	**2.515**	**2.432**	**2.632**	**1.861**	**1.414**	**1.189**	**2.515**	**1.000**	**1.000**	**1.260**	**2.236**	< 5.00	1.822	20.00	20 of 44
CHLOROFORM	**7.487**	**4.738**	**7.211**	**5.609**	**5.826**	**4.527**	**4.356**	**4.427**	**6.214**	**4.642**	**8.759**	**18.57**	< 5.00	5.948	23.00	42 of 44
DIBROMOCHLOROMETHANE	< 5.000	< 10.00	< 10.00	< 10.00	< 10.00	**1.968**	**1.000**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 5.00	0.983	15.00	2 of 44
DICHLOROBROMOMETHANE	< 5.000	**1.000**	**2.213**	**1.732**	**1.000**	**1.732**	**1.316**	**1.000**	**1.260**	< 10.00	< 10.00	< 10.00	< 5.00	1.143	9.00	12 of 44
ETHYLBENZENE	< 5.000	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	**1.260**	**1.260**	**1.000**	< 5.00	0.954	2.00	6 of 44
METHYL BROMIDE	< 5.000	< 10.00	**2.213**	< 10.00	**1.000**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 5.00	0.993	4.00	4 of 44
METHYL CHLORIDE	< 5.000	**1.189**	**9.342**	**10.09**	**1.968**	**1.189**	< 10.00	< 10.00	< 10.00	< 10.00	**1.260**	**1.000**	< 5.00	1.558	17.00	15 of 44
METHYLENE CHLORIDE	**1.000**	**8.657**	**4.762**	**4.757**	**7.565**	**2.913**	**5.721**	**4.054**	**5.013**	**8.434**	**5.769**	**12.85**	< 5.00	4.825	26.00	39 of 42
TETRACHLOROETHYLENE	**2.673**	**6.055**	**4.787**	**3.722**	**6.779**	**2.783**	**3.936**	**3.936**	**3.302**	**9.698**	**5.769**	**8.062**	< 5.00	4.500	14.00	41 of 44
TOLUENE	**4.226**	**4.681**	**5.233**	**4.472**	**5.180**	**3.162**	**4.949**	**4.949**	**4.309**	**6.316**	**7.958**	**7.937**	< 5.00	4.936	11.00	42 of 44
TOTAL XYLENES	**2.140**	**2.280**	**1.495**	< 10.00	**1.316**	**1.495**	**2.632**	**2.991**	**2.520**	**8.320**	**5.646**	**2.828**	< 5.00	2.287	9.00	21 of 39
TRANS-1,2-DICHLOROETHYLEN	< 5.000	**1.861**	**2.060**	**2.449**	**1.682**	**1.861**	**1.861**	**1.565**	**2.289**	**2.000**	**2.289**	**2.449**	< 5.00	1.913	3.00	33 of 40
TRICHLOROETHYLENE	< 5.000	**2.632**	**3.224**	**3.224**	**2.060**	**1.732**	**3.224**	**2.280**	**3.000**	**3.634**	**3.302**	**2.000**	< 5.00	2.214	4.00	35 of 44
VINYL ACETATE	< 5.000	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 5.00	0.924	1.00	1 of 44

Notes:

1. Monthly values were derived from back-calculating the geometric mean loadings of three data points to the monthly geometric mean concentrations. Loadings were calculated using flows during the sampling events.
2. To calculate the monthly geometric mean concentrations, values below detection levels were assigned half the method detection limit.

Appendix A Table A-5 Deer Island Effluent Characterization, Harbor Studies Monitoring Program, FY 1993

	JUNE		JUL		AUG		SEP		OCT		NOV		GEOM.		
METALS (ug/L)	16	18	14	16	11	13	15	17	13	15	10	12	MIN	MEAN	MAX
Cadmium	0.42	0.41	0.58	0.81	0.42	0.44	0.57	0.47	0.46	0.57	1.15	0.29	0.29	0.515	1.2
Chromium (Total)	3.39	2.86	3.42	4.48	3.21	3.36	3.7	7.61	2.96	2.02	2.37	1.65	1.65	3.176	7.6
Copper	75.3	75.6	80.9	73.2	68.8	67.9	85.9	81.4	68.9	66	62.9	56.2	56.2	71.450	85.9
Lead	13	11.1	11.2	7.81	9.53	10.2	16.7	23.3	8.73	7.49	13.3	8.64	7.49	11.123	23.3
Mercury	0.165	0.204	0.094	0.143	0.12	0.289	0.234	0.232	0.087	0.079	0.101	0.127	0.079	0.143	0.3
Nickel	5.89	5.97	6.69	3.81	7.31	5.86	5.66	5.29	6.39	6.4	5.38	7.62	3.81	5.939	7.6
Silver	5.08	5.87	2.4	3.25	7.11	6.03	3.39	5.09	4.09	1.75	3.16	2.82	1.75	3.861	7.1
Zinc	124	95	75.9	81.3	66.6	72.5	91.5	94.2	85.9	67.9	109	76.2	66.6	85.212	124.0
ORGANOCHLORINE PESTICIDES AND PCBs (ug/L)															
4,4'DDD	.0239	.0258	.0177	.0168	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	.0001	.0258
4,4'DDE	.0040	.0040	.0035	.0028	.0034	.0034	.0132	.0127	.0024	.0024	.0028	.0023	0.002	.0039	.0132
4,4'DDT	.0063	.0094	.0098	.0067	.0046	.0008	.0120	.0044	.0055	.0089	.0069	.0068	0.001	.0059	.0098
4,4'DDD	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	0.000	< .0100	< .0100
4,4'DDE	.0036	.0062	.0081	.0043	.0011	.0008	.0012	.0008	.0023	.0026	.0020	.0048	0.001	.0024	.0081
Dieldrin	.0761	.0696	.0781	.0826	.0018	.0022	.0020	.0012	< .0100	< .0100	< .0100	< .0100	0.001	.0011	.0826
Endrin	< .0100	< .0100	< .0100	< .0100	.0074	.0579	.0033	.0024	< .0100	< .0100	< .0100	< .0100	0.002	.0001	.0579
Lindane	.0140	.0158	.0150	.0128	.0160	.0163	.0169	.0119	.0133	.0202	.0130	.0124	0.012	.0146	.0202
Heptachlor	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	< .0100	0.000	< .0100	< .0100
Heptachlor epoxide	< .0100	< .0100	< .0100	< .0100	.0010	.0010	.0012	.0013	< .0100	< .0100	< .0100	< .0100	0.001	.00005	.0013
Hexachlorobenzene	.1015	.0938	.1651	.1065	< .0100	.0056	< .0100	< .0100	.0482	.0697	.0391	.0524	0.006	.0066	.1651
Polycyclic Aromatic Hydrocarbons (ug/L)															
Naphthalenes	1.408	1.434	1.015	1.081	2.453	1.281	2.236	1.394	0.927	1.348	0.954	1.064	0.927	1.318	2.453
C1-naphthalenes	1.755	1.761	1.136	1.167	1.935	1.737	3.987	2.331	1.520	2.730	1.881	2.139	1.136	1.894	3.987
C2-naphthalenes	2.575	2.543	1.488	1.470	3.100	3.028	6.377	3.952	2.825	5.040	3.546	3.927	1.470	3.059	6.377
C3-naphthalenes	2.351	2.345	1.339	1.282	3.128	3.241	5.472	3.941	7.080	10.899	9.091	9.715	1.282	3.942	10.899
C4-naphthalenes	1.073	1.124	0.631	0.556	1.921	1.976	2.897	2.381	1.805	2.764	2.177	2.489	0.556	1.608	2.897
Biphenyl	0.232	0.219	0.134	0.120	0.224	0.206	0.425	0.277	0.142	0.270	0.177	0.192	0.120	0.206	0.425
Acenaphthylene	0.016	0.018	0.006	0.011	0.013	0.012	0.020	0.011	0.547	0.462	0.556	0.549	0.006	0.044	0.556
Acenaphthene	0.147	0.154	0.112	0.126	0.153	0.175	0.189	0.162	0.113	0.187	0.184	0.163	0.112	0.153	0.189
Dibenzoffuram	0.092	0.091	0.080	0.068	0.101	0.121	0.012	0.112	0.066	0.111	0.090	0.092	0.012	0.077	0.121
Fluorene	0.190	0.192	0.137	0.124	0.205	0.237	0.275	0.231	0.096	0.156	0.214	0.200	0.096	0.181	0.275

	JUNE		JUL		AUG		SEP		OCT		NOV		GEOM.		
PAH (con't)	**16**	**18**	**14**	**16**	**11**	**13**	**15**	**17**	**13**	**15**	**10**	**12**	**MIN**	**MEAN**	**MAX**
C1-fluorenes	0.733	0.457	0.281	0.358	0.417	0.517	0.602	0.419	0.312	0.567	0.487	0.521	0.281	0.457	0.733
C2-fluorenes	0.398	0.417	0.241	0.226	0.582	0.617	0.754	0.660	0.392	0.584	0.535	0.640	0.226	0.473	0.754
C3-fluorenes	0.413	0.463	0.241	0.232	0.652	0.675	0.807	< 0.010	0.823	1.015	1.059	1.001	< 0.010	0.238	1.059
Phenantrrene	0.405	0.432	0.329	0.306	0.406	0.495	0.497	0.472	0.139	0.461	0.476	0.448	0.139	0.387	0.497
Anthracene	0.048	0.050	0.021	0.032	0.047	0.059	0.057	0.051	0.042	0.074	0.070	0.060	0.021	0.049	0.074
C1-phenanthrenes/anthracenes	0.475	0.517	0.306	0.287	0.527	0.565	0.657	0.588	0.435	0.677	0.674	0.755	0.287	0.518	0.755
C2-phenanthrenes/anthracenes	0.547	0.589	0.317	0.304	0.590	0.580	0.737	0.643	0.586	0.828	0.797	0.949	0.304	0.592	0.949
C3-phenanthrenes/anthracenes	0.325	0.342	0.154	0.159	0.361	0.373	0.418	0.362	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.010	0.418
C4-phenanthrenes/anthracenes	0.164	0.200	0.107	0.107	0.214	0.206	0.209	0.210	0.258	0.346	0.336	0.397	0.107	0.213	0.397
Dibenzothiophene	0.070	0.073	0.045	0.045	0.074	0.082	0.089	0.098	0.048	0.082	0.070	0.070	0.045	0.068	0.098
C1-dibenzothiophenes	0.214	0.182	0.118	0.115	0.211	0.209	0.271	0.227	0.182	0.254	0.233	0.251	0.115	0.199	0.271
C2-dibenzothiophenes	0.303	0.301	0.166	0.156	0.317	0.339	0.395	0.352	0.205	0.322	0.292	0.340	0.156	0.280	0.395
C3-dibenzothiophenes	0.292	0.256	0.158	0.142	0.289	0.272	0.354	0.316	0.250	0.318	0.326	0.377	0.142	0.269	0.377
Fluoranthene	0.176	0.206	0.167	0.146	0.160	0.189	0.181	0.168	0.123	0.271	0.237	0.171	0.123	0.179	0.271
Pyrene	0.174	0.200	0.144	0.136	0.146	0.172	0.173	0.156	0.113	0.239	0.223	0.167	0.113	0.167	0.239
C1-fluoranthenes/pyrenes	0.126	0.136	0.095	0.087	0.124	0.123	0.130	0.118	0.123	0.199	0.253	0.201	0.087	0.136	0.253
Benz(a)anthracene	0.061	0.076	0.066	0.054	0.046	0.045	0.054	0.041	0.033	0.082	0.079	0.052	0.033	0.055	0.082
Chrysene	0.075	0.075	0.065	0.050	0.051	0.058	0.058	0.048	0.040	0.097	0.091	0.058	0.040	0.062	0.097
C1-chrysenes	0.066	0.068	0.046	0.051	0.057	0.053	0.061	0.042	0.024	0.048	0.058	0.051	0.024	0.051	0.068
C2-chrysenes	0.046	0.058	0.033	0.033	0.041	0.051	0.056	0.051	0.041	0.071	0.087	0.079	0.033	0.051	0.087
C3-chrysenes	< 0.010	< 0.010	< 0.010	< 0.010	0.031	0.027	0.031	0.023	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.000	0.031
C4-chrysenes	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(b)fluoranthene	0.062	0.085	0.072	0.055	0.050	0.050	0.057	0.042	0.035	0.109	0.087	0.053	0.035	0.060	0.109
Benzo(k)fluoranthene	0.023	0.027	0.021	0.021	0.018	0.020	0.023	0.017	0.011	0.034	0.028	0.017	0.011	0.021	0.034
Benzo(e)pyrene	0.035	0.039	0.034	0.030	0.028	0.028	0.028	0.018	0.018	0.050	0.045	0.030	0.018	0.031	0.050
Benzo(a)pyrene	0.033	0.039	0.021	0.003	0.023	< 0.010	0.030	0.020	0.016	0.058	0.051	0.028	< 0.010	0.013	0.058
Perylene	0.012	0.012	0.008	0.008	0.006	< 0.010	0.010	0.005	0.006	0.017	0.015	0.008	< 0.010	0.005	0.017
Indeno(1,2,3-c,d)pyrene	0.075	0.075	0.058	0.062	0.127	0.128	0.145	0.081	0.039	0.095	0.084	0.050	0.039	0.079	0.145
Dibenz(a,h)pyrene	< 0.01	< 0.010	< 0.010	< 0.010	0.007	0.006	0.007	0.005	0.006	0.012	0.010	0.006	< 0.010	0.001	0.012
Benzo(g,h,i)perylene	0.035	0.052	0.043	0.033	0.027	0.024	0.027	0.017	0.016	0.050	0.038	0.024	0.016	0.030	0.052
Total PAHs	**31.23**	**33.31**	**23.44**	**25.24**	**29.86**	**30.98**	**43.81**	**37.04**	**32.44**	**45.93**	**35.61**	**39.33**	**23.44**	**18.56**	**45.93**

Appendix A Table A-6 Deer Island Priority Pollutants Loadings, NPDES Data, Fiscal Year 1993

LOADINGS (lbs/d)

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	AVE	MAX
METALS															
Antimony	4.92	4.71	4.27	4.45	4.66	6.94	6.24	11.66	83.18	134.44	83.29	4.43	4.27	29.43	134.44
Arsenic	5.90	3.77	1.71	3.56	1.87	2.77	2.50	1.94	5.20	8.40	5.21	3.55	1.71	3.86	8.40
Beryllium	0.98	0.94	0.85	0.89	0.93	1.39	1.25	0.97	4.16	6.72	4.16	3.55	0.85	2.23	6.72
Boron	684.95	503.25	558.16	638.73	563.34	774.07	604.14	645.15	644.63	873.87	666.31	585.30	503.25	645.16	873.87
Cadmium	0.98	0.94	0.85	7.12	1.87	2.77	1.25	0.97	5.20	8.40	5.21	0.89	0.85	3.04	8.40
Chromium (Hex)	4.92	4.71	4.27	4.45	4.66	6.94	7.49	5.83	5.20	8.40	5.21	4.43	4.27	5.54	8.40
Chromium (Total)	4.92	11.31	4.27	4.45	4.66	6.94	7.49	5.83	10.40	16.81	10.41	4.43	4.27	7.66	16.81
Copper	143.68	103.67	107.54	112.09	91.40	155.37	119.83	99.10	114.37	144.52	120.77	115.29	91.40	118.97	155.37
Lead	33.46	24.50	13.48	33.80	29.85	13.87	22.97	19.43	31.19	50.42	31.23	28.38	13.48	27.72	50.42
Mercury	0.79	0.57	1.88	0.18	0.19	0.28	1.25	0.19	0.52	1.68	1.04	0.18	0.18	0.73	1.88
Molybdenum	33.46	7.54	29.02	24.91	29.85	22.20	9.99	7.77	83.18	134.44	83.29	47.89	7.54	42.79	134.44
Nickel	11.81	11.31	10.24	10.68	11.19	16.65	18.72	14.57	20.79	33.61	20.82	10.64	10.24	15.92	33.61
Selenium	1.97	1.88	1.71	1.78	1.87	2.77	2.50	1.94	5.20	8.40	10.41	3.55	1.71	3.66	10.41
Silver	13.78	2.83	6.83	2.67	2.80	4.16	4.99	11.66	7.28	11.76	7.29	2.66	2.66	6.56	13.78
Thallium	1.97	5.65	1.71	1.78	1.87	2.77	4.99	3.89	5.20	8.40	5.21	1.77	1.71	3.77	8.40
Zinc	188.95	171.52	133.14	142.34	113.79	205.31	184.74	116.59	228.74	336.10	166.58	177.36	113.79	180.43	336.10
Cyanide	5.90	11.31	18.78	8.90	4.66	6.94	17.48	19.43	20.79	33.61	41.64	20.10	4.66	17.46	41.64
Phenols	51.17	49.01	58.04	35.58	37.31	69.36	27.46	213.75	27.03	40.33	41.64	39.02	27.03	57.48	213.75
PHC	1968.24	8293.30	1706.92	4625.92	1865.38	9710.54	3120.55	5829.66	2495.33	4705.43	5882.27	5569.23	1706.92	4647.73	9710.54
ORGANOCHLORINE PESTICIDES AND PCBs															
4,4'DDD	0.04	0.04	0.03	0.18	0.04	0.06	0.05	0.03	0.07	0.03	0.02	0.20	0.02	0.07	0.20
4,4'DDE	0.04	0.06	0.03	0.04	0.04	0.06	0.05	0.02	0.02	0.03	0.02	0.02	0.02	0.04	0.06
a-BHC	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.19	0.04	0.02	0.01	0.01	0.01	0.03	0.19
aldrin	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.01	0.01	0.02	0.01	0.04	0.01	0.02	0.04
b-BHC	0.02	0.02	0.02	0.02	0.02	0.03	0.08	0.01	0.01	0.02	0.08	0.01	0.01	0.03	0.08
Chlordane	0.20	0.19	0.17	0.18	0.19	0.03	0.04	0.02	0.42	0.67	0.42	0.35	0.02	0.24	0.67

LOADINGS (lbs/d)

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	AVE	MAX
ORGANOCHLORINE PESTICIDES AND PCBs (cont)															
d-BHC	0.02	0.02	0.02	0.02	0.02	0.04	0.12	0.01	0.01	0.14	0.18	0.96	0.01	0.13	0.96
Dieldrin	0.04	0.04	0.03	0.06	0.04	0.06	0.05	0.02	0.02	0.03	0.02	0.02	0.02	0.04	0.06
Endosulfan Sulfate	0.04	1.04	0.03	0.04	0.04	0.06	0.05	0.02	0.02	0.03	0.16	0.44	0.02	0.16	1.04
g-BHC	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.02	0.03
Heptachlor	0.02	0.02	0.02	0.02	0.02	0.03	0.08	0.02	0.01	0.02	0.01	0.01	0.01	0.02	0.08
Heptachlor epoxide	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.03
SEMIVOLATILE ORGANICS															
2-methylnaphthalene	5.90	5.65	3.41	1.78	1.87	2.77	2.50	0.97	2.08	6.72	2.08	8.87	0.97	3.72	8.87
4-Methyl phenol	35.43	32.04	51.21	62.27	67.15	66.59	39.94	58.30	64.46	36.97	29.15	90.46	29.15	52.83	90.46
Benzoic acid	141.71	9.42	204.83	355.84	298.46	332.93	159.77	272.05	207.94	369.71	129.10	549.83	9.42	252.63	549.83
Benzyl alcohol	33.46	20.73	23.90	42.70	123.12	2.77	19.97	29.15	24.95	23.53	16.66	8.87	2.77	30.82	123.12
bis(2-ethylhexyl)pthalate	21.65	24.50	15.36	12.45	24.25	30.52	19.97	19.43	16.64	13.44	10.41	14.19	10.41	18.57	30.52
Butylbenzyl phthalate	5.90	5.65	5.12	3.56	5.60	2.77	7.49	5.83	8.32	6.72	2.08	8.87	2.08	5.66	8.87
Di-n-butylpthalate	11.81	16.96	6.83	5.34	7.46	8.32	12.48	7.77	6.24	6.72	6.25	8.87	5.34	8.75	16.96
Di-n-octylphthalate	1.97	1.88	3.41	0.89	5.60	16.65	2.50	0.97	1.04	6.72	2.08	8.87	0.89	4.38	16.65
Diethyl pthalate	13.78	13.19	11.95	12.45	9.33	2.77	17.48	11.66	14.56	16.81	6.25	19.51	2.77	12.48	19.51
Naphthalene	5.90	1.88	1.71	1.78	1.87	2.77	2.50	1.94	2.08	6.72	2.08	8.87	1.71	3.34	8.87
Phenol	1.97	1.88	1.71	0.89	1.87	2.77	2.50	0.97	8.32	6.72	2.08	8.87	0.89	3.38	8.87
VOLATILE ORGANICS															
1,1,1-trichloroethane	0.98	2.20	2.56	1.19	3.11	3.24	4.16	2.59	3.47	5.60	2.08	2.36	0.98	2.80	5.60
1,1,2-trichloroethane	0.98	0.94	0.85	0.89	0.93	6.47	1.25	0.97	2.08	3.36	2.08	1.77	0.85	1.88	6.47
1,2-dichloroethene	4.59	5.03	4.55	3.26	3.42	5.55	3.41	3.24	4.16	6.72	4.86	4.14	3.24	4.41	6.72
2-butanone	5.90	1.88	1.71	13.05	14.30	5.55	4.41	16.84	5.55	3.36	2.08	5.91	1.71	6.71	16.84
Acetone	148.93	127.54	250.35	284.67	186.54	221.96	332.86	312.86	211.41	302.49	262.36	325.17	127.54	247.26	332.86
Benzene	3.28	3.14	1.71	2.08	1.24	3.70	5.83	3.24	4.16	7.84	4.16	1.77	1.24	3.51	7.84
Bromodichloromethane	2.62	1.26	3.70	2.67	1.87	8.79	1.25	0.97	2.08	3.36	2.08	1.77	0.97	2.70	8.79
Bromoform	0.98	0.94	0.85	0.89	0.93	17.57	1.25	0.97	2.08	3.36	2.08	1.77	0.85	2.81	17.57
Bromomethane	1.97	1.88	5.69	2.37	1.87	2.77	2.75	2.14	2.08	3.36	2.08	1.77	1.77	2.56	5.69
Carbon disulfide	11.15	16.96	10.24	4.74	6.84	4.16	1.75	3.50	2.08	3.36	2.78	5.32	1.75	6.07	16.96

LOADINGS (lbs/d)

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	AVE	MAX
SEMIVOLATILE ORGANICS (cont)															
Chloroform	16.40	11.94	20.48	18.33	13.06	16.65	10.82	9.72	12.48	16.81	20.82	25.42	9.72	16.08	25.42
Chloromethane	5.25	2.51	22.76	20.16	5.60	2.77	2.75	2.14	2.08	3.36	3.47	1.77	1.77	6.22	22.76
Dibromochloromethane	0.98	0.94	0.85	0.89	0.93	11.10	1.25	0.97	2.08	3.36	2.08	1.77	0.85	2.27	11.10
Ethyl benzene	2.30	0.94	0.85	0.89	0.93	1.39	1.25	0.97	1.46	4.48	2.08	1.77	0.85	1.61	4.48
Methylene chloride	13.78	7.54	14.22	8.30	11.81	14.80	13.31	9.07	9.01	36.97	18.74	17.74	7.54	14.61	36.97
Tetrachloroethene	13.12	13.82	10.81	8.90	17.41	11.10	10.82	9.72	6.24	22.41	13.88	15.96	6.24	12.85	22.41
Toluene	14.43	11.31	9.10	7.71	10.57	13.87	12.48	8.42	9.70	19.05	15.96	15.96	7.71	12.38	19.05
Trichloroethene	5.90	6.28	4.84	5.93	4.97	6.47	6.32	5.83	4.16	11.20	6.94	5.32	4.16	6.18	11.20
Vinyl Acetate	1.97	1.88	2.28	1.78	1.87	2.77	2.75	2.14	2.08	3.36	2.08	1.77	1.77	2.23	3.36
Xylene	13.45	6.91	8.53	2.97	0.93	5.55	9.65	4.21	11.09	22.41	10.41	4.74	0.93	8.40	22.41

Notes:

1. Loadings were calculated using the average monthly flow.
2. In April, the calculated loadings were exceptionally high because of high precipitation.

Appendix A Table A-7 Deer Island Treatment Plant, Priority Pollutants, NPDES Data

	Geometric Mean Concentration				
	FY 89	**FY 90**	**FY 91**	**FY 92**	**FY 93**
METALS (ug/L)					
Arsenic	1.14	1.66	1.39	1.51	1.639
Boron				322.00	304.000
Cadmium	2.60	2.12	1.50	0.67	0.998
Chromium (Total)	10.96	4.50	5.76	3.94	3.297
Chromium (Hex)	6.93	5.00	4.22	3.28	2.577
Copper	131.69	82.71	53.68	59.34	56.016
Lead	18.43	16.75	11.90	11.36	12.398
Mercury	0.12	0.16	0.30	0.23	0.242
Molybdenum				6.10	14.012
Nickel	10.10	9.04	7.22	8.28	7.076
Selenium	1.21	1.50	1.31	1.10	1.411
Silver	7.73	7.65	3.24	3.06	2.630
Thallium	0.89	0.50	0.70	1.06	1.547
Zinc	95.12	71.63	74.29	74.18	82.270
Cyanide (mg/L)	0.060	0.020	0.020	0.010	0.007
Phenols (mg/L)	0.020	0.010	0.020	0.020	0.023
PHC (mg/L)	2.890	1.960	2.420	2.720	1.902
PESTICIDES AND PCBs (ug/L)					
4,4'DDD					0.024
4,4'DDE					0.015
4,4'DDT	0.060	0.020		0.040	
a-BHC	0.030	0.010	0.010		0.011

	Geometric Mean Concentration				
	FY 89	FY 90	FY 91	FY 92	FY 93
Pesticides/PCBs (Con't)					
Aldrin		0.020			0.009
b-BHC	0.040	0.020		0.060	0.010
Chlordane	0.280	0.050		0.130	0.072
d-BHC		0.010			0.020
Dieldrin		0.010			0.016
Endosulfan I		0.010		0.020	
Endosulfan Sulfate					0.031
g-BHC	0.050	0.020	0.010	0.020	0.008
Heptachlor	0.030	0.020			0.009
Heptachlor Epoxide	0.050	0.040			0.007
SEMIVOLATILE ORGANICS (ug/L)					
2-Methylnaphthalene	1.46	1.05	1.83	2.20	1.455
4-Methyl phenol	6.60	2.99	3.67	10.52	23.764
Benzoic Acid	19.19	5.00			90.804
Benzyl alcohol	3.88	1.60	3.34	5.10	10.438
bis(2-chloroethyl)ether	1.46	1.05	1.67		1.019
bis(2-ethylhexyl)pthalate	4.58	4.57	2.54	8.14	8.447
Butylbenzyl phthalate	1.46	1.05	1.53	1.75	2.495
Di-n-butylpthalate	1.84	1.55	1.53	1.93	3.940
Di-n-octylphthalate	1.46	1.05	1.53	1.16	1.373
Diethyl pthalate	1.80	1.61	1.53	2.16	5.376
Naphthalene	1.46	1.05	1.62		1.328
Phenol	1.46	1.05	1.88	1.41	1.212

	Geometric Mean Concentration				
	FY 89	**FY 90**	**FY 91**	**FY 92**	**FY 93**
VOLATILE ORGANICS (ug/L)					
1,1,1-Trichloroethane	1.75	2.19	2.58	1.73	1.205
1,1,2-Trichloroethane					0.716
1,2-Dichloroethene	1.51	0.55	0.49	2.55	2.051
2-Butanone	8.66	11.13	2.58	2.45	2.446
Acetone	107.00	151.38	164.35	101.00	113.058
Benzene	1.99	1.86	1.49	1.57	1.473
Bromodichloromethane	0.73	0.54	0.84	0.95	1.071
Bromoform	0.60	0.99	0.49	0.53	0.778
Bromomethane	1.48	1.07	1.07	1.13	1.150
Carbon disulfide	3.05	0.65	1.00	1.94	2.306
Carbon Tetrachloride	0.50	0.56	0.49		
Chlorobenzene	0.51	0.55	0.49		
Chloroform	6.37	5.39	5.95	7.77	7.366
Chloromethane	5.91	2.10	1.33	1.77	1.962
Dibromochloromethane	0.72	0.84	0.56	0.59	0.749
Ethyl benzene	1.41	2.96	0.66	0.65	0.672
Methylene chloride	11.40	3.17	6.44	4.89	6.300
Styrene	0.73	0.61	0.49	0.56	
Tetrachloroethene	7.76	5.49	5.17	6.82	5.818
Toluene	10.78	7.58	6.85	6.24	5.685
Trichloroethene	4.27	3.88	3.41	2.68	2.859
Vinyl Acetate	1.00	1.00	0.98	1.35	1.041
Xylene	5.59	3.13	4.43	4.15	3.114
Average Flow (MGD)	259	273	262	257	268

Notes: Data from NPDES Monitoring Program.
Geometric mean concentration for March, April and May are artificially higher due to higher MDL.

Appendix B

Appendix B Table B-1 Nut Island Treatment Plant, Operations Summary, Fiscal Year 1993

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN VALUE	AVE VALUE	MAX VALUE
DAILY FLOW (MGD)															
AVERAGE	99.04	95.76	95.47	93.22	91	168.19	144.8	136.23	179.51	217.63	131.88	99.14		129	
MINIMUM	86.79	72.49	78.14	83.34	49.93	116	108.64	103.73	113.22	170.31	99.71	81.01	50		
MAXIMUM	113.8	150.84	118.71	101.29	149.99	233.9	213.85	237.38	261.86	258.01	171.17	117.68			262
PEAK FLOW (a)	135.00	176.00	122.00	149.00	196.00	241.00	277.00	248.00	268.00	265.00	191.00	128.00			277
TEMP (DEG F)	68.2	69.7	68	67	62.8	57.3	54.3	53.2	51.8	51.8	57	62.1		60	
EFFLUENT pH															
MINIMUM	6.69	6.70	6.30	6.62	6.67	6.48	6.55	6.46	6.33	5.59	6.50	6.50	5.59		
MAXIMUM	7.38	7.07	7.06	7.05	7.17	7.43	7.01	6.94	7.28	7.00	7.18	7.05			7.43
CONVENTIONAL PARAMETERS (mg/l)															
SETTLEABLE SOLIDS															
INFLUENT	9.5	10	6.8	7.9	9	5.1	8.2	6.1	7.8	5.9	9.5	10.5	5.1	8.0	10.5
EFFLUENT	1.3	0.9	1	1.2	1.1	1.2	1.2	1.3	1.2	1.3	1.2	0.8	0.8	1.1	1.3
BIOCHEMICAL OXYGEN DEMAND															
INFLUENT	205	188	225	251	231	122	139	150	164	133	170	150	122	177	251
EFFLUENT	124	118	134	142	142	64	86	96	78	64	91	97	64	103	142
TOTAL SUSPENDED SOLIDS															
INFLUENT	192	204	182	190	180	112	150	147	149	171	206	205	112.0	174.0	206.0
EFFLUENT	80	79	80	80	69	48	52	61	52	44	66	77	44.0	65.7	80.0
OIL AND GREASE															
INFLUENT	45.6	44.7	59.0	49.2	50.3	39.6	23.6	24.1	17.9	18.8	10.5	34.9	10.5	34.9	59.0
EFFLUENT	34.5	32.7	36.1	37.2	28.4	27.4	15.7	10.9	9.4	8.0	8.0	24.2	8.0	22.7	37.2
TOTAL COLIFORMS															
INFLUENT (E+06)	50.621	59.593	68.884	81.036	52.512	26.969	6.145	8.563	11.071	9.099	31.546	73.315	6.1	39.9	81.0
EFFLUENT	172	255	214	263	172	229	224	256	314	478	466	816	172.0	321.6	816.0
FECAL COLIFORM															
INFLUENT (E+06)	3.847	3.889	5.015	3.279	1.858	0.244	0.757	0.585	0.557	0.356	0.916	2.577	0.2	2.0	5.0
EFFLUENT	15	15	13	17	11	12	14	18	28	37	31	33	11.0	20.3	37.0

Appendix B Table B-1, Nut Island Plant

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN VALUE	AVE VALUE	MAX VALUE
RESIDUAL CHLORINE	2.5	2.8	2.5	2.2	2.8	2.8	2.4	2.4	2.3	2.5	2.5	2.3	2.2000	2.5	2.8
CHLORIDES	647	615	567	580	490	346	443	464	401	362	519	598	346.0000	502.7	647.0
METALS															
ARSENIC															
INFLUENT	ND	ND	ND	ND	ND	ND	0.006	0.003	0.038	< 0.001	0.001	0.011	0.0010	0.0118	0.0380
EFFLUENT	ND	ND	ND	ND	ND	ND	0.001	< 0.001	< 0.005	0.003	0.003	0.001	0.0010	0.0020	0.0030
CHROMIUM															
INFLUENT	0.0115	0.0213	0.0120	0.0130	0.0010	0.0030	< 0.003	0.0120	0.0300	0.0140	0.0280	0.0120	0.0010	0.0143	0.0300
EFFLUENT	0.0095	0.0113	0.0041	0.0090	< 0.001	< 0.003	0.0060	0.0020	< 0.01	0.0010	0.0090	0.0070	0.0010	0.0065	0.0113
COPPER															
INFLUENT	0.1125	0.0884	0.1328	0.1060	0.1080	0.0590	0.0580	0.0720	0.0680	0.0850	0.1180	0.1000	0.0580	0.0923	0.1328
EFFLUENT	0.0732	0.0610	0.0670	0.0690	0.0750	0.0400	0.0580	0.0510	0.0460	0.0350	0.0510	0.0720	0.0350	0.0582	0.0750
CADMIUM															
INFLUENT	0.0011	< 0.05	< 0.0005	0.0010	0.0020	0.0020	0.0020	0.0010	< 0.005	0.0010	0.0010	0.0010	0.0010	0.0013	0.0020
EFFLUENT	0.0007	< 0.05	< 0.0005	0.0030	0.0010	0.0010	0.0020	0.0010	< 0.005	0.0010	0.0010	0.0010	0.0007	0.0013	0.0030
IRON															
INFLUENT	ND	ND	ND	ND	ND	1.8200	1.1800	1.6900	1.8000	ND	2.9000	3.4830	1.1800	2.1455	3.4830
EFFLUENT	ND	ND	ND	ND	ND	0.9810	1.2250	0.4480	1.3600	ND	1.1200	1.5620	0.4480	1.1160	1.5620
LEAD															
INFLUENT	0.0740	0.0209	0.0923	0.0723	0.0280	0.0130	0.0140	0.0120	< 0.03	0.0220	0.0850	0.0120	0.0120	0.0405	0.0923
EFFLUENT	0.0600	< 0.0208	0.0591	0.0573	0.0070	0.0090	0.0110	0.0060	< 0.03	0.0060	0.0070	0.0080	0.0060	0.0230	0.0600
NICKEL															
INFLUENT	0.0361	0.0221	0.0434	0.0080	0.0070	0.0100	0.0030	0.0100	< 0.02	0.0130	0.0170	0.0100	0.0030	0.0163	0.0434
EFFLUENT	0.0361	0.0228	0.0265	0.0040	0.0070	0.0050	0.0050	0.0060	< 0.02	0.0050	0.0060	0.0110	0.0040	0.0122	0.0361
SILVER															
INFLUENT	0.0070	0.0195	0.0135	0.0080	0.0050	0.0060	0.0020	0.0040	< 0.007	0.0030	0.0050	0.0050	0.0020	0.0071	0.0195
EFFLUENT	0.0080	0.0079	0.0094	0.0070	0.0020	0.0030	0.0020	0.0030	< 0.007	0.0020	0.0030	0.0040	0.0020	0.0047	0.0094
ZINC															
INFLUENT	0.1797	0.1685	0.1500	0.1315	0.1660	0.0860	0.1170	0.0910	0.1300	0.1910	0.2630	0.2530	0.0860	0.1606	0.2630
EFFLUENT	0.0938	0.1685	0.1000	0.1185	0.2100	0.1490	**0.49b**	0.1110	0.0900	0.0870	0.1050	0.1700	0.0870	0.1275	0.2100

Appendix B Table B-1, Nut Island Plant

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN VALUE	AVE VALUE	MAX VALUE
MERCURY															
INFLUENT	ND	ND	ND	ND	ND	0.0040	0.0005	0.0002 < 0.0005 < 0.0002			0.0007	0.0004	0.0002	0.0012	0.0040
EFFLUENT	ND	ND	ND	ND	ND	0.0060	0.0002	0.0002 < 0.0005 < 0.0002			0.0007	0.0002	0.0002	0.0015	0.0060
EFFLUENT NUTRIENTS (mg/l)															
TKN	21.700	17.500	24.580	20.720	20.000	10.000	14.980	17.400	7.140	9.267	16.007	17.640	7.1400	16.4111	24.5800
AMMONIA	13.020	9.800	14.700	15.260	16.000	9.000	12.250	9.000	2.450	4.123	12.070	17.350	2.4500	11.2519	17.3500
NITRATES	0.150	0.080	0.025	0.440	0.040	0.120	0.610	0.610	0.620	1.495	0.870	0.525	0.0250	0.8240	1.4950
NITRITE	0.05	0.020	0.015	0.060	0.000	0.000	0.030	0.090	0.06	0.210	0.760	0.100	0.0600	0.2440	0.7600
ORTHOPHOSPHORUS	1.5	2.000	2.630	2.830	1.920	0.810	0.600	0.500	0.5	0.240	1.140	1.390	0.2400	1.3236	2.8300
TOTAL PHOSPHORUS	3	3.500	4.960	2.900	9.130	3.930	2.780	2.310	1.5	1.803	2.787	2.855	1.5000	3.4959	9.1300
SLUDGE															
PRIMARY SLUDGE															
FLOW (MGD)	0.2616	0.2440	0.2215	0.2325	0.2476	0.2160	0.2496	0.2081	0.1849	0.1956	0.2173	0.1990	0.1849	0.2231	0.2616
pH	5.17	5.1	5.32	5.38	5.7	5.87	5.78	5.78	5.63	6.02	5.49	5.92	5.1	5.6	6.0
SOLIDS (%)	7.22	7.76	6.02	5.92	6.13	5.79	5.47	5.19	5.6	5.64	5.48	5.71	5.2	6.0	7.8
VOLATILE SOLIDS (%)	81.46	76.38	80.19	78.25	81.76	78.53	83.18	81.75	82.57	79.14	82.47	83.25	76.4	80.7	83.3
GREASE (%)	12.12	11.79	14.3	17.63	15.61	14.43	10.63	8.48	8.41	9.11	10.51	10.15	8.4	11.9	17.6
DIGESTED SLUDGE															
FLOW (MGD)	0.153	0.184	0.180	0.197	0.164	0.135	0.115	0.101	0.109	0.047	0.070	0.047	0.047	0.125	0.197
pH	7.18	7.06	7.22	7.35	7.29	7.49	7.25	7.40	7.36	7.39	7.39	7.09	7.06	7.29	7.49
TOTAL SOLIDS (%)	3.28	3.41	2.85	3.45	3.08	2.59	3.31	2.21	3.81	3.50	4.14	4.20	2.210	3.319	4.200
VOLATILE SOLIDS (%)	60	58	59	62	65	61	64.2	64	64	61	63	64	58.370	62.233	64.730
GREASE (%)	11.93	10.40	12.83	16.68	16.53	25.90	10.84	5.18	7.62	8.00	8.00	4.93	4.930	11.570	25.900
ARSENIC (mg/l)	ND	ND	ND	ND	ND	ND	< 0.001	C	0.042 < 0.001		0.053	0.152	0.042	0.082	0.152
CHROMIUM (mg/l)	1.110	1.132	0.990	1.598	0.550	1.560	0.622	0.858	0.637	0.722	1.626	0.964	0.550	1.031	1.626
COPPER (mg/l)	23.050	18.660	25.000	16.104	20.580	19.980	10.300	15.040	7.875	13.320	27.200	21.500	7.875	18.217	27.200
CADMIUM (mg/l)	0.130 < 0.05		0.077	0.521	0.070	0.111	0.056	0.083	0.072	0.089	0.140	0.103	<.01	0.1320	0.5209
IRON (mg/l)	ND	ND	ND	ND	ND	450	266	318	172	ND	364	306	172	313	450
LEAD (mg/l)	3.702	6.667	2.335	3.001	5.650	6.330	2.850	3.170	1.925	3.550	5.060	4.740	1.9250	4.0817	6.6670
NICKEL (mg/l)	0.860	0.990	1.178	0.046	0.670	0.892	0.407	0.673	0.481	0.646	0.907	0.866	<.26	0.7180	1.1780

Appendix B Table B-1, Nut Island Plant

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN VALUE	AVE VALUE	MAX VALUE
SILVER (mg/l)	0.601	1.024	0.452	0.642	1.066	0.026	0.214	0.077	0.667	0.043	0.053	0.029	0.0260	0.4078	1.0660
ZINC (mg/l)	27.120	27.660	35.390	17.335	21.700	26.500	13.700	16.600	11.200	18.500	27.700	24.600	11.2000	22.3337	35.3895
MERCURY (mg/l)	ND	ND	ND	ND	ND	< 0.001	0.0410	0.0560	0.0740	0.1300	0.3050	0.2800	0.0410	0.1477	0.3050
GAS PROD (E+06cu. ft.)	0.945	0.952	0.812	0.851	0.841	0.814	0.868	0.610	0.435	0.462	0.518	0.667	0.4350	0.7313	0.9520

Notes:

1. Data reduced from Nut Island Monthly Operation Logs. All anayses were performed by Deer Island Laboratory.

ND No data

a Instantaneous peak flow

b Zinc is 10X historical average, suspected sample contamination

C instrument malfunction

Appendix B Table B-2 Nut Island Influent Characterization, Priority Pollutants, Local Limits Study, Fiscal Year 1993

Metals (mg/L)	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN	MEAN	MAX	TIMES DETECTED
ALUMINUM												1.637	1.210	1.637	2.280	3 of 3
ANTIMONY (TOTAL)	0.039	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	0.040	0.045	3 of 35
ARSENIC (TOTAL)	0.003	< 0.010	0.001	0.003	0.002	< 0.002	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.002	0.002	0.003	6 of 35
BORON		0.283	0.313	0.316	0.410	0.208	0.185	0.220	0.224	0.163	0.205	0.296	0.150	0.347	16.000	35 of 35
CADMIUM	0.001	< 0.005	0.007	< 0.005	0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.003	0.008	5 of 35
CHROMIUM (TOTAL)	0.010	< 0.010	0.026	< 0.010	0.008	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.008	0.013	< 0.010	0.007	0.038	12 of 35
COPPER (TOTAL)	0.159	0.078	0.232	0.111	0.092	0.055	0.071	0.092	0.091	0.059	0.120	0.179	0.032	0.102	0.340	35 of 35
LEAD (TOTAL)	0.006	< 0.030	0.031	0.013	0.013	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	0.020	0.026	< 0.030	0.016	0.051	13 of 35
MERCURY (TOTAL)	0.001	< 0.001	< 0.0005	< 0.001	0.0003	0.001	0.001	0.001	0.0004	< 0.001	0.001	0.001	< 0.0005	0.001	0.001	13 of 35
NICKEL	0.011	< 0.020	0.014	< 0.020	0.014	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.011	0.020	5 of 35
SELENIUM (TOTAL)	< 0.020	< 0.025	< 0.002	0.002	< 0.002	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.002	< 0.005	< 0.002	0.002	0.003	1 of 35
SILVER (TOTAL)	0.007	< 0.007	0.026	0.008	0.007	0.005	< 0.007	< 0.007	0.007	0.005	0.005	0.006	< 0.007	0.006	0.030	16 of 35
ZINC	0.220	0.090	0.251	0.143	0.108	0.087	0.123	0.125	0.127	0.089	0.149	0.228	0.061	0.137	0.390	35 of 35
CYANIDE (mg/L)	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.002	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.01	0.001	0.010	1 of 44
OIL AND GREASE (mg/L)	12.59	46.04	16.82	15.06	12.76	1.87	4.90	10.39	12.32	5.59	14.05	12.68	< 5.00	10.74	130.0	40 of 44
SURFACTANTS (mg/L)	4.44	6.10	6.54	6.27	6.35	3.35	3.48	6.02	4.40	2.42	3.37	7.57	2.25	4.79	7.940	31 of 31
Pesticides/PCBs (ug/L)																
ALDRIN	< 0.100	< 0.400	0.100	< 0.100	< 0.070	< 0.050	< 0.080	< 0.050	< 0.090	< 0.050	< 0.050	< 0.050	< 0.050	0.010	0.400	1 of 35
CHLORDANE	< 0.100	< 0.860	< .460	< 0.220	< 0.070	0.023	0.018	< 2.000	< 0.860	< 0.790	< 0.510	< 0.510	< 0.100	0.049	0.080	3 of 35
4,4'-DDD (P,P'TDE)	< 0.100	< 0.790	0.177	< 0.200	0.031	< 0.100	0.032	< 0.100	< 0.170	< 0.100	< 0.100	< 0.100	< 0.100	0.020	0.290	4 of 35
4,4'-DDT	< 0.100	< 0.790	0.790	< 0.200	< 0.140	< 0.100	< 0.160	< 0.100	< 0.170	< 0.100	< 0.100	< 0.100	< 0.100	0.017	0.090	1 of 35
DELTA-BHC	0.018	0.040	0.079	< 0.100	< 0.070	< 0.050	0.049	< 0.050	< 0.090	0.009	< 0.050	< 0.050	< 0.050	0.012	0.460	7 of 35
DIELDRIN	0.010	< 0.790	< 0.930	< 0.200	< 0.140	< 0.100	< 0.160	< 0.100	< 0.170	< 0.100	< 0.100	0.034	< 0.100	0.019	0.070	2 of 35
GAMMA-BHC	0.017	0.056	< 0.370	0.065	0.017	0.010	0.030	0.019	< 0.090	< 0.050	< 0.050	< 0.050	< 0.050	0.016	0.210	10 of 35
HEPTACHLOR	< 0.100	< 0.400	< .460	< 0.100	< 0.070	0.012	0.048	< 0.050	< 0.090	< 0.050	0.071	< 0.050	< 0.050	0.014	0.320	5 of 35
TOXAPHENE	< 1.000	8.550	21.54	< 10.00	< 7.070	< 5.000	< 7.940	< 5.000	< 8.550	< 5.000	< 5.130	< 5.100	< 1.000	0.969	50.000	3 of 34

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN	MEAN	MAX	TIMES DETECTED
Semi-volatile Organics (ug/L)																
BENZOIC ACID	105.9	< 184.2		100.6	340.6	35.0	22.4	97.1	80.6	15.9	46.0	199.3	< 25.00	59.6	450.00	25 of 32
4-CHLORO-3-METHYLPHENOL	< 2.000	< 73.68	23.51	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 7.94	< 18.57	< 16.63	< 2.00	2.79	130.00	1 of 35
2-CHLOROPHENOL	< 2.000	< 73.68	24.10	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 7.94	< 18.57	< 16.63	< 2.00	2.79	140.00	1 of 35
4-METHYLPHENOL	18.37	46.90	48.39	28.65	64.45	11.45	8.57	10.80	39.88	8.43	29.12	43.18	< 20.00	23.22	110.00	31 of 35
4-NITROPHENOL	< 2.000	< 184.20	44.40	< 130.0	< 130.0	< 130.0	< 130.0	< 130.0	< 25.33	< 19.57	< 46.80	< 41.70	< 2.00	6.39	140.00	1 of 35
PENTACHLOROPHENOL	< 2.000	< 184.20	42.17	< 130.0	< 130.0	< 130.0	< 130.0	< 130.0	< 25.33	< 19.57	< 46.80	< 41.70	< 2.00	6.36	120.00	1 of 35
PHENOL	0.65	10.57	23.51	7.88	28.57	< 50.00	< 50.00	7.37	15.46	1.44	13.76	32.40	< 2.00	7.70	130.00	19 of 35
ACENAPHTHENE	< 2.000	< 73.68	20.57	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 7.94	< 18.57	< 16.63	< 2.00	2.75	87.00	1 of 35
BENZO(GHI)PERYLENE	< 2.000	< 73.68	< 126.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 7.94	< 18.57	1.66	< 2.00	2.68	4.00	2 of 35
BENZYL ALCOHOL	13.75	< 73.68	18.17	12.13	18.57	< 50.00	5.59	10.16	12.70	1.82	8.30	13.01	< 2.00	8.85	26.00	23 of 35
BIS(2-ETHYLHEXYL) PHTHALA	1.53	9.58	14.42	6.84	7.35	23.48	5.31	9.97	12.20	5.94	21.86	21.11	< 2.00	9.41	370.00	26 of 35
BUTYL BENZYL PHTHALATE	< 2.000	14.74	< 126.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	3.63	1.59	7.83	3.02	< 2.00	3.96	10.00	12 of 35
DI-N-BUTYL PHTHALATE	0.49	15.33	< 126.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	3.92	0.79	2.89	5.65	< 2.00	3.94	10.00	11 of 35
DI-N-OCTYL PHTHALATE	< 2.000	10.63	< 126.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	1.26	< 7.94	< 18.57	2.10	< 2.00	2.84	3.00	4 of 35
DIBENZO(A,H)ANTHRACENE	< 2.000	< 73.68	< 126.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 7.94	< 18.57	1.90	< 2.00	2.67	3.00	1 of 35
1,3-DICHLOROBENZENE	< 3.550	< 73.68	< 126.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 7.94	1.86	< 16.63	< 2.00	2.15	2.00	1 of 40
1,4-DICHLOROBENZENE	< 3.550	9.28	20.08	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	0.67	< 18.57	1.66	< 2.00	2.23	81.00	4 of 40
DIETHYL PHTHALATE	< 2.000	21.79	14.89	6.84	10.49	6.69	6.21	8.00	8.32	3.92	8.57	9.66	< 2.00	6.24	47.00	28 of 35
DIMETHYL PHTHALATE	< 2.000	< 73.68	< 126.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	0.67	< 18.57	< 16.63	< 2.00	2.60	0.30	1 of 35
2,4-DINITROTOLUENE	< 2.000	< 73.68	18.66	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 7.94	< 18.57	< 16.63	< 2.00	2.73	65.00	1 of 35
INDENO(1,2,3-CD)PYRENE	< 2.000	< 73.68	< 126.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 7.94	< 18.57	1.90	< 2.00	2.67	3.00	1 of 35
2-METHYLNAPHTHALENE	0.49	< 73.68	< 126.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	0.74	< 18.57	1.23	< 2.00	2.76	3.00	4 of 35
N-NITROSO-DI-N-PROPYLAMI	< 2.000	< 73.68	19.92	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 7.94	< 18.57	< 16.63	< 2.00	2.75	79.00	1 of 35
NAPTHALENE	0.54	7.37	< 126.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	0.79	< 18.57	1.54	< 10.00	2.86	4.00	4 of 35
PHENANTHRENE	< 2.000	< 73.68	< 126.0	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 7.94	< 18.57	1.66	< 2.00	2.64	2.00	1 of 35
PYRENE	< 2.000	< 73.68	19.13	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 7.94	< 18.57	< 16.63	< 2.00	2.74	70.00	1 of 35
1,2,4-TRICHLOROBENZENE	< 2.000	< 73.68	19.40	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.00	< 7.94	< 18.57	< 16.63	< 2.00	2.74	73.00	1 of 35

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	MIN	MEAN	MAX	TIMES DETECTED
Volatile Organics (ug/L)																
ACETONE	**73.8**	**16.1**	**95.4**	**113.6**	**86.8**	**97.1**	**79.5**	**71.1**	**84.8**	**106.3**	**71.9**	**73.9**	< 5.00	73.9	310.00	41 of 43
BENZENE	**16.44**	< 10.00	**1.19**	< 10.00	< 10.00	< 10.00	< 10.00	**1.00**	< 10.00	< 10.00	< 10.00	< 10.00	< 5.00	1.077	16.00	4 of 43
2-BUTANONE (MEK-METHYL E	**4.90**	**11.69**	**123.5**	**48.22**	**77.82**	**10.97**	**148.04**	**75.42**	**90.08**	**2.00**	**1.59**	**5.00**	< 5.00	21.888	430.00	31 of 43
CARBON DISULFIDE	< 5.00	**1.32**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 5.00	0.946	3.00	1 of 43
CHLOROFORM	< 5.00	**1.86**	**3.94**	**3.46**	**2.45**	**2.06**	**2.71**	**2.62**	**2.89**	**2.29**	**3.30**	**3.00**	< 5.00	2.219	5.00	36 of 43
TRANS-1,2-DICHLOROETHYLE	< 5.00	< 10.00	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	< 10.00	< 10.00	< 10.00	**1.00**	< 5.00	0.982	1.00	10 of 39
1,2-DICHLOROPROPANE	< 5.00	**1.00**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 5.00	0.923	1.00	1 of 43
ETHYLBENZENE	**1.65**	< 10.00	**1.00**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	**1.00**	< 5.00	1.060	1.00	4 of 43
METHYL CHLORIDE	< 5.00	< 10.00	< 10.00	< 10.00	< 10.00	**1.78**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 5.00	0.973	10.00	1 of 43
METHYLENE CHLORIDE	< 5.00	**5.38**	**5.00**	**2.21**	**5.32**	**2.78**	**2.24**	**1.59**	**2.29**	**1.26**	**2.62**	**2.45**	< 5.00	2.316	28.00	33 of 40
4-METHYL-2-PENTANONE (MII	< 5.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	**1.26**	< 10.00	< 10.00	< 5.00	0.938	2.00	1 of 43
TETRACHLOROETHYLENE	**0.79**	**1.86**	**3.36**	**3.00**	**4.68**	**4.82**	**7.84**	**10.00**	**3.98**	**7.61**	**6.30**	**2.45**	< 5.00	3.654	25.00	38 of 43
TOLUENE	**8.58**	**2.78**	**6.51**	**3.94**	**4.68**	**3.22**	**2.91**	**3.63**	**2.62**	**3.30**	**4.76**	**4.47**	< 5.00	4.129	80.00	41 of 43
TOTAL XYLENES	< 10.00	< 10.00	**1.32**	< 10.00	< 10.00	**1.32**	**2.00**	**2.00**	**1.44**	**4.31**	**1.59**	**3.46**	< 10.00	1.540	5.00	13 of 38
1,1,1-TRICHLOROETHANE	**0.79**	< 10.00	**1.00**	**1.19**	**1.73**	**4.05**	**3.08**	**2.62**	**3.04**	< 10.00	**2.89**	**1.00**	< 5.00	1.638	15.00	26 of 43
TRICHLOROETHYLENE	< 5.00	**1.41**	**1.68**	**1.00**	**1.19**	< 10.00	**1.00**	**1.26**	< 10.00	< 10.00	**1.26**	**1.41**	< 5.00	1.067	2.00	21 of 43
VINYL ACETATE	< 5.00	**1.19**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 5.00	0.938	2.00	1 of 43

Notes:

1. Monthly values were derived from back-calculating the geometric mean loadings of three data points to the monthly goemetric mean concentrations. Loadings were calculated using flows during the sampling events.
2. To calculate the monthly geometric mean concentrations, values below detection levels were assigned half the method detection limit.

Appendix B Table B-3 Nut Island Effluent Characterization, Priority Pollutants, NPDES Program, Fiscal Year 1993

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	GEOMETRIC MIN	GEOMETRIC MEAN	MAX	TIMES DETECTED
METALS (ug/L)																
Antimony	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 80	< 80	< 80	< 5	< 5	5.00	< 80	0 of 12
Arsenic	3	< 2	< 2	< 2	< 2	< 2	3	< 2	< 5	< 5	< 5	< 2	< 2	1.51	3	2 of 12
Beryllium	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 4	< 4	< 4	< 4	< 1	0.79	< 4	0 of 12
Boron	249	272	326	281	248	196	185	180	200	180	220	290	180	231	326	12 of 12
Cadmium	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 5	< 5	< 1	< 1	0.75	< 5	0 of 12
Chromium (Hex.)	< 5	< 5	< 5	< 5	< 5	< 5	< 6	< 6	< 5	< 5	< 5	< 5	< 5	2.58	< 6	0 of 12
Chromium (total)	6	< 5	11	5	5	10	7	< 6	< 10	< 10	< 10	< 5	< 5	5.04	11	6 of 12
Copper	61	59	72	69	63	54	49	55	54	35	58	91	35	58.59	91	12 of 12
Lead	11	10	7	7	10	3	5	11	< 30	< 30	< 30	11	3	9.12	11	9 of 12
Mercury	0.5	0.3	0.9	< 0.2	< 0.2	< 0.2	0.3	< 0.2	< 0.5	< 1	< 1	< 0.2	< 0.2	0.23	0.9	4 of 12
Molybdenum	11	< 8	11	< 8	8	12	< 8	< 8	< 80	< 80	< 80	< 80	8	11.84	12	4 of 12
Nickel	< 12	25	< 12	< 12	< 12	16	< 15	< 15	< 20	< 20	< 20	< 12	< 12	8.65	25	2 of 12
Selenium	< 2	< 2	< 2	< 2	2	< 2	< 2	< 2	< 5	< 5	< 5	< 2	< 2	1.33	2	1 of 12
Silver	6	< 3	< 3	< 3	< 3	< 3	4	< 4	< 7	< 7	< 7	3	< 3	2.45	6	3 of 12
Thallium	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 5	< 5	< 5	< 2	< 2	1.26	< 5	0 of 12
Zinc	62	62	65	59	63	58	65	57	72	60	60	87	57	63.74	87	12 of 12
Cyanide (mg/L)	< 0.006	0.009	0.011	< 0.005	< 0.005	< 0.005	0.013	0.017	0.013	0.017	0.00667	0.00667	< 0.005	0.01	0.017	7 of 12
Phenols (mg/L)	0.035	0.033	0.032	0.022	0.033	0.021	0.013	0.037	0.02	0.012	0.024	0.026	0.012	0.02	0.037	12 of 12
PHC (mg/L)	< 2	3.25	1.5	3.25	< 2	1.2	1.25	2	< 2	1.25	1.85	1.24	< 2	1.51	3.25	9 of 12
PESTICIDES AND PCBs (ug/L)																
4,4'-DDE	< 0.2	0.044	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.02	0.044	1 of 12
4,4'DDD	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	0.062	0.013	< 0.1	0.02	0.062	2 of 12
a-BHC	< 0.1	< 0.1	< 0.1	< 0.1	< 0.5	< 0.1	< 0.05	0.19	0.023	< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.19	2 of 12
Aldrin	< 0.1	< 0.1	< 0.1	< 0.1	0.018	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.018	1 of 12
Chlordane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.1	< 0.05	0.0085	< 2.0	< 2.0	< 2.0	< 0.05	< 0.05	0.07	0.0085	1 of 12
d-BHC	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.032	0.011	< 0.05	0.031	0.036	< 0.05	< 0.05	0.01	0.036	4 of 12
Dieldrin	< 0.2	< 0.2	< 0.2	0.024	0.02	0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.01	0.024	1 of 12
Endosulfan sulfate	< 0.2	0.72	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.28	< 0.1	0.03	0.72	2 of 12
g-BHC	< 0.1	0.042	< 0.1	0.068	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	0.026	0.18	< 0.05	0.01	0.18	4 of 12
Heptachlor	< 0.1	< 0.1	< 0.1	< 0.1	0.034	< 0.1	0.011	0.0067	0.0069	0.028	< 0.05	0.017	< 0.05	0.01	0.034	6 of 12

Appendix B Table B-3, Nut Island Treatment Plant

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	GEOMETRIC MIN	GEOMETRIC MEAN	GEOMETRIC MAX	TIMES DETECTED
SEMIVOLATILE ORGANICS (ug/L)																
4-Methyl phenol	19	23	29	41	45	31	9	17	24	4	11	17	4	18.83	45	12 of 12
Benzoic acid	95	< 50	12	< 5	170	80	43	120	89	36	45	120	< 5	40.10	170	10 of 12
Benzyl alcohol	15	28	18	18	< 10	12	6	9	15	3	4	< 5	< 5	8.10	28	10 of 12
bis(2-ethylhexyl)pthalate	12	19	12	6	13	14	10	10	8	2	3	11	2	8.57	19	12 of 12
Butyl benzylpthalate	3	6	4	2	4	< 10	3	3	3	2	1	< 5	< 5	2.71	6	10 of 12
Di-n-butylpthalate	5	7	5	2	3	2	4	3	3	1	2	< 5	< 5	3.09	7	11 of 12
Diethylpthalate	8	13	10	9	7	< 10	6	6	7	4	4	11	< 10	6.15	13	11 of 12
Naphthalene	< 10	< 10	< 10	< 5	< 10	< 10	< 10	4	< 5	< 10	< 10	< 10	< 5	1.00	4	1 of 12
Phenol	< 10	13	< 10	< 5	< 10	< 10	< 10	< 5	9	< 10	< 10	< 5	< 5	1.52	13	2 of 12
VOLATILE ORGANICS (ug/L)																
1,1,1-trichloroethane	1	1	< 0.8	1.0	0.8	3.6	3.0	2.0	3.33	1.00	2.33	1.00	0.63	1.37	3.60	11 of 12
1,2-dichloroethene	< 10	< 10	< 0.8	1.0	1.1	0.5	0.7	0.7	< 10	< 10	< 10	< 10	< 5	0.78	1.10	4 of 12
2-butanone	61	188	183.3	90.3	203.3	130.0	136.7	183.3	166.7	2.00	2.3	6.5	2.00	54.15	203.33	12 of 12
2-hexanone	< 10	< 10	1.6	< 10	5.7	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.23	5.67	2 of 12
4-Methyl-2-pentanone	< 10	< 10	1.6	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.07	1.60	1 of 12
Acetone	99	91	163	112	114	91	82	147	108	94	102	200	81.67	112.80	200.00	12 of 12
Benzene	2.7	< 10	< 0.8	< 5	< 5	< 5	0.7	0.7	< 10	< 10	< 10	< 10	< 5	0.84	2.67	2 of 12
Bromodichloromethane	3	3	< 0.8	2.0	2.7	3.3	3.3	2.0	3.33	< 10	< 10	< 10	2.00	2.04	3.33	7 of 12
Chlorobenzene	1	2	< 0.8	1.7	0.9	1.0	0.5	< 10	< 10	< 10	< 10	< 10	< 5	0.67	1.87	6 of 12
Chloroform	8	9	10.0	9.0	7.7	5.0	5.7	5.7	6.67	3.00	3.33	4.50	3.00	6.05	10.00	12 of 12
Chloromethane	1	< 10	< 1.6	1.3	1.6	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.00	1.13	1.57	3 of 12
Dibromochloromethane	1	1	1.3	< 5	< 5	2.7	1.2	0.8	< 10	< 10	< 10	< 10	< 5	1.04	2.67	6 of 12
Ethyl benzene	< 5	< 10	< 0.8	< 5	< 5	< 5	< 5	0.7	< 10	1.33	< 10	< 10	< 5	0.73	1.33	1 of 12
Methylene chloride	6	3	11.7	2.3	3.7	4.7	1.7	11.0	2.33	1.33	3.67	4.00	1.33	3.77	11.67	12 of 12
Tetrachloroethene	3	2	4.3	3.7	7.3	3.7	8.3	4.3	3.67	4.67	4.33	4	2	4.17	8.33	12 of 12
Toluene	19	9	5.7	5.0	4.7	3.7	3.7	3.3	2.33	7.33	3.33	5	2.33	5.09	19.00	12 of 12
Trichloroethene	< 10	1	1.3	0.6	< 5	< 5	0.7	0.7	1.00	< 10	1.00	1	< 5	0.75	1.30	7 of 12
Xylene	24	< 30	3.0	< 5	< 5	< 5	3.8	1.0	2.00	7.33	2.67	3	< 5	2.19	24.33	8 of 12

Notes:

1. Geometric mean concentrations were calculated by assigning half the method detection limit for those results that were below detection.

Appendix B Table B-4 Nut Island Effluent Characterization, Local Limits Study, Fiscal Year 1993

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	MEAN	MAX	TIMES DETECTED
Metals (mg/L)																
SILVER (TOTAL)	**0.003**	< 0.007	0.010	0.008	0.004	0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	**0.005**	< 0.003	0.004	0.010	12 of 36
ALUMINUM												**0.600**	0.56	0.600	0.680	2 of 2
ARSENIC (TOTAL)	< 0.003	< 0.010	< 0.002	< 0.002	**0.001**	**0.001**	< 0.002	0.003	< 0.005	< 0.005	< 0.005	< 0.005	< 0.002	0.002	0.002	2 of 36
BORON	**14.537**	**0.224**	**0.306**	**0.310**	**0.320**	**0.197**	**0.212**	**0.202**	**0.213**	**0.159**	**0.226**	**0.326**	< 0.250	0.34	16.00	35 of 36
CADMIUM	< 0.002	< 0.005	**0.004**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.002	0.002	0.01	1 of 36
CHROMIUM (TOTAL)	**0.003**	< 0.010	**0.010**	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.003	0.01	10.00	5 of 36
COPPER (TOTAL)	**0.071**	**0.059**	**0.083**	**0.064**	**0.069**	**0.048**	**0.041**	**0.058**	**0.057**	**0.038**	**0.058**	**0.085**	0.04	0.06	0.10	36 of 36
MERCURY (TOTAL)	**0.0001**	< 0.001	**0.0002**	< 0.001	< 0.0005	< 0.001	**0.0003**	< 0.004	< 0.0005	< 0.001	< 0.001	< 0.001	< 0.0002	0.000	0.001	3 of 36
LEAD (TOTAL)	**0.005**	< 0.030	**0.008**	**0.008**	**0.007**	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.010	0.011	0.008	10 of 36
SELENIUM (TOTAL)	< 0.002	< 0.010	< 0.002	< 0.004	**0.001**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.040	< 0.005	< 0.002	0.002	0.003	1 of 36
ZINC	**0.099**	**0.074**	**0.066**	**0.076**	**0.117**	**0.076**	**0.072**	**0.076**	**0.080**	**0.059**	**0.066**	**0.084**	0.05	0.078	0.220	36 of 36
CYANIDE (mg/L)	**0.034**	**0.003**	**0.003**	< 0.010	**0.002**	**0.002**	**0.008**	**0.020**	**0.006**	**0.016**	**0.003**	**0.006**	< 0.01	0.005	0.06	25 of 45
OIL AND GREASE (mg/L)	**10.344**	**20.677**	**1.000**	**1.732**	**3.637**	**1.030**	**0.500**	**10.595**	**0.500**	**1.205**	**2.621**	**7.114**	< 5.00	2.608	35.00	25 of 44
SURFACTANTS (mg/L)	**4.125**	**4.679**	**7.234**	**6.888**	**6.300**	**4.131**	**3.706**	**3.233**	**3.894**	**2.390**	**3.625**	**6.769**	1.84	4.547	8.02	33 of 33
Pesticides/PCBs (ug/L)																
ALDRIN	< 0.100	**0.038**	**0.033**	< 0.100	< 0.100	< 0.050	< 0.080	< 0.050	< 0.090	**0.010**	< 0.050	< 0.060	< 0.05	0.010	0.09	3 of 36
ALPHA-BHC	< 0.100	< 0.250	< 0.290	**0.030**	< 0.100	**0.149**	< 0.080	**0.022**	< 0.090	< 0.050	< 0.050	< 0.060	< 0.05	0.014	0.45	5 of 36
ALPHA-ENDOSULFAN	< 0.100	< 0.250	**0.029**	< 0.100	< 0.100	**0.010**	< 0.080	< 0.050	< 0.090	< 0.050	< 0.050	< 0.060	< 0.05	0.009	0.05	2 of 36
BETA-BHC	**0.013**	< 0.250	< 0.290	< 0.100	**0.025**	**0.011**	**0.015**	< 0.050	< 0.090	< 0.050	< 0.050	< 0.060	< 0.05	0.011	0.08	4 of 36
CHLORDANE	< 1.000	< 1.160	< 0.290	< 0.220	**0.021**	< 0.050	< 0.080	< 2.000	< 0.860	< 0.790	< 0.510	< 0.590	< 0.05	0.041	0.05	1 of 36
4,4'-DDE (P,P'-DDX)	**0.011**	< 0.500	< 0.580	< 0.200	< 0.200	< 0.100	< 0.160	< 0.100	< 0.170	< 0.100	< 0.100	< 0.120	< 0.10	0.016	0.01	1 of 36
4,4'-DDT	< 0.100	< 0.500	< 0.580	< 0.200	< 0.200	< 0.100	< 0.160	< 0.100	< 0.170	< 0.100	**0.018**	< 0.120	< 0.10	0.017	0.06	1 of 36
DELTA-BHC	**0.018**	**0.032**	**0.102**	< 0.100	< 0.100	< 0.050	**0.047**	< 0.050	**0.037**	**0.010**	< 0.050	< 0.060	< 0.05	0.014	0.42	7 of 36
DIELDRIN	**0.014**	< 0.500	**0.070**	< 0.200	< 0.200	**0.017**	< 0.160	< 0.100	< 0.170	< 0.100	< 0.100	**0.019**	< 0.10	0.019	0.05	4 of 36
ENDRIN	**0.013**	< 0.500	< 0.580	< 0.200	< 0.200	< 0.100	< 0.160	< 0.100	< 0.170	< 0.100	< 0.100	< 0.120	< 0.10	0.017	0.02	1 of 36
GAMMA-BHC	**0.022**	**0.035**	**0.075**	**0.017**	< 0.100	< 0.050	< 0.080	< 0.050	< 0.090	< 0.050	< 0.050	< 0.060	< 0.05	0.011	0.17	4 of 36

Appendix B Table B-4, Nut Island Plant

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	MEAN	MAX	TIMES DETECTED
Pesticides/PCBs (cont)																
HEPTACHLOR	**0.038**	< 0.250	< 0.290	< 0.100	**0.017**	< 0.050	**0.033**	< 0.050	< 0.090	< 0.050	**0.083**	< 0.060	< 0.05	0.014	0.55	6 of 36
HEPTACHLOR EPOXIDE	**0.022**	< 0.250	< 0.290	< 0.100	< 0.100	< 0.050	**0.025**	< 0.050	**0.018**	< 0.050	< 0.050	< 0.060	< 0.05	0.011	0.23	4 of 36
METHOXYCHLOR		< 2.500	**0.356**	< 1.000	< 1.000	< 0.500	< 0.790	< 0.500					< 0.50	0.113	0.18	1 of 20
TOXAPHENE	< 1.000	< 25.000	**13.57**	< 10.000	< 10.000	< 5.000	< 7.940	< 5.000	< 8.550	< 5.000	< 5.070	< 5.870	< 1.00	0.815	50.00	2 of 36
Semi-volatile Organics (ug/L)																
BENZOIC ACID	**1.73**	**18.42**	**0.00**	**386.8**	**239.11**	**50.55**	**55.76**	**176.24**	**61.32**	**41.17**	**131.8**	**34.27**	< 2.00	55.92	530.0	27 of 33
4-METHYLPHENOL (P-CRESOL)	**31.07**	**41.15**	**45.27**	**48.49**	**11.32**	**15.33**	**9.09**	**25.64**	**21.34**	**6.65**	**37.97**	**6.18**	< 20.00	19.87	170.0	30 of 36
2-METHYLPHENOL (O-CRESOL)	< 2.000	< 73.68	< 100.00	< 50.00	**8.88**	< 50.00	< 50.00	< 50.00	< 10.32	< 7.94	< 15.87	< 20.95	< 2.00	2.79	28.0	1 of 36
PHENOL	**0.74**	**15.98**	< 100.00	**14.28**	**15.20**	< 50.00	< 50.00	**9.49**	**8.65**	**2.29**	**15.12**	**7.72**	< 2.00	7.01	100.0	20 of 36
BENZO(GHI)PERYLENE	< 2.000	< 73.68	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.32	< 7.94	< 15.87	**2.40**	< 2.00	2.69	3.0	1 of 36
BENZYL ALCOHOL	**52.24**	< 73.68	**13.52**	**10.12**	**10.49**	**6.30**	**6.08**	**10.84**	**12.25**	**2.29**	**5.52**	**6.32**	< 10.00	8.83	310.0	25 of 36
BIS(2-ETHYLHEXYL) PHTHALAT	**8.65**	**9.87**	**6.34**	**8.32**	**5.94**	**9.47**	**6.46**	**16.39**	**14.23**	**5.52**	**12.48**	**15.22**	< 10.00	9.27	0.00	30 of 36
4-BROMOPHENYL PHENYL ETHE	**0.96**	< 73.68	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.32	< 7.94	< 15.87	< 20.95	< 2.00	3.03	22.00	1 of 36
BUTYL BENZYL PHTHALATE	< 2.000	**10.63**	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	**4.00**	**1.59**	**5.01**	**2.64**	< 2.00	3.65	7.00	11 of 36
DI-N-BUTYL PHTHALATE	**1.17**	**12.60**	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	**4.22**	**1.59**	**2.29**	**3.42**	< 2.00	4.12	5.00	12 of 36
DI-N-OCTYL PHTHALATE	< 2.000	**14.10**	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.32	< 7.94	< 15.87	< 20.95	< 2.00	2.81	7.00	1 of 36
DIBENZO(A,H)ANTHRACENE	< 2.000	< 73.68	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.32	< 7.94	< 15.87	**2.40**	< 2.00	2.69	3.00	1 of 36
1,3-DICHLOROBENZENE	< 2.900	< 73.68	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.32	< 7.94	**1.59**	< 20.95	< 2.00	2.09	1.00	1 of 41
1,4-DICHLOROBENZENE	< 2.000	< 73.68	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.32	**0.79**	< 15.87	< 20.95	< 2.00	2.09	0.50	1 of 41
DIETHYL PHTHALATE	< 2.000	**35.90**	**12.27**	**9.28**	**8.90**	**6.30**	**6.65**	**8.28**	**7.96**	**4.22**	**9.32**	**10.63**	< 2.00	6.71	58.00	31 of 36
DIMETHYL PHTHALATE	< 2.000	< 73.68	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.32	**0.74**	< 15.87	< 20.95	< 2.00	2.64	0.40	1 of 36
INDENO(1,2,3-CD)PYRENE	< 2.000	< 73.68	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.32	< 7.94	< 15.87	**2.40**	< 2.00	2.69	3.00	1 of 36
2-METHYLNAPHTHALENE	**0.49**	< 73.68	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.32	**0.79**	< 15.87	< 20.95	< 2.00	2.87	3.00	2 of 36
NAPTHALENE	**0.54**	< 73.68	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	**5.00**	< 10.32	**0.84**	**1.47**	< 20.95	< 2.00	2.95	11.00	4 of 36
PHENANTHRENE	**0.43**	< 73.68	< 100.00	< 50.00	< 50.00	< 50.00	< 50.00	< 50.00	< 10.32	< 7.94	< 15.87	**1.66**	< 2.00	2.78	2.00	2 of 36

Appendix B Table B-4, Nut Island Plant

	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	MEAN	MAX	TIMES DETECTED
Volatile Organics (ug/L)																
ACETONE	**44.6**	**54.7**	**76.9**	**116.9**	**105.4**	**28.0**	**120.9**	**103.1**	**98.5**	**101.8**	**102.4**	**130.0**	< 5.00	78.3	400.0	40 of 43
BENZENE	**1.01**	< 10.00	< 10.00	< 10.00	< 10.00	**1.00**	**1.00**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 1.00	1.00	7.00	5 of 43
BROMOFORM	< 3.62	**1.00**	< 10.00	< 10.00	< 10.00	**2.45**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 1.00	0.97	12.00	3 of 43
2-BUTANONE	**14.9**	**108.9**	**12.0**	**98.5**	**220.4**	**104.6**	**162.0**	**204.0**	**146.4**	**3.1**	**1.7**	**6.0**	< 1.00	45.5	490.0	36 of 43
CARBON DISULFIDE	< 3.60	< 10.00	**1.00**	**1.32**	**1.00**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	**1.00**	< 1.00	0.91	3.00	5 of 43
CHLOROFORM	**1.22**	**1.00**	**7.70**	**9.00**	**7.45**	**5.14**	**6.48**	**5.48**	**5.94**	**3.30**	**3.30**	**4.00**	< 1.00	4.96	13.00	40 of 43
DIBROMOCHLOROMETHANE	< 3.60	**1.50**	**1.19**	**1.00**	**1.00**	**2.78**	**1.41**	**1.00**	**1.26**	< 10.00	< 10.00	< 10.00	< 1.00	1.08	12.00	11 of 43
DICHLOROBROMOMETHANE	< 3.60	**2.85**	**2.06**	**2.63**	**2.63**	**3.03**	**2.99**	**2.00**	**2.29**	< 10.00	< 10.00	< 10.00	< 1.00	1.74	11.00	27 of 43
TRANS-1,2-DICHLOROETHYLENE		**1.00**	< 10.00	**1.00**	< 10.00	**1.00**	**1.00**	**1.00**	< 10.00	< 10.00	< 10.00	**1.00**	< 10.00	1.00	1.00	6 of 38
ETHYLBENZENE	< 3.60	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	**1.00**	< 10.00	**1.00**	< 1.00	0.91	3.00	3 of 43
2-HEXANONE (MPK)	< 3.60	< 10.00	< 10.00	< 10.00	< 10.00	**1.57**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 1.00	0.93	6.00	1 of 43
METHYL CHLORIDE	< 3.60	< 10.00	**1.86**	**2.21**	**1.00**	1.00	**1.19**	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 1.00	1.03	4.00	7 of 43
METHYLENE CHLORIDE	**0.57**	**3.94**	**3.76**	**3.13**	**5.07**	**2.21**	**1.57**	**2.38**	**2.29**	**1.26**	**3.11**	**5.00**	< 1.00	2.29	12.00	36 of 43
4-METHYL-2-PENTANONE	< 3.60	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	**1.26**	< 10.00	< 10.00	< 1.00	0.90	2.00	1 of 43
TETRACHLOROETHYLENE	**0.60**	**1.68**	**3.13**	**3.13**	**5.70**	**3.46**	**5.00**	**5.79**	**3.30**	**6.00**	**5.19**	**3.00**	< 1.00	3.13	11.00	39 of 43
TOLUENE	**7.70**	**5.57**	**4.68**	**3.98**	**4.36**	**3.94**	**3.46**	**3.72**	**2.29**	**6.60**	**3.30**	**5.00**	< 5.00	4.40	41.00	42 of 43
TOTAL XYLENES		< 10.000	**1.63**	< 10.00	< 10.00	< 10.00	**1.86**	**1.19**	**1.44**	**6.38**	**2.29**	**5.00**	< 10.00	1.52	13.00	11 of 38
1,1,1-TRICHLOROETHANE	< 3.60	< 10.00	< 10.00	**1.32**	**1.19**	**2.45**	**3.00**	**2.21**	**1.44**	< 10.00	**2.00**	**1.00**	< 1.00	1.29	3.00	22 of 43
TRICHLOROETHYLENE	< 3.60	**1.19**	**1.19**	**1.00**	**1.00**	< 10.00	**1.00**	< 10.00	< 10.00	< 10.00	**1.00**	**1.00**	< 1.00	0.92	2.00	15 of 43

Notes:

1. Monthly values were derived from back-calculating the geometric mean loadings of three data points to the monthly geometric mean conacentrations. Loadings were calculated using the flows during sampling event.
2. To calculate the monthly geometric mean concentrations, values below detecion levels were assigned half the method detection levels.

Appendix B Table B-5 Nut Island Priority Pollutants Loadings, NPDES Data, FY 1993

	LOADINGS (lbs/d)												Average
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	Loading
METALS													
Antimony	2.186	1.723	1.985	2.074	1.725	3.245	3.522	2.412	A	A	A	2.010	2.32
Arsenic	2.623	0.689	0.794	0.830	0.690	1.298	4.226	0.965	A	A	A	0.804	1.44
Beryllium	0.437	0.345	0.397	0.415	0.345	0.649	0.704	0.482	A	A	A	1.608	0.60
Boron	217.69	187.47	258.79	233.12	171.14	254.44	260.61	173.69	207.97	390.82	238.11	233.11	235.58
Cadmium	0.437	0.345	0.397	0.415	0.345	0.649	0.704	0.482	A	A	A	0.402	0.46
Chromium (Hex.)	2.186	1.723	1.985	2.074	1.725	3.245	4.226	2.895	A	A	A	2.010	2.45
Chromium (total)	5.246	1.723	8.732	4.148	3.450	12.982	9.861	2.895	A	A	A	2.010	5.67
Copper	53.330	40.664	57.156	57.243	43.475	70.102	69.027	53.072	56.152	75.993	62.774	73.149	59.34
Lead	9.617	6.892	5.557	5.807	6.901	3.895	7.044	10.614	A	A	A	8.842	7.24
Mercury	0.437	0.207	0.714	0.083	0.069	0.130	0.423	0.096	A	A	A	0.080	0.25
Molybdenum	9.617	2.757	8.732	3.318	5.521	15.578	5.635	3.860	A	A	A	32.153	9.69
Nickel	5.246	17.230	4.763	4.978	4.140	20.771	10.565	7.237	A	A	A	4.823	8.86
Selenium	0.874	0.689	0.794	0.830	1.380	1.298	1.409	0.965	A	A	A	0.804	1.00
Silver	5.246	1.034	1.191	1.244	1.035	1.947	5.635	1.930	A	A	A	2.412	2.41
Thallium	0.874	0.689	0.794	0.830	0.690	1.298	1.409	0.965	A	A	A	0.804	0.93
Zinc	54.204	42.731	51.599	48.947	43.475	75.294	91.566	55.001	74.870	130.274	64.939	69.934	66.90
Cyanide	2.623	6.203	8.732	2.074	1.725	3.245	18.313	16.404	13.865	36.187	7.215	5.359	10.16
Phenols	30.599	22.744	25.403	18.251	22.773	27.262	18.313	35.703	20.797	26.055	25.975	20.900	24.56
PHC	874	2240	1191	2696	690	1558	1761	1930	1040	2714	2002	997	1641.06
PESTICIDES AND PCBs													
4,4'-DDE	0.017	0.030	0.016	0.017	0.014	0.026	0.014	0.010	0.010	0.022	0.011	0.008	0.02
4,4'DDD	0.017	0.014	0.016	0.017	0.014	0.026	0.014	0.010	0.010	0.022	0.067	0.010	0.02
4,4'DDT	0.017	0.014	0.016	0.017	0.014	0.026	0.014	0.010	0.010	0.022	0.011	0.008	0.01
a-BHC	0.009	0.007	0.008	0.008	0.035	0.013	0.007	0.183	0.024	0.011	0.005	0.004	0.03
Aldrin	0.009	0.007	0.008	0.008	0.012	0.013	0.007	0.005	0.005	0.011	0.005	0.004	0.01
b-BHC	0.009	0.007	0.008	0.008	0.007	0.013	0.007	0.005	0.005	0.011	0.005	0.004	0.01

Appendix B Table B-5, Nut Island Treatment Plant

	LOADINGS (lbs/d)												Average
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	Loading
Pesticides (Con't)													
Chlordane	0.087	0.069	0.079	0.083	0.069	0.013	0.007	0.008	0.208	0.434	0.216	0.161	0.12
d-BHC	0.009	0.007	0.008	0.008	0.007	0.013	0.045	0.011	0.005	0.067	0.039	0.004	0.02
Dieldrin	0.017	0.014	0.016	0.020	0.014	0.026	0.014	0.010	0.010	0.022	0.011	0.008	0.02
Endosulfan I	0.009	0.007	0.008	0.008	0.007	0.013	0.007	0.005	0.005	0.011	0.005	0.004	0.01
Endosulfan sulfate	0.017	0.496	0.016	0.017	0.014	0.026	0.014	0.010	0.010	0.022	0.011	0.225	0.07
g-BHC	0.009	0.029	0.008	0.056	0.007	0.013	0.007	0.005	0.005	0.011	0.028	0.145	0.03
Heptachlor	0.009	0.007	0.008	0.008	0.023	0.013	0.015	0.006	0.007	0.061	0.005	0.014	0.01
Heptachlor epoxide	0.009	0.007	0.008	0.008	0.007	0.013	0.007	0.005	0.005	0.011	0.005	0.004	0.01
SEMIVOLATILE ORGANICS													
4-Methyl phenol	16.611	15.852	23.021	34.014	31.054	40.243	12.678	16.404	24.957	8.685	11.905	13.665	20.76
Benzoic acid	83.054	3.446	9.526	2.074	117.313	103.854	60.575	115.793	92.547	78.164	48.704	96.460	67.63
Benzyl alcohol	13.114	19.298	14.289	14.933	0.690	15.578	8.452	8.684	15.598	6.514	4.329	4.019	10.46
bis(2-ethylhexyl)pthalate	10.491	13.095	9.526	4.978	8.971	18.174	14.087	9.649	8.319	4.342	3.247	8.842	9.48
Butyl benzylpthalate	2.623	4.135	3.175	1.659	2.760	1.298	4.226	2.895	3.120	4.342	1.082	4.019	2.94
Di-n-butylpthalate	4.371	4.825	3.969	1.659	2.070	2.596	5.635	2.895	3.120	2.171	2.165	4.019	3.29
Diethylpthalate	6.994	8.960	7.938	7.466	4.831	1.298	8.452	5.790	7.279	8.685	4.329	8.842	6.74
Dimethyl pthalate	0.874	0.689	0.794	0.415	0.690	1.298	1.409	0.482	0.520	2.171	1.082	4.019	1.20
N-Nitrosodiphenylamine	0.874	0.689	0.794	0.415	0.690	1.298	1.409	0.482	0.520	2.171	1.082	4.019	1.20
Naphthalene	0.874	0.689	0.794	0.415	0.690	1.298	1.409	3.860	0.520	2.171	1.082	0.804	1.22
Phenol	0.874	8.960	0.794	0.415	0.690	1.298	1.409	0.482	9.359	2.171	1.082	4.019	2.63
VOLATILE ORGANICS													
1,1,1-trichloroethane	0.583	0.437	0.635	0.830	0.529	4.673	4.226	1.930	3.466	2.171	2.525	0.804	1.90
1,2 dichloropropane	0.437	0.345	0.635	0.415	0.345	0.649	0.704	0.675	1.040	2.171	1.082	0.804	0.78
1,2-dichloroethene	0.437	0.345	0.635	0.830	0.759	0.649	0.939	0.643	1.040	2.171	1.082	0.804	0.86
2-butanone	53.330	129.573	145.535	74.941	140.316	168.763	192.524	176.905	173.310	4.342	2.525	5.225	105.61
2-hexanone	0.874	0.919	1.270	0.830	3.910	1.298	1.409	0.965	1.040	2.171	1.082	0.804	1.38
4-Methyl-2-pentanone	0.874	0.919	1.270	0.830	0.690	1.298	1.409	0.965	1.040	2.171	1.082	0.804	1.11

Appendix B Table B-5, Nut Island Treatment Plant

	LOADINGS (lbs/d)												Average
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	Loading
VOC (Con't)													
Acetone	86.551	62.719	129.659	92.916	78.439	118.134	115.045	141.524	112.305	204.096	110.756	160.767	117.74
Benzene	2.331	0.689	0.635	0.415	0.345	0.649	0.939	0.643	1.040	2.171	1.082	0.804	0.98
Bromodichloromethane	2.623	1.907	1.270	1.659	1.840	4.327	4.696	1.930	3.466	2.171	1.082	0.804	2.31
Carbon disulfide	1.020	1.287	0.635	1.383	0.644	1.298	0.704	0.675	1.040	2.171	1.082	0.804	1.06
Carbon tetrachloride	0.437	0.689	0.635	0.415	0.345	0.649	0.704	0.675	1.040	2.171	1.082	0.804	0.80
Chlorobenzene	0.437	0.345	0.635	0.415	0.345	0.649	0.704	0.675	1.040	2.171	1.082	0.804	0.78
Chloroform	7.285	5.973	7.938	7.466	5.291	6.491	7.983	5.468	6.932	6.514	3.608	3.617	6.21
Chloromethane	0.874	0.919	1.270	1.106	1.081	1.298	1.409	0.965	1.040	2.171	1.082	0.804	1.17
Dibromochloromethane	0.874	0.758	1.032	0.415	0.345	3.462	1.643	0.804	1.733	2.171	1.082	0.804	1.26
Ethyl benzene	0.437	0.689	0.635	0.415	0.345	0.649	0.704	0.675	1.040	2.895	1.082	0.804	0.86
Methylene chloride	5.537	2.274	9.261	1.936	2.530	6.058	2.348	10.614	2.426	2.895	3.968	3.215	4.42
Styrene	0.437	0.437	0.635	0.415	0.345	0.649	0.704	0.675	1.040	2.171	1.082	0.804	0.78
Tetrachloroethene	2.623	1.378	3.440	3.042	5.061	4.760	11.739	4.181	3.813	10.132	4.690	3.215	4.84
Toluene	16.611	6.433	4.498	4.148	3.220	4.760	5.165	3.216	2.426	15.922	3.608	4.019	6.17
Trichloroethene	0.437	0.482	1.032	0.498	0.345	0.649	0.939	0.643	1.040	2.171	1.082	0.804	0.84
Xylene	21.274	2.068	2.355	0.415	0.345	0.649	5.400	0.965	2.080	15.922	2.886	2.412	4.73

Notes:

1. In March, April and May, the method detection levels for metals analyses were very high. These values were excluded in the loadings calculations.
2. Loadings were calculated by using the average monthly flows.

Appendix B Table B-6 Nut Island Treatment Plant Priority Pollutants, NPDES Data

	Geometric Mean Concentration				
	FY 89	FY 90	FY 91	FY 92	FY 93
METALS (ug/L)					
Arsenic	1.18	1.68	1.31	1.53	1.51
Boron				211.00	231.00
Cadmium	2.47	2.16	1.50	0.71	0.75
Chromium (Total)	5.39	4.50	5.09	4.48	5.04
Chromium (Hex)	7.49	10.24	7.34	3.16	2.58
Copper	71.91	51.57	55.26	55.48	58.59
Lead	13.05	8.08	7.00	7.20	9.12
Mercury	0.10	0.13	0.27	0.21	0.23
Molybdenum				5.90	11.84
Nickel	10.03	11.45	9.42	9.24	8.65
Selenium	1.18	1.86	1.53	1.10	1.33
Silver	5.73	8.25	3.06	3.12	2.45
Thallium	0.89	0.50	0.70	1.30	
Zinc	81.66	60.95	58.84	63.20	63.74
Cyanide (mg/L)	0.02	0.01	0.01	0.01	0.01
Phenols (mg/L)	0.03	0.03	0.02	0.03	0.02
PHC (mg/L)	2.46	2.30	2.30	1.93	1.51
PESTICIDES AND PCBs (ug/L)					
4,4'DDD					0.02
4,4'DDE	0.10			0.05	0.02
4,4'DDT		0.02		0.04	
a-BHC		0.02			0.01
Aldrin		0.03			0.01
b-BHC	0.06	0.01		0.30	

	Geometric Mean Concentration				
	FY 89	**FY 90**	**FY 91**	**FY 92**	**FY 93**
Pesticides/PCBs (Con't)					
Chlordane			0.02	0.22	0.07
d-BHC					0.01
Endosulfan I		0.01		0.03	
Endosulfan Sulfate	0.08	0.01			0.03
g-BHC	0.05	0.02			0.01
Heptachlor					0.01
Heptachlor Epoxide	0.05	0.04	0.01		0.01
SEMIVOLATILE ORGANICS (ug/L)					
2-Methylnaphthalene					
4-Methyl phenol	7.24	2.26	3.40	9.31	18.83
Benzoic Acid	15.00	6.66	12.42		40.10
Benzyl alcohol	4.26	2.00	3.50	8.93	8.10
bis(2-ethylhexyl)pthalate	4.52	4.34	3.73	11.00	8.57
Butylbenzyl phthalate	2.89	1.75	2.43	2.46	2.71
Di-n-butylpthalate	1.98	2.13	2.10	1.90	3.09
Diethyl pthalate	3.24	3.66	2.49	2.44	6.15
Naphthalene					1.00
Phenol	2.02		2.46	1.16	1.52
VOLATILE ORGANICS (ug/L)					
1,1,1-Trichloroethane	2.23	2.72	2.03	1.89	1.37
1,2-Dichloroethene	0.79	0.53	0.56	1.16	0.78
1,2-dichloropropane	0.50	0.54			
2-Butanone	8.14	4.98	138.75	104.00	54.15
2-hexanone	1.21				1.23
Acetone	88.55	125.66	143.26	113.06	112.80
Benzene	0.72		0.62	0.55	0.84
Bromodichloromethane	0.69	0.54		2.08	2.04

	Geometric Mean Concentration				
	FY 89	**FY 90**	**FY 91**	**FY 92**	**FY 93**
Volatile Organics (Con't)					
Carbon disulfide	0.77	0.59	0.61	0.66	1.00
Carbon Tetrachloride		0.59			
Chlorobenzene		0.53	0.57		
Chloroform	4.26	3.17	4.89	7.98	6.05
Chloromethane		1.06		1.12	1.13
Dibromochloromethane	0.59		0.54	0.90	1.04
Ethyl benzene	1.01	1.22	0.56	0.59	0.73
Methylene chloride	18.53	2.50	4.43	3.79	3.77
Styrene	0.61	0.56			0.69
Tetrachloroethene	9.18	8.66	7.06	5.48	4.17
Toluene	7.25	4.86	6.27	5.60	5.09
Trichloroethene	1.47	2.31	1.32	0.99	0.75
Xylene	3.14	1.16	1.31	1.33	2.19
Average Flow (MGD)	119.83	144.17	120.17	127.00	129.00

Note: Data from NPDES Monitoring Program.
FY93 geometric mean concentrations are artificially higher due to higher MDL in March, April and May.

Appendix C

Appendix C Table C-1 Cottage Farm CSO Facility Operations Summary, Fiscal Year 1993

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)	SS Effluent (mg/L)	FECAL COLIFORM (#/100 ml)	CHLORINE RESIDUAL (mg/L)
JULY											
7-9-92	0.47	2.50	3.61	7.32	103	283	156	128	2	20	2.1
AUGUST											
8-1-92	0.03	2.50	1.06	7.09	129	100	169	43	0.1	10	4.0
8-12-92	0.05	3.00	8.78	6.97	159	268	140	100	1.2	100	2.0
8-16-92	0.88	3.50	4.10	6.90	40	58	90	55	0.2	45000	1.0
8-18-92	1.14	4.50	18.96	7.27	34	50	75	55	0.4	170	4.0
SEPTEMBER											
9-3-92	0.89	5.00	7.99	7.37	34	34	14	34	0.2	10	1.3
9-26-92	1.22	4.25	10.36	7.57	46	103	76	42	0.2	10	1.3
9-27-92	0.05	1.00	1.47	7.24	160	277	64	56	0.2	10	1.7
OCTOBER											
10-10-92	0.55	1.75	1.27	8.06	81	31	164	64	0.2	10	1.5
NOVEMBER											
11-23-92	3.31	9.50	34.74	7.62	120	64	90	72	0.2	10	1.4
DECEMBER											
12-3-92	0.90	6.50	8.84	6.62	68	57	110	36	0.1	10	1.3
12-11-92	1.38	6.50	23.60	7.04	59	27	62	22	0.2	20	1.5
12-12-92	4.21	24.00	81.25	7.00	78	30	232	36	0.2	10	1.3
12-13-92	0.14	13.50	21.98	7.04	83	25	206	20	0.2	10	1.1
12-14-92	0.05	1.00	1.00								1.0
12-17-92	0.67	14.00	6.25	7.27	89	65	938	58	0.2	10	1.3
JANUARY											
1-5-93	0.65	4.30	18.50	7.04	114	87	210	121	2.8	10	1.5
FEBRUARY											
2-12-93	1.01	1.15	3.63	6.51	120	103	140	130	3	10	1.0
2-13-93	1.09	9.00	70.41	6.54	73	99	83	126	3.2	10	1.0
2-16-93	1.40	4.00	23.60	6.68	121	65	130	161	1.6	10	1.6
2-17-93	0.01	4.50	13.00	6.80	112	65	95	163	2.2	10	1.5

Appendix C Table C-1, Cottage Farm CSO

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)	SS Effluent (mg/L)	FECAL COLIFORM (#/100 ml)	CHLORINE RESIDUAL (mg/L)
MARCH											
3-17-93	0.74	10.10	22.80	7.17	113	105	119	81	1.3	10	1.8
3-29-93	1.44	22.30	144.70	7.35	263	26	365	5	0.1	10	1.6
3-30-93	0.21	24.00	42.47	6.68	97	28	257	22	0.1	10	1.6
3-31-93	0.05	24.00	3.98	7.04	68	64	119	27	0.2	10	1.3
APRIL											
4-1-93	1.33	20.50	57.91	7.17	108	66	151	20	0.2	10	1.4
4-2-93	0.04	24.00	10.84	7.03	53	60	60	43	0.2	10	1.5
4-3-93	0.05	11.00	0.69	6.95	62	254	254	17	0.1	10	1.5
4-10-93	0.20	4.00	2.07	7.07	35	5	30	51	0.2	50	1.5
4-12-93	0.83	9.75	12.27	7.18	67	19	26	226	0.2	1	1.8
4-13-93	0.04	1.50	1.10	7.06	98	59	25	26	0.2	30	1.5
4-17-93	0.85	8.00	11.35	7.06	59	54	67	30	0.2	10	1.6
4-27-93	0.40	4.00	2.65	7.18	126	87	109	47	0.1	35000	1.5
TOTAL		**289.10**	**677.23**		**2972.00**	**2718.00**	**4826.00**	**2117.00**	**21.70**		**52.9**
AVERAGE		**8.76**	**20.52**		**92.88**	**84.94**	**150.81**	**66.16**	**0.68**	**20.84**	**1.6**
MINIMUM		**1.00**	**0.69**	**6.51**	**34.00**	**5.00**	**14.00**	**5.00**	**0.10**	**1.00**	**1.0**
MAXIMUM		**24.00**	**144.70**	**8.06**	**263.00**	**283.00**	**938.00**	**226.00**	**3.20**	**45000.00**	**4.0**
No. OF ACTIVATIONS			**33**								

Appendix C Table C-2 Cottage Farm CSO BOD and TSS Loadings, Fiscal Year 1993

DATE	Effluent pH (su)	Biochemical Oxygen Demand Influent (lbs/d)	Effluent (lbs/d)	% Removal	Total Suspended Solids Influent (lbs/d)	Effluent (lbs/d)	% Removal
JULY							
7-9-92	7.32	3,101	8,520	-175	4,697	3,854	18
AUGUST							
8-1-92	7.09	1,140	884	22	1,494	380	75
8-12-92	6.97	11,643	19,624	-69	10,252	7,323	29
8-16-92	6.9	1,368	1,983	-45	3,077	1,881	39
8-18-92	7.27	5,376	7,906	-47	11,859	8,697	27
SEPTEMBER							
9-3-92	7.37	2,266	2,266	0	933	2,266	-143
9-26-92	7.57	3,975	8,899	-124	6,567	3,629	45
9-27-92	7.24	1,962	3,396	-73	785	687	13
OCTOBER							
10-10-92	8.06	858	328	62	1,737	678	61
NOVEMBER							
11-23-92	7.62	34,768	18,543	47	26,076	20,861	20
DECEMBER							
12-3-92	6.62	5,013	4,202	16	8,110	2,654	67
12-11-92	7.04	11,613	5,314	54	12,203	4,330	65
12-12-92	7	52,855	20,329	62	157,209	24,395	84
12-13-92	7.04	15,215	4,583	70	37,763	3,666	90
12-14-92							
12-17-92	7.27	4,635	3,385	27	48,854	3,021	94
JANUARY							
1-5-93	7.04	17,589	13,423	24	32,401	18,669	42
FEBRUARY							
2-12-93	6.51	3,633	3,118	14	4,238	3,936	7
2-13-93	6.54	42,867	58,135	-36	48,739	73,990	-52
2-16-93	6.68	23,816	12,794	46	25,587	31,689	-24
2-17-93	6.8	12,143	7,047	42	10,300	17,672	-72

Appendix C Table C-2, Cottage Farm CSO

DATE	pH (su)	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
MARCH							
3-17-93	7.17	21,487	19,966	7	22,628	15,402	32
3-29-93	7.35	317,388	31,377	90	440,481	6,034	99
3-30-93	6.68	34,357	9,918	71	91,029	7,792	91
3-31-93	7.04	2,257	2,124	6	3,950	896	77
APRIL							
4-1-93	7.17	52,161	31,876	39	72,928	9,659	87
4-2-93	7.03	4,791	5,424	-13	5,424	3,887	28
4-3-93	6.95	357	1,462	-310	1,462	98	93
4-10-93	7.07	604	86	86	518	880	-70
4-12-93	7.18	6,856	1,944	72	2,661	23,127	-769
4-13-93	7.06	899	541	40	229	239	-4
4-17-93	7.06	5,585	5,112	8	6,342	2,840	55
4-27-93	7.18	2,785	1,923	31	2,409	1,039	57
TOTAL		**705,362**	**316,434**		**1,102,942**	**306,169**	
AVERAGE		**22,043**	**9,889**	**55**	**34,467**	**9,568**	**72**
MINIMUM	**6.51**	**357**	**86**		**229**	**98**	
MAXIMUM	**8.06**	**317,388**	**58,135**		**440,481**	**73,990**	

Appendix C Table C-3 Cottage Farm CSO Facility, Priority Pollutants, NPDES Data, Fiscal Year 1993

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	MEAN	MAX	TIMES DETECTED
Metals (ug/L)	(A)															
Antimony			< 5.00	(B)	(B)						(B)	(B)	< 5.0	2.5	< 5.0	0 of 1
Arsenic			**3.00**				**2.00**						**2.0**	2.4	**3.0**	2 of 2
Beryllium			< 1.00										< 1.0	0.5	< 1.0	0 of 1
Boron			**49.00**				**89.00**						**49.0**	66.0	**89.0**	2 of 2
Cadmium		**0.50**	**1.00**				**1.00**	**10.00**	**1.00**	< 5.00			< 5.0	1.5	**10.0**	5 of 6
Chromium			**11.00**			**1.00**	**12.00**						**1.0**	5.1	**12.0**	3 of 3
Copper		**90.0**	**152.0**			**42.0**	**94.0**	**110.0**	**74.0**	**64.0**			**42.0**	83.4	**152.0**	7 of 7
Lead		**252.0**	**174.0**			**22.0**	**56.0**	**87.0**	**77.0**	**78.0**			**22.0**	83.5	**252.0**	7 of 7
Mercury		**0.10**	**0.80**			< 0.20	**0.30**	**0.50**	< 1.00	< 1.00			**0.1**	0.3	**0.8**	4 of 7
Molybdenum			**22.00**				**15.00**						**15.0**	18.2	**22.0**	2 of 2
Nickel		**6.00**	< 12.00			< 12.00	< 15.00	< 15.00	< 20.00	< 20.00			< 12.00	7.4	**10.0**	1 of 7
Selenium			< 2.00										< 2.0	1.0	< 2.0	0 of 1
Silver			< 3.00				**2.00**						< 3.0	1.7	**2.0**	1 of 2
Thallium			< 2.00										< 2.0	1.0	< 2.0	0 of 1
Zinc		**148.0**	**218.0**			**72.0**	**152.0**	**236.0**	**16.0**	**120.0**			**16.0**	106.9	**236.0**	7 of 7
cyanide(ug/L)		**2.50**	< 5.00			< 5.00	**15.00**	**11.00**	**20.00**	**10.00**			< 5.00	6.5	**20.0**	5 of 7
phenols (ug/L)		**11.00**	< 5.00			**6.00**	**7.00**	**19.00**	**12.00**	**8.00**			< 5.00	8.0	**19.0**	6 of 7
Ammonia (mg/L)		**4.10**	**4.40**			**3.00**	**4.20**	**2.30**	**5.88**	**3.78**			**2.3**	3.8	**5.9**	7 of 7
Phosphorus (mg/L)		**1.70**	**0.90**			**1.90**	**1.60**	**1.30**	**2.13**	**1.27**			**0.9**	1.5	**2.1**	7 of 7
Surfactants (mg/L)		**2.50**	**3.40**			**0.80**	**2.70**		**1.71**	**1.84**			**0.8**	2.0	**3.4**	6 of 6
Pesticides/PCBs (ug/L)																
a-BHC		< 0.10	< 0.10			< 0.10	< 0.10	**0.550**	< 0.05	< 0.05			< 0.05	0.01	**0.55**	1 of 7
b-BHC		< 0.10	< 0.10			**0.03**	< 0.10	< 0.05	< 0.05	< 0.05			< 0.05	0.01	**0.03**	1 of 7
d-BHC		< 0.10	**0.29**			< 0.10	< 0.10	**0.043**	**0.029**	< 0.05			< 0.05	0.02	**0.29**	3 of 7
Dieldrin		< 0.20	< 0.20			< 0.20	< 0.20	**0.025**	< 0.10	< 0.11			< 0.10	0.02	**0.03**	1 of 7

Appendix C Table C-3, Cottage Farm CSO

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	MEAN	MAX	TIMES DETECTED
Pesticides/PCBs	(A)			(B)	(B)						(B)	(B)				
Endosulfan I		< 0.10	**0.01**			< 0.10	< 0.10	< 0.05	< 0.05	< 0.05			< 0.05	0.01	**0.01**	1 of 7
endosulfan sulfate		**0.23**	< 0.20			< 0.10	< 0.10	< 0.10	< 0.10	0.010			< 0.10	0.02	**0.23**	2 of 7
hepatchlor epoxide		< 0.10	< 0.10			< 0.10	0.02	**0.012**	< 0.05	< 0.05			< 0.05	0.01	**0.02**	2 of 7
Heptachlor		< 0.10	**0.02**			< 0.10	**0.02**	< 0.05	**0.029**	< 0.05			< 0.05	0.01	**0.03**	3 of 7
Methoxychlor		< 1.00	**0.30**			< 1.00	**0.03**	**0.520**					**0.03**	0.13	**0.52**	3 of 5
Semi-volatile Organics (ug/L)																
2-methylnaphthalene		**1.00**	< 5.00			< 5.00	< 11.00	< 5.00	**2.00**	< 10.00			< 5.00	0.83	**2.00**	2 of 7
4-methylphenol		< 5.00	**5.00**			**3.00**	< 11.00	**9.00**	**9.00**	< 10.00			< 5.00	2.53	**9.00**	4 of 7
benzoic acid		< 25.00	**16.00**			**17.00**	< 11.00	**33.00**	**38.00**	**90.00**			< 11.00	13.56	**90.00**	5 of 7
benzyl alcohol		**1.00**	**3.00**			< 5.00	**15.00**	< 5.00	**6.00**	< 10.00			< 5.00	1.83	**15.00**	4 of 7
bis(2-ethylhexl)phthalate		**19.00**	**9.00**			**5.00**	**12.00**	**14.00**	**16.00**	**7.00**			**5.00**	10.70	**19.00**	7 of 7
butylbenzylphthalate		**3.00**	**1.00**			**2.00**	**3.00**	**2.00**	**3.00**	**1.00**			**1.00**	1.95	**3.00**	7 of 7
butylbenzylphthalate		< 5.00	< 5.00			< 5.00	< 11.00	< 5.00	**3.00**	< 10.00			**0.50**	0.80	**3.00**	1 of 7
di-n-butylphthalate		< 5.00	**2.00**			**2.00**	**5.00**	**3.00**	**3.00**	**2.00**			< 5.00	2.10	**5.00**	6 of 7
di-n-octyl phthalate		**1.00**	**1.00**			**1.00**	< 11.00	**1.00**	< 5.00	< 10.00			< 5.00	0.92	**1.10**	4 of 7
diethylphthalate		**3.00**	**1.00**			**2.00**	**5.00**	**2.00**	**3.00**	**4.00**			**1.00**	2.56	**5.00**	7 of 7
fluoranthene		< 5.00	< 5.00			< 5.00	< 11.00	**1.00**	**2.00**	< 10.00			< 5.00	0.83	**2.00**	2 of 7
naphthalene		< 5.00	< 5.00			< 5.00	< 11.00	< 5.00	**1.00**	< 10.00			< 5.00	0.68	**1.10**	1 of 7
p-cresol		< 5.00	< 5.00			< 5.00	< 11.00	< 5.00	**9.00**	**7.00**			< 5.00	1.23	**9.00**	2 of 7
phenanthrene		**1.00**	< 5.00			< 5.00	< 11.00	**1.00**	**2.00**	< 10.00			< 5.00	0.92	**2.00**	3 of 7
phenol		< 5.00	< 5.00			< 5.00	< 11.00	< 5.00	< 10.00	**2.00**			< 5.00	0.75	**2.00**	1 of 7
pyrene		< 5.00	< 5.00			< 5.00	< 11.00	< 5.00	**1.00**	< 10.00			< 5.00	0.68	**1.10**	1 of 7

(A) No activation.
(B) The activation duration was not long enough to set up samplers. No samples were collected.

Notes:
1. No analyses were conducted where no results are indicated except for semivolatile and pesticides.
2. Geometric mean concentrations were calculated by substituting 1/2 the method detection limit for pollutants that were below detection.

Appendix C Table C-4 Cottage Farm Facility, Priority Pollutants Loadings, NPDES Data, FY93

	Loadings (lbs/d)												AVERAGE
	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	LOADINGS
Metals	(A)			(B)	(B)						(A)	(A)	
Antimony			0.167										0.167
Arsenic			0.200				0.309						0.254
Beryllium			0.033										0.033
Boron			3.265				13.732						8.499
Cadmium		0.037	0.067				0.154	1.968	0.190	1.207			0.604
Chromium			0.733			0.074	1.851						0.886
Copper		6.590	10.129			3.096	14.503	21.651	14.071	30.910			14.422
Lead		18.453	11.595			1.622	8.640	17.124	14.642	37.672			15.678
Mercury		0.007	0.053			0.007	0.046	0.098	0.095	0.241			0.078
Molybdenum			1.466				2.314						1.890
Nickel		0.439	0.400			0.442	1.157	1.476	1.902	4.830			1.521
Selenium			0.067										0.067
Silver			0.100				0.309						0.204
Thallium			0.067										0.067
Zinc		10.837	14.527			5.308	23.452	46.450	3.042	57.956			23.082
cyanide		0.183	0.167			0.184	2.314	2.165	3.803	4.830			1.949
phenols		0.805	0.167			0.442	1.080	3.740	2.282	3.864			1.769
Ammonia		0.300	0.293			0.221	0.648	0.453	1.118	1.826			0.694
Phosphorus		0.124	0.060			0.140	0.247	0.256	0.405	0.613			0.264
Surfactants		0.183	0.227			0.059	0.417	0.000	0.325	0.889			0.300
Pesticides/PCBs													
a-BHC		0.001	0.001			0.001	0.002	0.108	0.001	0.003			0.016
b-BHC		0.001	0.001			0.002	0.002	0.001	0.001	0.003			0.001
d-BHC		0.001	0.019			0.001	0.002	0.008	0.006	0.003			0.006
Dieldrin		0.001	0.001			0.001	0.003	0.005	0.002	0.005			0.003

	Loadings (lbs/d)											AVERAGE
	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	LOADINGS
Pesticides/PCBs (cont)													
Endosulfan		0.001	0.001			0.001	0.002	0.001	0.001	0.003			0.001
endosulfan sulfate		0.017	0.001			0.001	0.002	0.002	0.002	0.005			0.004
hepatchlor epoxide		0.001	0.001			0.001	0.003	0.002	0.001	0.003			0.002
Heptachlor		0.001	0.001			0.001	0.004	0.001	0.006	0.003			0.002
Methoxychlor		0.007	0.020			0.007	0.004	0.102					0.028
Semi-volatile Organics													
2-methylnaphthalene		0.073	0.033			0.037	0.170	0.098	0.380	0.483			0.182
4-methylphenol		0.037	0.333			0.221	0.170	1.771	1.711	0.483			0.675
benzoic acid		0.183	1.066			1.253	0.170	6.495	7.226	43.467			8.552
benzyl alcohol		0.073	0.200			0.037	2.314	0.098	1.141	0.483			0.621
bis(2-ethylhexl)phthalate		1.391	0.600			0.369	1.851	2.756	3.042	3.381			1.913
butylbenzylphthalate		0.220	0.067			0.147	0.463	0.394	0.570	0.483			0.335
butylbenzylphthalate		0.037	0.033			0.037	0.170	0.098	0.570	0.483			0.204
di-n-butylphthalate		0.037	0.133			0.147	0.771	0.590	0.570	0.966			0.459
di-n-octyl phthalate		0.073	0.067			0.074	0.170	0.197	0.095	0.483			0.165
diethylphthalate		0.220	0.067			0.147	0.771	0.394	0.570	1.932			0.586
fluoranthene		0.037	0.033			0.037	0.170	0.197	0.380	0.483			0.191
naphthalene		0.037	0.033			0.037	0.170	0.098	0.190	0.483			0.150
p-cresol		0.037	0.033			0.037	0.170	0.098	1.711	3.381			0.781
phenanthrene		0.073	0.033			0.037	0.170	0.197	0.380	0.483			0.196
phenol		0.037	0.033			0.037	0.170	0.098	0.190	0.966			0.219
pyrene		0.037	0.033			0.037	0.170	0.098	0.190	0.483			0.150

Note:

1. Loadings calculated from the NPDES data set using the total flow during time of sampling event.

Appendix C Table C-5 Cottage Farm CSO Facility, Priority Pollutants, Historical NPDES Data

	Geometric Mean Concentration			
	FY90	**FY91**	**FY92**	**FY93**
Metals (ug/L)				
Antimony		15.79	2.50	2.50
Arsenic		2.17	2.91	2.45
Beryllium		0.50	0.35	0.50
Boron			57.07	66.04
Cadmium	2.13	1.33	1.17	1.52
Chromium	4.50	5.90	10.14	5.09
Copper	96.31	82.85	83.10	83.43
Lead	46.52	57.44	63.31	83.47
Mercury	0.29	0.33	0.40	0.31
Molybdenum			5.42	18.17
Nickel	11.68	7.05	9.14	7.40
Selenium		1.37	1.00	1.00
Silver		3.12	4.09	1.73
Thallium		0.61	1.00	1.00
Zinc	141.71	145.58	138.64	106.94
Cyanide (mg/L)			10.27	6.55
Phenols (mg/L)			2.67	8.01
Ammonia (mg/L)	6.67	3.66	1.85	3.81
Phosphorus (mg/L)	2.89	1.96	1.30	1.49
MBAS (mg/L)			1.18	1.97
Organic Pesticides PCB (ug/L)				
a-BHC	0.03	0.04	0.01	0.01
d-BHC	0.03	0.03	0.01	0.02
b-BHC	0.03	0.03	0.07	0.01

	Geometric Mean Concentration			
	FY90	FY91	FY92	FY93
Organic Pesticides/PCBs (cont.)				
Hepatchlor epoxide	0.05	0.05	0.01	0.01
Heptachlor			0.01	0.01
Endosulfan sulfate	0.06	0.05	0.05	0.02
Endosulfan			0.01	0.01
Methoxychlor			0.41	0.13
Semi-volatile organics (ug/L)				
Benzyl alcohol			0.56	1.83
4-methylphenol			0.89	3.34
Benzoic acid			1.64	13.56
Diethylphthalate			0.79	2.56
Phenanthrene	4.92	1.71	0.72	0.92
Di-n-butylphthalate			1.07	2.10
Pyrene	6.08	1.58	0.57	0.68
Butylbenzylphthalate			0.79	1.95
Bis(2-ethylhexl)phthalate			2.11	10.70
Di-n-octyl phthalate			0.61	0.92
Naphthalene	21.59	1.97	0.61	0.68
2-methylnaphthalene			1.44	0.83
Fluoranthene	5.11	1.85	0.61	0.83

Appendix D

Appendix D Table D-1 Prison Point CSO Operations Summary, Fiscal Year 1993

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)	SS EFFLUENT (mg/L)	FECAL COLIFORM (#/100ml)	CHLORINE RESIDUAL (mg/L)
JULY											
7-9-92	0.47	3.00	3.88	7.80	153	62	520	116	0.8	10	0.9
AUGUST											
8-1-92	0.03	6.00	6.00	6.86	142	80	182	50	0.1	10	1.3
8-9-92	0.83	6.00	3.20	6.24	57	41	94	48	0.4	10	1.7
8-12-92	0.02	3.50	5.83	7.03	60	133	162	78	0.6	10	1.5
8-16-92	0.88	3.50	2.25	7.04	53	255	158	109	0.8	10	1.2
8-18-92	1.14	6.00	15.00	6.80	26	187	37	17	0.1	10	1.4
SEPTEMBER											
9-4-92	0.00	3.00	11.52	7.19	65	66	158	90	0.8	20	1.17
9-26-92	1.22	2.00	9.27	7.14	106	276	150	146	0.4	10	1.85
9-27-92	0.02	1.75	1.63	(A)	(A)	(A)	(A)	(A)	(A)	(A)	1.65
NOVEMBER											
11-3-92	0.72	2.50	3.31	6.74	100	147	164	56	0.1	10	1.33
11-23-92	3.31	8.00	27.23	7.21	46	37	104	94	0.6	40	0.9
DECEMBER											
12-3-92	0.90	4.50	9.90	6.73	50	40	92	60	0.1	10	1.8
12-11-92	1.38	7.00	15.72	7.15	57	31	60	16	0.2	10	1.7
12-12-92	4.21	10.00	27.73	7.39	26	14	4	12	0.2	10	1.6
12-13-92	0.14	3.75	2.50	7.49	24	24	38	26	0.2	10	1.5
12-17-92	0.67	2.50	3.09	7.26	61	54	94	64	0.6	50	1.8
JANUARY											
1-5-93	0.65	2.00	5.10	7.09	52	68	66	41	0.5	30	1.5
FEBRUARY											
2-13-93	1.09	10.00	23.10	6.52	74	58	135	104	1	20	1.3
2-16-93	1.40	2.00	6.19	6.76	53	34	122	118	0.6	30	1.5
2-17-93	0.01	2.50	10.16	(A)	(A)	(A)	(A)	(A)	(A)	(A)	0.9

Appendix D Table D-1, Prison Point CSO

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)	SS EFFLUENT (mg/L)	FECAL COLIFORM (#/100ml)	CHLORINE RESIDUAL (mg/L)
MARCH											
3-17-93	0.74	5.00	15.11	6.77	83	56	169	125	1.3	20	1
3-29-93	1.44	11.50	23.10	7.10	56	47.5	98.5	73.5	0.45	30	1.16
APRIL											
4-1-93	1.33	8.00	22.43	7.24	61	61	148	129	0.4	80	1.15
4-12-93	0.83	3.00	4.42	7.10	53	53	96	100	2.5	10	1.4
4-17-93	0.85	4.00	5.79	7.28	50	50	106	73	0.4	20	1.2
4-27-93	0.40	5.00	5.42	7.18	54	43	66	59	0.2	10	1.5
TOTAL		126.00	268.87	169.11	1562.00	1917.50	3023.50	1804.50	13.35		35.91
AVERAGE		4.85	10.34	7.05	65.08	79.90	125.98	75.19	0.56	39.24	1.38
MINIMUM		1.75	1.63	6.24	24.00	14.00	4.00	12.00	0.10	10.00	0.90
MAXIMUM		11.50	27.73	7.80	153.00	276.00	520.00	146.00	2.50	80.00	1.85
No. OF ACTIVATIONS			26								

(A) No samples were collected.

Appendix D Table D-2 Prison Point CSO BOD and TSS Loadings, Fiscal Year 1993

DATE	Effluent PH (SU)	Biochemical Oxygen Demand Influent (lbs/d)	Effluent (lbs/d)	% Removal	Total Suspended Solids Influent (lbs/d)	Effluent (lbs/d)	% Removal
JULY							
7-9-92	7.8	4951	2006	59	16827	3754	78
AUGUST							
8-1-92	6.86	7106	4003	44	9107	2502	73
8-9-92	6.24	1521	1094	28	2509	1281	49
8-12-92	7.03	2917	6467	-122	7877	3793	52
8-16-92	7.04	993	4777	-381	2960	2042	31
8-18-92	6.8	3253	23394	-619	4629	2127	54
SEPTEMBER							
9-4-92	7.19	6245	6341	-2	15180	8647	43
9-26-92	7.14	8193	21333	-160	11594	11285	3
9-27-92	(A)	(A)	(A)	(A)	(A)	(A)	(A)
NOVEMBER							
11-3-92	6.74	2759	4056	-47	4525	1545	66
11-23-92	7.21	10446	8402	20	23617	21346	10
DECEMBER							
12-3-92	6.73	4130	3304	20	7598	4955	35
12-11-92	7.15	7474	4065	46	7867	2098	73
12-12-92	7.39	6013	3238	46	925	2775	-200
12-13-92	7.49	501	501	0	793	543	32
12-17-92	7.26	1571	1391	11	2421	1648	32
JANUARY							
1-5-93	7.09	2212	2892	-31	2807	1744	38
FEBRUARY							
2-13-93	6.52	14256	11174	22	26008	20036	23
2-16-93	6.76	2735	1754	36	6295	6089	3
2-17-93	(A)	(A)	(A)	(A)	(A)	(A)	(A)

Appendix D Table D-2, Prison Point CSO

DATE	Effluent PH (SU)	Biochemical Oxygen Demand Influent (lbs/d)	Effluent (lbs/d)	% Removal	Total Suspended Solids Influent (lbs/d)	Effluent (lbs/d)	% Removal
MARCH							
3-17-93	6.77	10460	7057	33	21298	15753	26
3-29-93	7.1	10789	9151	15	18976	14160	25
APRIL							
4-1-93	7.24	11412	11412	0	27688	24134	13
4-12-93	7.1	1952	1952	0	3535	3682	-4
4-17-93	7.28	2412	2412	0	5114	3522	31
4-27-93	7.18	2441	1944	20	2984	2667	11
TOTAL		**126741**	**144120**		**233135**	**162128**	
AVERAGE		**5281**	**6005**	**-14**	**9714**	**6755**	**30**
MINIMUM	**6.24**	**501**	**501**		**793**	**543**	
MAXIMUM	**7.80**	**14256**	**23394**		**27688**	**24134**	

(A) No samples collected.

Appendix D Table D-3 Prison Point CSO Facility, Priority Pollutants, NPDES Data, Fiscal Year 1993

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	GEOM. MEAN	MAX	TIMES DETECTED
Metals (ug/L)				(A)							(A)	(A)				
Antimony	**8.00**		< 5.00		**5.00**								< 5.00	4.64	8.00	2 of 3
Arsenic	**9.90**		**4.00**		**4.00**		**3.00**						**3.00**	4.67	9.90	4 of 4
Beryllium	< 1.00		< 1.00		< 1.00								< 1.00	0.50	< 1.00	0 of 3
Boron	**43.00**		**35.00**		**24.00**								**24.00**	33.06	43.00	3 of 3
Cadmium	**2.00**	**2.00**	**2.00**		**2.00**	< 1.00	**2.00**	**3.00**	**2.00**	**5.00**			< 1.00	1.99	5.00	8 of 9
Chromium	**19.00**		< 5.00		**18.00**		**8.00**						< 5.00	9.09	19.0	3 of 4
Copper	**182.00**	**99.00**	**59.00**		< 4.00	**63.00**	**42.00**	**73.00**	**77.00**	**70.00**			< 4.00	50.70	182.0	8 of 9
Lead	**182.00**	**119.00**	**75.00**		**269.00**	**34.00**	**53.00**	**96.00**	**140.00**	**14.00**			**14.00**	80.88	269.0	9 of 9
Mercury	< 0.20	**0.10**	**0.40**		**0.40**	< 0.20	**0.50**	**0.30**	< 1.00	< 0.50			< 0.20	0.24	0.50	5 of 9
Molybdenum	< 8.00		**24.00**		**13.00**		**17.00**						< 8.00	12.07	24.00	3 of 4
Nickel	< 12.00	**6.00**	< 12.00		< 12.00	< 12.00		< 15.00	< 20.00	< 20.00			< 12.00	7.01	6.00	1 of 8
Selenium	< 2.00		< 2.00		< 2.00								< 2.00	1.00	< 2.00	0 of 3
Silver	**4.00**		< 3.00		< 3.00		**5.00**						< 3.00	2.59	5.00	2 of 4
Thallium	< 2.00		< 2.00		< 2.00								< 2.00	1.00	< 2.00	0 of 3
Zinc	**358.0**	**318.0**	**186.0**		**326.0**	**165.0**	**84.0**	**214.0**	**30.0**	**230.0**			**30.0**	173.3	358.0	9 of 9
cyanide (ug/L)	< 5.00	**5.00**	< 5.00		< 5.00	< 5.00	**22.00**	**25.00**	**40.00**	**50.00**			< 5.00	8.43	50.00	5 of 9
phenol (ug/L)	**5.00**	**6.00**	< 5.00		**5.00**	< 5.00	< 5.00	**39.00**	**11.00**	**6.00**			< 5.00	5.67	39.00	6 of 9
Ammonia (mg/L)	**2.46**	**1.80**	**1.50**		**0.50**	**0.90**	**0.70**	**0.50**	**2.54**	**1.17**			**0.50**	1.13	2.54	9 of 9
Phosphorus (mg/L)	**0.69**	**1.10**	**0.80**		**0.70**	**0.90**	**0.70**	**0.70**	**1.32**	**0.92**			**0.69**	0.85	1.32	9 of 9
Surfactants (mg/L)	**0.88**		**1.10**		**0.90**	**0.70**	**1.80**		**0.74**	**0.98**			**0.70**	0.97	1.80	7 of 7
Pesticide/PCBs (ug/L)																
4,4'-DDE	< 0.20	< 0.20	< 0.20		< 0.20	< 0.20	**0.020**	< 0.20	< 0.10	< 0.10			< 0.10	0.017	0.020	1 of 9
a-BHC	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.05	**0.120**	< 0.05	< 0.05			< 0.05	0.011	0.120	1 of 9
aldrin	< 0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.05	**0.024**	< 0.05	< 0.05			< 0.05	0.009	0.024	1 of 9
b-BHC	< 0.10	< 0.10	< 0.10		< 0.10	**0.04**	< 0.05	**0.005**	< 0.05	< 0.05			< 0.05	0.009	0.037	2 of 9

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	GEOM. MIN	GEOM. MEAN	MAX	TIMES DETECTED
Pesticide/PCBs (cont)				(A)							(A)	(A)				
d-BHC	**0.03**	< 0.10	**0.07**		**0.04**	< 0.10	**0.110**	< 0.05	< 0.05	< 0.05			< 0.05	0.017	0.110	4 of 9
Dieldrin	< 0.20	< 0.20	< 0.20		**0.06**	< 0.20	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10	0.017	0.060	1 of 9
endosulfan II	< 0.20	< 0.20	< 0.20		**0.08**	< 0.20	< 0.10	**0.030**	< 0.10	< 0.10			< 0.10	0.019	0.077	2 of 9
Endrin	< 0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.10	**0.110**	< 0.10	< 0.10			< 0.10	0.019	0.110	1 of 9
heptachlor	< 0.10	< 0.10	< 0.10		< 0.10	**0.05**	< 0.05	< 0.05	< 0.05	< 0.05			< 0.05	0.009	0.046	1 of 9
Methoxychlor	< 1.00	< 1.00	< 1.00		**0.25**	< 1.00	< 0.50	**0.330**					< 0.50	0.122	0.330	2 of 7
Semi-volatile Organics (ug/L)																
1,2,4 trichlorobenzene	< 5.00	< 5.00	**1.00**		< 10.00	< 10.00	< 11.00	< 5.00	< 5.00	< 5.00			< 5.00	0.69	1.00	1 of 9
2-methylnaphthalene	< 5.00	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**2.00**	**2.00**			< 5.00	0.82	2.00	2 of 9
4-methylphenol	< 5.00	**8.00**	**2.00**		**8.00**	**2.00**	< 11.00	< 5.00	< 5.00	< 5.00			< 5.00	1.38	8.00	4 of 9
acenapthene	< 5.00	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**0.80**	**0.50**			< 5.00	0.63	0.80	2 of 9
anthracene	< 5.00	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**0.50**	**0.70**			< 5.00	0.62	0.70	2 of 9
benzo(a)anthracene	**1.00**	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**2.00**	**2.00**			< 5.00	0.88	2.00	3 of 9
benzo(a)pyrene	**1.00**	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**2.00**	**1.00**			< 5.00	0.82	2.00	3 of 9
benzo(b)fluoranthene	**2.00**	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**3.00**	**2.00**			< 5.00	1.00	3.00	3 of 9
benzo(ghi)perylene	< 5.00	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**1.00**	**0.80**			< 5.00	0.68	1.00	2 of 9
benzo(k)fluoranthene	**3.00**	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**1.00**	**1.00**			< 5.00	0.86	3.00	3 of 9
benzoic acid	**2.50**	**2.50**	**8.00**		**5.00**	**8.00**	< 11.00	< 5.00	**7.00**	**24.00**			< 5.00	3.85	24.00	7 of 9
benzyl alcohol	< 5.00	**3.00**	**4.00**		< 10.00	< 6.00	< 11.00	< 5.00	< 5.00	**2.00**			< 5.00	1.08	4.00	3 of 9
bis(2-ethylhexl)phthalate	**14.00**	**9.00**	**6.00**		**11.00**	**8.00**	**9.00**	**11.00**	**24.00**	**12.00**			6.00	10.74	24.00	9 of 9
butylbenzylphthalate	**2.00**	< 5.00	< 5.00		< 10.00	**3.00**	< 11.00	< 5.00	**2.00**	**1.00**			< 5.00	1.06	3.00	4 of 9
chrysene	**2.00**	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**3.00**	**2.00**			< 5.00	1.00	3.00	3 of 9
di-n-butylphthalate	**2.00**	< 5.00	**1.00**		< 10.00	**3.00**	< 11.00	**1.00**	**3.00**	**1.00**			< 5.00	1.29	3.00	6 of 9
di-n-octyl phthalate	**1.00**	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	**2.00**	**3.00**	**1.00**			< 5.00	1.00	3.00	4 of 9
dibenzo(a,h)anthracene	< 5.00	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	< 5.00	**0.30**			< 5.00	0.57	0.30	1 of 9
dibenzofuran	< 5.00	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	< 5.00	**0.40**			< 5.00	0.59	0.40	1 of 9
diethylphthalate	**1.00**	< 5.00	< 5.00		< 10.00	**1.00**	< 11.00	**0.50**	**2.00**	**2.00**			< 5.00	0.94	2.00	5 of 9
fluoranthene	**4.00**	**1.00**	**2.00**		< 10.00	**1.00**	**3.00**	**2.00**	**4.00**	**4.00**			< 10.00	2.09	4.00	8 of 9
fluorene	< 5.00	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**1.00**	**0.90**			< 5.00	0.69	1.00	2 of 9

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	GEOM. MIN	GEOM. MEAN	MAX	TIMES DETECTED
Semi-volatile organics (cont)				(A)							(A)	(A)				
indeno(1,2,3-cd)pyrene	< 5.00	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	< 5.00	**0.90**			< 5.00	0.64	0.90	1 of 9
naphthalene	< 5.00	**1.00**	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**2.00**	**1.00**			< 5.00	0.82	2.00	3 of 9
p-cresol	< 5.00	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**6.00**	**4.00**			< 5.00	1.00	6.00	2 of 9
p-dichlorobenzene							< 11.00	< 5.00	**1.00**	**0.50**			< 5.00	0.72	1.00	2 of 4
phenanthrene	**3.00**	**1.00**	**1.00**		< 10.00	**1.00**	**4.00**	**2.00**	**5.00**	**5.00**			< 10.00	2.04	5.00	8 of 9
phenol	< 5.00	< 5.00	< 5.00		< 10.00	< 6.00	< 11.00	< 5.00	**1.00**	**2.00**			< 5.00	0.76	2.00	2 of 9
pyrene	**3.00**	**1.00**	< 5.00		< 10.00	< 6.00	**2.00**	**2.00**	**4.00**	**3.00**			< 5.00	1.52	4.00	6 of 9

(A) No activation.

Notes:

1. No analyses were conducted where no results are indicated except for semivolatiles and pesticides.
2. Geometric mean concentrations were calculated by sustituting 1/2 the method detection limit for those pollutants that were below detection.

Appendix D Table D-4 Prison Point CSO Facility, Priority Pollutants Loadings, NPDES Data, Fiscal Year 1993

	Loadings (lbs/d)												AVERAGE
	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	LOADINGS
Metals				(A)							(A)	(A)	
Antimony	0.259		0.240		0.138								0.212
Arsenic	0.320		0.384		0.110		0.128						0.236
Beryllium	0.016		0.048		0.014								0.026
Boron	1.391		3.363		0.662								1.805
Cadmium	0.065	0.100	0.192		0.055	0.041	0.085	0.155	0.252	0.935			0.209
Chromium	0.615		0.240		0.497		0.340						0.423
Copper	5.889	4.954	5.669		0.055	5.203	1.786	3.767	9.703	13.095			5.569
Lead	5.889	5.955	7.206		7.421	2.808	2.254	4.954	17.642	2.619			6.305
Mercury	0.003	0.005	0.038		0.011	0.008	0.021	0.015	0.063	0.047			0.024
Molybdenum	0.129		2.306		0.359		0.723						0.879
Nickel	0.194	0.300	0.576		0.166	0.496		0.387	1.260	1.871			0.656
Selenium	0.032		0.096		0.028								0.052
Silver	0.129		0.144		0.041		0.213						0.132
Thallium	0.032		0.096		0.028								0.052
Zinc	11.6	15.9	17.9		9.0	13.6	3.6	11.0	3.8	43.0			14.4
cyanide	0.081	0.250	0.240		0.069	0.206	0.936	1.290	5.041	9.353			1.941
phenol	0.162	0.300	0.240		0.138	0.206	0.106	2.012	1.386	1.122			0.630
Ammonia	79.6	58.2	48.5		16.2	29.1	22.7	16.2	82.2	37.9			43.4
Phosphorus	22.3	35.6	25.9		22.7	29.1	22.7	22.7	42.7	29.8			28.2
Surfactants	28.5	0.0	35.6		29.1	22.7	58.2		23.9	31.7			28.7
Pesticide/PCBs													
4,4'-DDE	0.0006	0.0010	0.0019		0.0006	0.0017	0.0009	0.0010	0.0013	0.0019			0.0012
a-BHC	0.0003	0.0005	0.0010		0.0003	0.0008	0.0002	0.0062	0.0007	0.0009			0.0012
aldrin	0.0003	0.0005	0.0010		0.0003	0.0008	0.0002	0.0012	0.0007	0.0009			0.0007
b-BHC	0.0003	0.0003	0.0010		0.0003	0.0031	0.0002	0.0003	0.0007	0.0009			0.0008

	Loadings (lbs/d)												AVERAGE
	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	LOADINGS
Pesticide/PCBs(cont)				(A)							(A)	(A)	
d-BHC	0.0010	0.0003	0.0024		0.0012	0.0003	0.0047	0.0002	0.0002	0.0002			0.0011
Dieldrin	0.0006	0.0010	0.0019		0.0017	0.0017	0.0004	0.0005	0.0013	0.0019			0.0012
endosulfan II	0.0006	0.0006	0.0006		0.0021	0.0017	0.0004	0.0015	0.0013	0.0019			0.0012
Endrin	0.0006	0.0010	0.0019		0.0006	0.0017	0.0004	0.0057	0.0013	0.0019			0.0017
heptachlor	0.0003	0.0003	0.0003		0.0003	0.0015	0.0002	0.0003	0.0007	0.0009			0.0005
Methoxychlor	0.0032	0.0050	0.0096		0.0069	0.0083	0.0016	0.0107	0.0000	0.0000			0.0050
Semi-volatile Organics													
1,2,4 trichlorobenzene	0.016	0.025	0.096		0.028	0.083	0.091	0.041	0.063	0.094			0.060
2-methylnaphthalene	0.016	0.025	0.048		0.028	0.050	0.091	0.041	0.252	0.374			0.103
4-methylphenol	0.016	0.400	0.192		0.221	0.165	0.047	0.026	0.063	0.094			0.136
acenapthene	0.016	0.025	0.048		0.028	0.050	0.047	0.026	0.101	0.094			0.048
anthracene	0.016	0.025	0.048		0.028	0.050	0.047	0.026	0.063	0.131			0.048
benzo(a)anthracene	0.032	0.025	0.048		0.028	0.050	0.047	0.026	0.252	0.374			0.098
benzo(a)pyrene	0.032	0.025	0.048		0.028	0.050	0.047	0.026	0.252	0.187			0.077
benzo(b)fluoranthene	0.065	0.025	0.048		0.028	0.050	0.047	0.026	0.378	0.374			0.116
benzo(ghi)perylene	0.016	0.025	0.048		0.028	0.050	0.047	0.026	0.126	0.150			0.057
benzo(k)fluoranthene	0.097	0.025	0.048		0.028	0.050	0.047	0.026	0.126	0.187			0.070
benzoic acid	0.081	0.125	0.769		0.138	0.661	0.047	0.026	0.882	4.490			0.802
benzyl alcohol	0.016	0.150	0.384		0.028	0.050	0.047	0.026	0.063	0.374			0.126
bis(2-ethylhexl)phthalate	0.453	0.450	0.576		0.303	0.661	0.383	0.568	3.024	2.245			0.963
butylbenzylphthalate	0.065	0.025	0.048		0.028	0.248	0.047	0.026	0.252	0.187			0.103
chrysene	0.065	0.025	0.048		0.028	0.050	0.047	0.026	0.378	0.374			0.116
di-n-butylphthalate	0.065	0.025	0.096		0.028	0.248	0.047	0.052	0.378	0.187			0.125
di-n-octyl phthalate	0.032	0.025	0.048		0.028	0.050	0.047	0.103	0.378	0.187			0.100
dibenzo(a,h)anthracene	0.016	0.025	0.048		0.028	0.050	0.047	0.026	0.063	0.056			0.040
dibenzofuran	0.016	0.025	0.048		0.028	0.050	0.047	0.026	0.063	0.075			0.042
diethylphthalate	0.032	0.025	0.048		0.028	0.083	0.047	0.026	0.252	0.374			0.102
fluoranthene	0.129	0.050	0.192		0.028	0.083	0.128	0.103	0.504	0.748			0.218
fluorene	0.016	0.025	0.048		0.028	0.050	0.047	0.026	0.126	0.168			0.059

	Loadings (lbs/d)												AVERAGE
	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	LOADINGS
Semi-volatile organics (cont)				(A)							(A)	(A)	
indeno(1,2,3-cd)pyrene	0.016	0.025	0.048		0.028	0.050	0.047	0.026	0.063	0.168			0.052
naphthalene	0.016	0.050	0.048		0.028	0.050	0.047	0.026	0.252	0.187			0.078
p-cresol	0.016	0.025	0.048		0.028	0.050	0.047	0.026	0.756	0.748			0.194
p-dichloobenzene	0.000	0.000	0.000		0.000	0.000	0.047	0.026	0.126	0.094			0.032
phenanthrene	0.097	0.050	0.096		0.028	0.083	0.170	0.103	0.630	0.935			0.244
phenol	0.016	0.025	0.048		0.028	0.050	0.047	0.026	0.126	0.374			0.082
pyrene	0.097	0.050	0.048		0.028	0.050	0.085	0.103	0.504	0.561			0.170

(A) No activation.

Notes:

1. Loadings calculated from the NPDES data set using the total flow during the time of sampling.

Appendix D Table D-5 Prison Point CSO Facility, Priority Pollutants, Historical NPDES Data

	Geometric Mean Concentration			
	FY90	**FY91**	**FY92**	**FY93**
Metals (ug/L)				
Antimony		15.79	3.79	4.64
Arsenic		3.44	4.66	4.67
Beryllium		0.50	0.33	0.50
Boron			45.38	33.06
Cadmium	2.90	2.80	1.29	1.99
Chromium		9.66	9.65	9.09
Copper	94.25	104.51	107.21	50.70
Lead	121.08	94.58	125.75	80.88
Mercury	0.25	0.48	0.44	0.24
Molybdenum			4.70	12.07
Nickel	11.53	10.97	9.40	7.01
Selenium		1.27	1.00	1.00
Silver		3.04	4.74	2.59
Thallium		0.61	1.00	1.00
Zinc	296.71	255.69	265.23	173.34
cyanide (mg/L)			4.18	7.80
phenol (mg/L)			5.12	5.67
Ammonia (mg/L)	2.11	1.37	1.10	1.14
Phosphorus (mg/L)	1.72	1.06	0.95	0.85
MBAS (mg/L)			0.68	1.87

	Geometric Mean Concentration			
	FY90	**FY91**	**FY92**	**FY93**
Organochlorine Pesticides/PCBs (ug/L)				
Aldrin	0.04	0.03	0.01	0.01
a-BHC	0.03	0.04	0.01	0.01
b-BHC		0.47	0.02	0.01
d-BHC	0.03	0.03	0.01	0.02
Methoxychlor			0.21	0.12
Heptachlor	0.05	0.05	0.01	0.01
Endosulfan II	0.05	0.05	0.03	0.02
Semi-volatile organics (ug/L)				
1,2,4 trichlorobenzene	0.10	0.35	0.34	0.67
Benzyl alcohol			0.74	1.08
4-methylphenol			1.01	1.69
Benzoic acid			4.57	3.85
Diethylphthalate			0.71	0.94
Acenapthene	2.76	1.39	0.39	0.62
Phenanthrene	3.01	1.64	1.33	2.04
Di-n-butylphthalate			0.93	1.29
Pyrene	3.22	1.78	0.99	1.52
Butylbenzylphthalate			0.77	1.06
Benzo(a)anthracene			0.92	0.88
Chrysene			0.79	1.00
Bis(2-ethylhexl)phthalate			2.08	10.74
Di-n-octyl phthalate			0.71	1.00
Benzo(b)fluoranthene			0.92	1.00
Benzo(k)fluoranthene			0.84	0.86
Benzo(a)pyrene			0.77	0.82
Naphthalene	5.65	1.55	0.81	0.82
2-methylnaphthalene			1.22	0.82

	FY90	FY91	FY92	FY93
Semi-volatile organics (cont)				
Dibenzo(ah)anthracene	6.00	2.16	0.45	0.57
Benzo(ghi)perylene	5.56	2.16	0.51	0.49
Fluoranthene	4.61	1.68	1.17	2.09
FFluorene	2.89	2.12	0.39	0.69
Anthracene	4.21	2.61	0.56	0.62

(1) concentrations expressed as the geometric means.

Appendix E

Appendix E Table E-1 Somerville Marginal CSO Operations Summary, Fiscal Year 1993

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)	SS EFFLUENT (mg/L)	FECAL COLIFORM (#/100ml)	CHLORINE RESIDUAL (mg/L)
JULY											
7-6-92	0.23	1.50	0.64	7.00	57	50	74	80	0.3	10	4.0
7-9-92	0.47	2.33	0.60	6.91	36	25	106	52	0.2	10	3.0
7-11-92	0.18	0.33	0.37	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
7-14-92	0.20	0.67	0.45	6.88	155	291	270	124	0.4	10	4.0
7-15-92	0.40	2.00	0.77	7.81	58	25	84	46	0.2	10	4.0
7-23-92	0.37	1.55	0.77	7.41	76	75	96	123	2.0	3	4.0
7-29-92	0.05	0.55	0.28	7.63	125	59	916	232	0.5	200	
7-31-92	0.43	6.75		6.91	258	39	330	106	0.1	1400	4.0
AUGUST											
8-9-92	0.83	(B)	2.35	6.38	65	176	190	128	0.6	10	4.0
8-11-92	0.45	5.50	0.10	6.89	34	18	184	92	0.4	40	4.0
8-16-92	0.88	4.75	3.59	7.03	31	21	77	68	0.5	140	4.0
8-18-92	1.14	5.75	3.62	8.28	16	10	99	31	0.1	10	2.5
SEPTEMBER											
9-3-92	0.89	3.00	3.91	7.13	82	47	56	104	1.6	20	4.0
9-9-92	0.02	0.75	1.13	6.50	48	39	126	120	0.2	10	4.0
9-22-92	0.17	0.75	0.21	6.97	292	174	458	244	4.6	10	3.3
9-23-92	0.31	2.00	1.24	7.75	149	24	328	60	1.0	10	3.5
9-26-92	1.22	3.75	2.40	6.65	73	45	96	66	1.2	10	4.0
OCTOBER											
10-9-92	0.08	1.00	0.20	6.88	39	35	128	133	2.0	360	4.0
10-10-92	0.55	4.50	5.94	6.88	47	19	79	68	0.6	10	4.0
NOVEMBER											
11-3-92	0.72	3.50	1.22	6.81	108	129	168	82	1.4	10	4.0
11-13-92	0.31	1.50	0.41	6.52	90	92	84	19	0.4	10	3.0
11-23-92	3.31	5.25	6.64	7.06	48	31	40	22	0.1	10	3.0
11-26-92	0.43	4.50	0.80	8.07	36	33	59	39	0.2	10	4.0
DECEMBER											
12-3-92	0.90	6.50	1.66	6.97	28	29	40	22	0.1	10	4.0
12-11-92	1.38	2.13	1.78	7.02	26	46	34	46	0.6	10	4.0
12-11-92	4.21	6.39	5.34	6.92	20	254	42	60	8.0	10	4.0
12-13-92	0.14	8.00	1.63	8.01	10	24	100	18	0.2	10	4.0

Appendix E Table E-1, Somerville Marginal CSO

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)	SS EFFLUENT (mg/L)	FECAL COLIFORM (#/100ml)	CHLORINE RESIDUAL (mg/L)
12-13-92	0.02		0.17	7.80	28	32	56	10	0.2	10	4.0
12-17-92	(B)	4.00	1.45	7.10	33	27	68	54	0.6	10	3.0
12-17-92	0.67		1.48	7.80	277	27	78	68	0.2	10	4.0
JANUARY											
1-5-93	0.65	4.00	2.31	7.10	92	86	92	185	6.6	10	3.0
1-22-93	0.22	1.40	0.62	6.54	158	119	668	288	3.6	10	3.0
FEBRUARY											
2-12-93	1.01	10.00	7.13	6.61	37	19	21	18	0.1	10	3.0
2-16-93	1.40	6.00	3.68	6.53	51	35	78	85	0.2	10	3.0
MARCH											
3-17-93	0.74	14.25	4.64	7.61	168	71	262	687	1.0	10	4.0
3-28-93	0.27	2.50	8.00	7.84	37	37	55	55	1.0	10	4.0
3-29-93	1.44	24.00	(B)	7.13	35	49	96	114	1.0	100	
APRIL											
4-1-93	1.33	13.25	4.23	7.33	96	36	79	79	0.1	10	4.0
4-10-93	0.20	5.50	0.88	6.83	83	78	124	106	1.6	10	4.0
4-12-93	0.83	15.00	3.39	6.84	80	20	85	65	0.2	10	4.0
4-17-93	0.85	9.00	1.52	6.70	34	22	68	54	0.1	10	3.0
4-26-93	0.70	12.50	1.36	6.94	44	77	66	120	0.2	10	3.0
JUNE											
6-1-93	0.32	4.25	0.48	6.70	123	130	344	276	0.2	3900	3.0
6-6-93	0.41	3.75	0.43	7.41	73	67	230	310	18.8	10	4.0
6-19-93	0.56	1.00	0.41	6.59	95	73	116	180	1.0	10	3.0
TOTAL		215.60	90.22	312.67	3551.00	2815.00	6850.00	4939.00	64.2		153.3
AVERAGE		5.13	2.00	7.11	80.70	63.98	155.68	112.25	1.5	25.53	3.7
MINIMUM		0.33	0.10	6.38	10.00	10.00	21.00	10.00	0.1	3.00	2.5
MAXIMUM		24.00	8.00	8.28	292.00	291.00	916.00	687.00	18.8	3900.00	4.0
No. OF ACTIVATIONS			45								

(A) No samples collected

(B) No data.

Appendix E Table E-2 Somerville Marginal CSO BOD and TSS Loadings, Fiscal Year 1993

DATE	Effluent pH (SU)	Biochemical Oxygen Demand Influent (lbs/d)	Effluent (lbs/d)	% Removal	Total Suspended Solids Influent (lbs/d)	Effluent (lbs/d)	% Removal
JULY							
7-6-92	7.00	302	265	12	393	424	-8
7-9-92	6.91	179	124	31	526	258	51
7-11-92	(A)	(A)	(A)	(A)	(A)	(A)	(A)
7-14-92	6.88	587	1102	-88	1022	470	54
7-15-92	7.81	372	160	57	539	295	45
7-23-92	7.41	491	484	1	620	794	-28
7-29-92	7.63	288	136	53	2108	534	75
7-31-92	6.91	(B)	(B)	(B)	(B)	(B)	(B)
AUGUST							
8-9-92	6.38	1274	3449	-171	3724	2509	33
8-11-92	6.89	29	15	47	155	77	50
8-16-92	7.03	927	628	32	2303	2034	12
8-18-92	8.28	483	302	38	2987	935	69
SEPTEMBER							
9-3-92	7.13	2674	1533	43	1826	3391	-86
9-9-92	6.50	453	368	19	1190	1133	5
9-22-92	6.97	502	299	40	787	419	47
9-23-92	7.75	1542	248	84	3395	621	82
9-26-92	6.65	1464	902	38	1925	1323	31
OCTOBER							
10-9-92	6.88	66	59	10	217	225	-4
10-10-92	6.88	2327	941	60	3912	3367	14
NOVEMBER							
11-3-92	6.81	1096	1309	-19	1705	832	51
11-13-92	6.52	309	316	-2	289	65	77
11-23-92	7.06	2658	1716	35	2215	1218	45
11-26-92	8.07	241	221	8	395	261	34
DECEMBER							
12-3-92	6.97	388	402	-4	555	305	45
12-11-92	7.02	386	684	-77	505	684	-35
12-11-92	6.92	891	11312	-1170	1870	2672	-43
12-13-92	8.01	136	325	-140	1355	244	82

Appendix E Table E-2, Somerville Marginal CSO

DATE	Effluent pH (SU)	Biochemical Oxygen Demand Influent (lbs/d)	Effluent (lbs/d)	% Removal	Total Suspended Solids Influent (lbs/d)	Effluent (lbs/d)	% Removal
12-13-92	7.80	40	45	-14	79	14	82
12-17-92	7.10	400	327	18	824	654	21
12-17-92	7.80	3408	332	90	960	837	13
JANUARY							
1-5-93	7.10	1773	1658	7	1773	3566	-101
1-22-93	6.54	812	611	25	3432	1480	57
FEBRUARY							
2-12-93	6.61	2200	1130	49	1249	1070	14
2-16-93	6.53	1565	1074	31	2393	2608	-9
MARCH							
3-17-93	7.61	6501	2748	58	10139	26585	-162
3-28-93	7.84	2469	2469	0	3670	3670	0
3-29-93	7.13	(B)	(B)	(B)	(B)	(B)	(B)
APRIL							
4-1-93	7.33	3386	1270	63	2786	2786	0
4-10-93	6.83	609	572	6	910	778	15
4-12-93	6.84	2263	566	75	2405	1839	24
4-17-93	6.70	432	280	35	864	686	21
4-26-93	6.94	499	873	-75	748	1360	-82
JUNE							
6-1-93	6.70	488	516	-6	1366	1096	20
6-6-93	7.41	261	240	8	823	1109	-35
6-19-93	6.59	324	249	23	396	614	-55
TOTAL		**47493**	**42261**		**71332**	**75844**	
AVERAGE		**1131**	**1006**	11	**1698**	**1806**	-6
MINIMUM	**6.38**	**29**	**15**		**79**	**14**	
MAXIMUM	**8.28**	**6501**	**11312**		**10139**	**26585**	

(A) No samples collected.

(B) No flow data available, loadings can not be calculated, and removal rates can not be determined.

Appendix E Table E-3 Somerville Marginal CSO Facility, Priority Pollutants, NPDES Data, Fiscal Year 1993

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	GEO MEAN	MAX	TIMES DETECTED
Metals (ug/L)																
Antimony	87.00		21.00	(A)	11.00		18.00				(A)		11.00	24.52	87.00	4 of 4
Arsenic	5.00		3.00		2.00		6.00						2.00	3.66	6.00	4 of 4
Beryllium	<1.00		<1.00		<1.00								<1.00	< 1	< 1	0 of 3
Boron	19.00		5.50		27.00		32.00						5.50	17.33	32.00	4 of 4
Cadmium	1.00	0.50	<1.00		<1.00	<1.00	2.00	6.00	2.00	<5.00		<5.00	<1.00	1.25	6.00	5 of 10
Chromium	10.00		8.00		<5.00		14.00						<5.00	7.27	14.00	3 of 4
Copper	51.00	22.00	28.00		34.00	19.00	95.00	75.00	38.00	36.00		45.00	19.00	39.35	95.00	10 of 10
Lead	115.0	27.0	67.0		51.0	28.0	155.0	124.0	100.0	100.0		40.0	27.0	68.53	155.0	10 of 10
Mercury	0.40	0.10	0.40		<.20	<.20	0.70	3.80	<1.00	<.50		<.40	<.20	0.32	3.80	5 of 10
Molybdenum	<8.00		4.00		<8.00		9.00						<8.00	4.90	9.00	2 of 4
Nickel	<12.00	14.00	26.00		<12.00	12.00	17.00	17.00	<20.00	<20.00		<20.00	<12.00	11.63	26.00	5 of 10
Selenium	<2.00		<2.00		<2.00								<2.00	< 2	< 2	0 of 3
Silver	6.00		<3.00		<3.00								<3.00	2.38	6.00	1 of 3
Thallium	1.00		3.00		<2.00								<2.00	1.44	3.00	2 of 3
Zinc	182.0	129.0	123.0		118.0	93.0	271.0	392.0	240.0	180.0		178.0	93.0	174.3	392.0	10 of 10
cyanide(ug/L)	9.00	2.50	<5.00		<5.00	<5.00	22.00	21.00	20.00	20.00		20.00	2.50	8.15	22.00	7 of 10
phenols (ug/L)	5.00	5.00	<5.00		20.00	<5.00	<5.00	29.00	6.00	<6.00		<6.00	<5.00	5.11	29.00	5 of 10
Ammonia (mg/L)	1.00	0.02	0.30		0.10	0.04	0.10	0.10	0.22	0.18		<.10	<.10	0.11	1.00	9 of 10
Phosphorus (mg/L)	1.00	1.00	0.60		0.80	0.50	1.20	0.60	0.67	0.52		0.64	0.50	0.73	1.20	10 of 10
Surfactants (mg/L)	0.70	1.16	0.60		1.60	0.50	2.00		0.93	1.01		0.64	0.50	0.9	2.00	9 of 9
Pesticides/PCBs (ug/L)																
b-BHC	<.10	<.10	<.10		<.10	<.10	0.12	<.05	0.11	0.03		<.06	<.10	0.02	0.12	3 of 10
d-BHC	0.16	<.10	<.10		<.10	<.10	<.10	<.05	<.05	<.05		<.06	<.05	0.01	0.16	1 of 10
Endosulfan I	<.10	<.10	<.10		<.10	<.10	<.10	0.01	<.05	<.05		<.06	<.10	0.01	0.01	1 of 10
endrin aldehyde	<.20	<.20	<.20		<.20	<.05	<.20	<.10	<.10	0.08		0.09	<.10	1.00	0.09	2 of 10
heptachlor	<.10	<.10	<.10		0.02	<.10	0.05	<.05	0.05	<.05		<.05	<.05	0.02	0.05	2 of 10

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	MIN	MEAN	MAX	TIMES DETECTED
Semi-volatile Organics (ug/L)																
benzo(a)anthracene	< 5.00	< 5.00	< 5.00		< 50.0	< 5.00	**2.00**	< 5.00	< 5.00	< 5.00		< 10.0	< 5.00	**0.62**	**2.00**	1 of 10
benzo(a)pyrene	< 5.00	< 5.00	< 5.00		< 50.0	< 5.00	**2.00**	< 5.00	< 5.00	< 5.00		< 10.0	< 5.00	**0.62**	**2.00**	1 of 10
benzo(b)fluoranthene	< 5.00	< 5.00	< 5.00		< 50.0	< 5.00	**3.00**	< 5.00	< 5.00	**6.00**		< 10.0	< 5.00	**0.82**	**6.00**	2 of 10
benzo(ghi)perylene	< 5.00	< 5.00	< 5.00		< 50.0	< 5.00	< 11.0	< 5.00	< 5.00	**5.00**		< 10.0	< 5.00	**0.73**	**5.00**	1 of 10
benzoic acid	**8.00**	< 5.00	**5.00**		< 50.0	**4.00**	< 11.0	**11.00**	**5.00**	**18.00**		**28.00**	< 5.00	**4.06**	**28.00**	7 of 10
benzyl alcohol	< 5.00	< 5.00	< 5.00		< 50.0	< 5.00	< 11.0	< 5.00	**3.00**	**1.00**		**1.00**	< 5.00	**1.00**	**3.00**	3 of 10
bis(2-ethylhexl)phthalate	**7.00**	**10.00**	**4.00**		**12.00**	**4.00**	**23.00**	< 5.00	**40.00**	**6.00**		**7.00**	< 5.00	**1.00**	**40.00**	9 of 10
butylbenzylphthalate	**1.00**	< 5.00	< 5.00		< 50.0	< 5.00	**3.00**	< 5.00	**1.00**	**1.00**		< 10.0	< 5.00	**0.79**	**3.00**	4 of 10
chrysene	< 5.00	< 5.00	< 5.00		< 50.0	< 5.00	**4.00**	< 5.00	< 5.00	**0.80**		< 10.0	< 5.00	**0.69**	**4.00**	2 of 10
di-n-butylphthalate	**1.00**	**1.00**	< 5.00		< 50.0	< 5.00	**3.00**	**2.00**	**1.00**	**1.00**		**2.00**	< 5.00	**1.04**	**3.00**	7 of 10
di-n-octyl phthalate	< 5.00	**2.00**	< 5.00		< 50.0	**2.00**	**2.00**	**2.00**	< 5.00	**9.00**		**1.00**	< 5.00	**1.25**	**5.00**	6 of 10
dibenz(a,h)anthracene	< 5.00	**2.00**	< 5.00		< 50.0	< 5.00	< 11.0	< 5.00	< 5.00	**5.00**		< 10.0	< 5.00	**0.84**	**2.00**	2 of 10
diethylphthalate	< 5.00	< 5.00	< 5.00		< 50.0	**1.00**	< 11.0	**1.00**	**1.00**	**2.00**		< 10.0	< 5.00	**0.82**	**7.00**	4 of 10
fluoranthene	**2.00**	< 5.00	< 5.00		< 50.0	< 5.00	**7.00**	**1.00**	**0.70**	**1.00**		< 10.0	< 5.00	**0.95**	**1.00**	5 of 10
indeno(1,2,3-cd)pyrene	< 5.00	< 5.00	< 5.00		< 50.0	< 5.00	< 11.0	< 5.00	< 5.00	**1.00**		< 10.0	< 5.00	**0.62**	**0.60**	1 of 10
p-dichlorobenzene							< 11.0	< 5.00	**0.60**	< 5.00		< 10.0	< 5.00	**0.70**	**5.00**	1 of 5
phenanthrene	**1.00**	< 5.00	< 5.00		< 50.0	< 5.00	**5.00**	< 5.00	< 5.00	**1.00**		< 10.0	< 5.00	**0.77**	**5.00**	3 of 10
pyrene	**1.00**	< 5.00	< 5.00		< 50.0	< 5.00	**6.00**	< 5.00	< 5.00	< 5.00		< 10.0	< 5.00	**0.74**	**6.00**	2 of 10

(A) No activation.

Notes:

1. No analyses were conducted where no results are indicated except for semivolatiles and pesticides.
2. Geometric mean concentrations were calculated by substituting 1/2 the method detection limit for pollutants that were below detection.

Appendix E Table E-4 Somerville Marginal Facility, Priority Pollutants Loadings, NPDES Data, FY93

	Loadings (lbs/d)												AVERAGE
	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	LOADINGS
				(A)							(A)		
Metals													
Antimony	0.435		0.685		0.112		0.347						0.395
Arsenic	0.025		0.098		0.020		0.116						0.065
Beryllium	0.003		0.016		0.005								0.008
Boron	0.095		0.179		0.275		0.616						0.291
Cadmium	0.005	0.015	0.016		0.005	0.007	0.039	0.184	0.077	0.088		0.010	0.045
Chromium	0.050		0.261		0.025		0.270						0.152
Copper	0.255	0.659	0.913		0.346	0.263	1.830	2.302	1.471	1.270		0.180	0.949
Lead	0.6	0.8	2.2		0.5	0.4	3.0	3.8	3.9	3.5		0.2	1.9
Mercury	0.002	0.003	0.013		0.001	0.001	0.013	0.117	0.019	0.009		0.001	0.018
Molybdenum	0.020		0.130		0.041		0.173						0.091
Nickel	0.030	0.419	0.848		0.061	0.166	0.328	0.522	0.387	0.353		0.040	0.315
Selenium	0.005		0.033		0.010								0.016
Silver	0.030		0.049		0.015								0.031
Thallium	0.005		0.098		0.010								0.038
Zinc	0.9	3.9	4.0		1.2	1.3	5.2	12.0	9.3	6.4		0.7	4.5
cyanide	0.045	0.075	0.082		0.025	0.035	0.424	0.645	0.774	0.706		0.080	0.289
phenols	0.025	0.150	0.082		0.203	0.035	0.048	0.890	0.232	0.106		0.012	0.178
Ammonia	5.004	0.599	9.783		1.017	0.554	1.927	3.069	8.513	6.350		0.200	3.702
Phosphorus	5.004	29.941	19.566		8.140	6.922	23.118	18.415	25.927	18.345		2.562	15.794
Surfactants	3.503	34.731	19.566		16.280	6.922	38.531	0.000	35.989	35.631		2.562	19.371
Pesticides/PCBs													
b-BHC	0.0001	0.0003	0.0003		0.0001	0.0001	0.0023	0.0002	0.0043	0.0012		0.0000	0.0009
d-BHC	0.0008	0.0003	0.0003		0.0001	0.0001	0.0002	0.0002	0.0002	0.0002		0.0000	0.0002
Endosulfan I	0.0001	0.0003	0.0003		0.0001	0.0001	0.0002	0.0002	0.0002	0.0002		0.0000	0.0002
endrin aldehyde	0.0001	0.0006	0.0007		0.0002	0.0001	0.0004	0.0003	0.0004	0.0027		0.0000	0.0005
heptachlor	0.0001	0.0003	0.0003		0.0002	0.0001	0.0010	0.0002	0.0020	0.0002		0.0020	0.0006

	Loadings (lbs/d)												AVERAGE
	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	LOADINGS
Semi-volatile Organics (ug/L)				(A)							(A)		
benzo(a)anthracene	0.003	0.015	0.016		0.005	0.007	0.039	0.015	0.019	0.018		0.004	0.014
benzo(a)pyrene	0.003	0.015	0.016		0.005	0.007	0.039	0.015	0.019	0.018		0.004	0.014
benzo(b)fluoranthene	0.003	0.015	0.016		0.005	0.007	0.058	0.015	0.019	0.212		0.004	0.035
benzo(ghi)perylene	0.003	0.015	0.016		0.005	0.007	0.021	0.015	0.019	0.176		0.004	0.028
benzoic acid	0.040	0.015	0.163		0.005	0.055	0.021	0.338	0.193	0.635		0.112	0.158
benzyl alcohol	0.003	0.015	0.016		0.005	0.007	0.021	0.015	0.116	0.035		0.004	0.024
bis(2-ethylhexl)phthalate	0.035	0.299	0.130		0.122	0.055	0.443	0.015	1.548	0.212		0.028	0.289
butylbenzylphthalate	0.005	0.015	0.016		0.005	0.007	0.058	0.015	0.039	0.035		0.004	0.020
chrysene	0.003	0.015	0.016		0.005	0.007	0.077	0.015	0.019	0.028		0.004	0.019
di-n-butylphthalate	0.005	0.030	0.016		0.005	0.007	0.058	0.061	0.039	0.035		0.008	0.026
di-n-octyl phthalate	0.003	0.060	0.016		0.005	0.028	0.039	0.061	0.019	0.318		0.004	0.055
dibenz(a,h)anthracene	0.003	0.060	0.016		0.005	0.007	0.021	0.015	0.019	0.176		0.004	0.033
diethylphthalate	0.003	0.015	0.016		0.005	0.014	0.021	0.031	0.039	0.071		0.004	0.022
fluoranthene	0.010	0.015	0.016		0.005	0.007	0.135	0.031	0.027	0.035		0.004	0.029
indeno(1,2,3-cd)pyrene	0.003	0.015	0.016		0.005	0.007	0.021	0.015	0.019	0.035		0.004	0.014
p-dichlorobenzene	0.000	0.000	0.000		0.000	0.000	0.021	0.015	0.023	0.018		0.004	0.008
phenanthrene	0.005	0.015	0.016		0.005	0.007	0.096	0.015	0.019	0.035		0.004	0.022
pyrene	0.005	0.015	0.016		0.005	0.007	0.116	0.015	0.019	0.018		0.004	0.022

(A) No Activation.

Note:

1. Loadings calculated from the NPDES data set using the total flow during time of sampling event.

Appendix E Table E-5 Somerville Marginal CSO Facility, Priority Pollutants, Historical NPDES Data

	Geometric Mean Concentration			
	FY90	FY91	FY92	FY93
Metals (ug/L)				
Antimony		18.33	16.28	24.52
Arsenic		3.21	5.06	3.66
Beryllium		0.50	0.30	0.50
Boron			20.00	17.33
Cadmium	2.44	2.10	1.27	1.25
Chromium		8.20	17.23	7.27
Copper	46.96	68.83	52.50	39.35
Lead	63.98	114.78	89.81	68.53
Mercury	0.13	0.15	0.34	0.04
Molybdenum			4.70	4.90
Nickel	11.48	11.30	10.68	10.33
Selenium		1.62	1.00	1.00
Silver		2.99	1.82	2.38
Thallium		0.64	1.20	1.44
Zinc	297.57	265.63	196.98	174.30
Cyanide (mg/L)			12.79	8.15
Phenol (mg/L)			5.87	5.11
Ammonia (mg/L)	0.45	0.59	0.49	0.10
Phosphorus (mg/L)	0.95	0.90	0.86	0.72
MBAS (mg/L)			1.03	0.92

	Geometric Mean Concentration			
	FY90	**FY91**	**FY92**	**FY93**
Organochlorine Pesticides/PCBs (ug/L)				
d-BHC	0.04	0.04	0.02	0.01
b-BHC	0.06	0.06	0.05	0.02
Heptachlor	0.06	0.05	0.02	0.01
Endosulfan I			0.03	0.01
Semi-volatile organics (ug/L)				
Benzyl alcohol			1.32	0.94
Benzoic acid			4.55	7.05
Diethylphthalate			0.87	1.03
Di-n-butylphthalate			0.82	1.31
Phenanthrene	2.93	3.02	1.09	0.98
Pyrene	2.69	3.15	0.79	0.93
Butylbenzylphthalate			1.05	0.99
Benzo(a)anthracene			0.74	0.77
Chrysene			1.25	0.87
Bis(2-ethylhexl)phthalate			2.87	6.94
Di-n-octyl phthalate			1.11	1.57
Benzo(b)fluoranthene			1.09	1.03
Benzo(a)pyrene			0.77	0.77
Dibenzo(a,h)anthracene	6.03	4.13	0.40	0.92
Fluoranthene	3.02	3.10	1.10	1.20

Appendix F

Appendix F Table F-1 Constitution Beach CSO Facility Operations Summary, Fiscal Year 1993

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)	SS Effluent (mg/l)	FECAL COLIFORM (#/100 ml)	CHLORINE RESIDUAL (mg/l)
JULY											
7/9/92	0.47	2.10	0.148	7.43	18	18	176	178	0.2	10	3.0
NOVEMBER											
11/3/92	3.31	3.50	1.217	6.91	16	8	30	14	0.1	10	4.0
MARCH											
3/29/93	1.44	5.00	0.095	6.98	6	15	30	25	0.1	10	3.5
APRIL											
4/1/93	1.33	2.25	0.110	7.08	55	24	207	54	0.1	10	4.0
TOTAL		**12.85**	**1.57**		**95.00**	**65.00**	**443.00**	**271.00**	**0.50**		**14.5**
AVERAGE		**3.21**	**0.39**		**23.75**	**16.25**	**110.75**	**67.75**	**0.13**	**10.00**	**3.6**
MINIMUM		**2.10**	**0.095**	**6.91**	**6.00**	**8.00**	**30.00**	**14.00**	**0.10**	**10.00**	**3.0**
MAXIMUM		**5.00**	**1.22**	**7.43**	**55.00**	**24.00**	**207.00**	**178.00**	**0.20**	**10.00**	**4.0**
NO. of ACTIVATIONS			**4**								

Note:

*** Meters broken. Flows are estimates and are 25% of the Somerville Marginal CSO facilty flows.**

Appendix F Table F-2 Constitution Beach CSO BOD and TSS Loadings, Fiscal Year 1993

DATE	Effluent pH (SU)	Biochemical Oxygen Demand Influent (lbs/d)	Effluent (lbs/d)	% Removal	Total Suspended Solids Influent (lbs/d)	Effluent (lbs/d)	% Removal
JULY							
7/9/92	7.43	22	22	0	217	220	-1
NOVEMBER							
11/3/92	6.91	162	81	50	304	142	53
MARCH							
3/29/93	6.98	5	12	-150	24	20	17
APRIL							
4/1/93	7.08	50	22	56	190	50	74
TOTAL		**240**	**137**		**735**	**431**	
AVERAGE		**60**	**34**	**43**	**184**	**108**	**41**
MINIMUM	**6.91**	**5**	**12**		**24**	**20**	
MAXIMUM	**7.43**	**162**	**81**		**304**	**220**	

Appendix G

Appendix G Table G-1 Fox Point CSO Facility Operations Summary, Fiscal Year 1993

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)	SS Effluent (mg/L)	FECAL COLIFORM (#/100ml)	CHLORI RESIDU (MG/L
JULY											
7-9-92	0.47	1.20	0.3590	6.94	40	44	60	56	0.2	10	3
7-14-92	0.2	1.00	0.6806	6.83	54	291	114	100	0.2	10	3
AUGUST											
8-9-92	0.83	0.70	0.5655	7.86	108	65	170	122	2.0	10	4
SEPTEMBER											
9-3-92	0.89	1.00	8.0800	7.56	57	42	76	30	0.2	10	3
9-26-92	1.22	4.00	2.2810	6.77	170	44	172	184	1.2	10	4
OCTOBER											
10-10-92	0.55	2.50	1.1070	7.10	28	25	40	40	0.2	10	4
10-12-92	0.39	0.50	0.5540	7.05	88	38	108	69	0.4	10	4
NOVEMBER											
11-23-92	3.31	4.00	2.5430	6.89	53	97	104	190	5.0	10	3
DECEMBER											
12-11-92	1.38	4.50	0.9870	6.92	58	65	26	118	5.0	10	3
12-12-92	4.21	5.00	2.6320	7.66	20	54	10	10	0.2	100	3
12-13-92	0.14	2.00	1.2940	6.91	31	16	22	70	2.0	100	4
12-17-92	0.67	1.00	0.4190	7.00	69	88	214	326	58.0	130	3
JANUARY											
1-5-93	0.65	3.00	0.8750	6.87	89	69	150	101	1.8	10	4
FEBRUARY											
2-12-93	1.01	5.00	2.4600	6.59	48	61	69	79	1.0	40	3
2-16-93	1.4	4.50	3.9100	6.66	35	34	156	173	1.8	10	4
MARCH											
3-17-93	0.74	5.20	1.6680	6.90	63	67	189	247	2.0	180	(A)
3-29-93	1.44	8.30	1.8920	6.88	25	33	169.5	136.5	2.0	10	(A)

Appendix G Table G-1, Fox Point CSO

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)	SS Effluent (mg/L)	FECAL COLIFORM (#/100ml)	CHLORI RESIDU (MG/L
APRIL											
4-1-93	1.33	4.50	1.5900	6.68	85	59	91	235	1.2	10	3
4-12-93	0.83	3.25	0.7900	6.62	35	95	64	372	7.0	1	4
4-27-93	0.4	1.75	1.1400	6.84	52	51	79	117	1.0	10	3
JUNE											
6-6-93	0.41	4.00	1.0846	6.86	44	56	172	388	2.5	10	3
TOTAL		**66.90**	**36.91**		**1252**	**1394**	**2255.5**	**3163.5**	**94.9**	**701**	**65**
AVERAGE		**3.19**	**1.76**		**59.62**	**66.38**	**107.40**	**150.64**	**4.52**	**33.38**	**3.42**
MINIMUM		**0.5**	**0.359**	**6.59**	**20**	**16**	**10**	**10**	**0.2**	**1**	**3**
MAXIMUM		**8.3**	**8.08**	**7.86**	**170**	**291**	**214**	**388**	**58**	**180**	**4**
No. OF ACTIVATIONS			**21**								

Note:
(A) No data

Appendix G Table G-2 Fox Point CSO Facility BOD and TSS Loadings, Fiscal Year 1993

DATE	Effluent pH (SU)	Biochemical Oxygen Demand			Total Suspended Solids		
		Influent	Effluent	% Removal	Influent	Effluent	% Remov
JULY							
7-9-92	6.94	120	132	-10	180	168	7
7-14-92	6.83	307	1652	-439	647	568	12
AUGUST							
8-9-92	7.86	509	307	40	802	575	28
SEPTEMBER							
9-3-92	7.56	3841	2830	26	5121	2022	61
9-26-92	6.77	3234	837	74	3272	3500	-7
OCTOBER							
10-10-92	7.10	259	231	11	369	369	0
10-12-92	7.05	407	176	57	499	319	36
NOVEMBER							
11-23-92	6.89	1124	2057	-83	2206	4030	-83
DECEMBER							
12-11-92	6.92	477	535	-12	214	971	-354
12-12-92	7.66	439	1185	-170	220	220	0
12-13-92	6.91	335	173	48	237	755	-218
12-17-92	7.00	241	308	-28	748	1139	-52
JANUARY							
1-5-93	6.87	649	504	22	1095	737	33
FEBRUARY							
2-12-93	6.59	985	1252	-27	1416	1621	-14
2-16-93	6.66	1141	1109	3	5087	5641	-11
MARCH							
3-17-93	6.90	876	932	-6	2629	3436	-31
3-29-93	6.88	394	521	-32	2675	2154	19

Appendix G Table G-2, Fox Point CSO

DATE	Effluent pH (SU)	Biochemical Oxygen Demand Influent	Effluent	% Removal	Total Suspended Solids Influent	Effluent	% Remov
APRIL							
4-1-93	6.68	1127	782	31	1207	3116	-158
4-12-93	6.62	231	626	-171	422	2451	-481
4-27-93	6.84	494	485	2	751	1112	-48
JUNE							
6-6-93	6.86	398	507	-27	1556	3510	-126
TOTAL	**139.53**	**17191**	**16631**		**29795**	**34905**	
AVERAGE	**6.98**	**860**	**832**	**3.3**	**1490**	**1745**	**-17.1**
MINIMUM	**6.59**	**120**	**132**		**180**	**168**	
MAXIMUM	**7.86**	**3841**	**2830**		**5121**	**5641**	

Appendix H

Appendix H Table H-1 Commercial Point CSO Facility Operations Summary, Fiscal Year 1993

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)	SS Effluent (mg/l)	FECAL COLIFORM (#/100ml)	CHLORINE RESIDUAL (mg/l)
AUGUST											
8-9-92	0.83	2.00	2.000	8.42	45	54	112	76	1.2	10	4.0
8-16-92	0.88	2.00	(A)	8.22	13	12	19	27	0.1	10	3.0
8-18-92	1.14	5.00	3.850	7.19	145	22	56	80	0.6	10	3.0
SEPTEMBER											
9-3-92	0.89	1.50	1.570	8.17	32	32	36	28	0.2	10	4.0
9-11-92	0.48	1.00	0.260	7.00	39	41	39	33	0.2	10	1.0
9-23-92	0.31	4.50	1.250	9.20	12	12	12	18	0.2	10	3.0
9-26-92	1.22	2.10	2.100	7.20	22	14	118	74	0.1	10	4.0
OCTOBER											
10-10-92	0.55	2.25	1.910	6.70	43	24	404	55	0.2	10	4.0
10-12-92	0.39	2.25	0.430	7.46	22	19	45	70	0.2	10	4.0
NOVEMBER											
11-3-92	0.72	1.00	0.890	5.58	35	133	42	27	0.2	10	4.0
11-23-92	3.31	7.50	5.250	6.83	105	78	2058	470	4.8	20	3.0
DECEMBER											
12-3-92	0.9	6.25	0.530	7.76	46	32	20	34	0.4	10	4.0
12-11-92	1.38	1.00	2.470	6.61	46	52	70	42	2	100	4.0
12-12-92	4.21	6.25	6.850	7.06	17	19	4	18	1.6	100	3.0
12-13-92	0.14	5.50	3.680								3.0
12-17-92	0.67	1.00	0.590	7.12	39	26	128	130	1	10	3.0
12-31-92	0.26	(A)	(B)	7.22	17	21	5	14	0.2	10	4.0
JANUARY											
1-5-93	0.65	2.50	4.000	6.96	14	65	29	271	7	50	3.0
FEBRUARY											
2-12-93	1.01	5.50	9.840	6.39	98	38	95	65	0.4	10	4.0
2-16-93	1.4	5.00	9.210	6.32	35	34	157	182	2	60	3.0

Appendix H Table H-1, Commercial Point CSO

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)	SS Effluent (mg/l)	FECAL COLIFORM (#/100ml)	CHLORINE RESIDUAL (mg/l)
MARCH											
3-17-93	0.74	13.00	5.300	7.01	37	29	100	103	0.2	10	3.0
3-28-93	0.27	10.00	2.170	7.25	36	36	61	66	0.2	10	4.0
3-29-93	1.44	12.00	4.030	6.93	11	15	87	95	0.5	10	3.0
APRIL											
4-1-93	1.33	5.00	6.680	6.96	34	30	168	75.5	0.1	728	2.5
4-12-93	0.83	1.00	0.160	10.56	16	154	30	78	0.2	10	3.0
4-26-93	0.7	3.25	0.900	6.88	36	30	67	59	0.1	10	3.0
MAY											
5-19-93	0.26	1.75	0.100	7.00	32	27	16	13	0.2	10	3.0
JUNE											
6-6-93	0.41	3.00	1.220	6.49	61	51	136	162	0.3	42000	3.0
TOTAL		**113.10**	**77.24**		**1088**	**1100**	**4114.00**	**2366**	**24.40**		**92.5**
AVERAGE		**4.19**	**2.76**		**40.30**	**40.74**	**152.37**	**87.61**	**0.90**	**22.0**	**3.3**
MINIMUM		**1.00**	**0.10**	**5.58**	**11.00**	**12.00**	**4.00**	**13.00**	**0.10**	**10.0**	**1.0**
MAXIMUM		**13.00**	**9.84**	**10.56**	**145.00**	**154.00**	**2058.00**	**470.00**	**7.00**	**42000.0**	**4.0**
No. OF ACTIVATION			**28**								

Notes:
(A) No data
(B) No flow measurements available, meters broken.

Appendix H Table H-2 Commercial Point CSO Facility BOD and TSS Loadings, Fiscal Year 1993

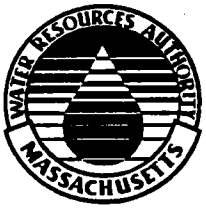
DATE	Effluent pH (SU)	Biochemical Oxygen Demand Influent (lbs/d))	Effluent (lbs/d))	% Removal	Total Suspended Solids Influent (lbs/d))	Effluent (lbs/d))	% Removal
AUGUST							
8-9-92	8.42	751	901	-20.0	1868	1268	32.1
8-16-92	8.22	(A)	(A)		(A)	(A)	
8-18-92	7.19	4656	706	84.8	1798	2569	-42.9
SEPTEMBER							
9-3-92	8.17	419	419	0.0	471	367	22.2
9-11-92	7.00	85	89	-5.1	85	72	15.4
9-23-92	9.20	125	125	0.0	125	188	-50.0
9-26-92	7.20	385	245	36.4	2067	1296	37.3
OCTOBER							
10-10-92	6.70	685	382	44.2	6435	876	86.4
10-12-92	7.46	79	68	13.6	161	251	-55.6
NOVEMBER							
11-3-92	5.58	260	987	-280.0	312	200	35.7
11-23-92	6.83	4597	3415	25.7	90110	20579	77.2
DECEMBER							
12-3-92	7.76	203	141	30.4	88	150	-70.0
12-11-92	6.61	948	1071	-13.0	1442	865	40.0
12-12-92	7.06	971	1085	-11.8	229	1028	-350.0
12-13-92							
12-17-92	7.12	192	128	33.3	630	640	-1.6
12-31-92	7.22	(A)	(A)		(A)	(A)	
JANUARY							
1-5-93	6.96	467	2168	-364.3	967	9041	-834.5
FEBRUARY							
2-12-93	6.39	8042	3118	61.2	7796	5334	31.6
2-16-93	6.32	2688	2612	2.9	12059	13980	-15.9

Appendix H Table H-2, Commercial Point CSO

DATE	Effluent pH (SU)	Biochemical Oxygen Demand Influent (lbs/d))	Effluent (lbs/d))	% Removal	Total Suspended Solids Influent (lbs/d))	Effluent (lbs/d))	% Removal
MARCH							
3-17-93	7.01	1635	1282	21.6	4420	4553	-3.0
3-28-93	7.25	652	652	0.0	1104	1194	-8.2
3-29-93	6.93	370	504	-36.4	2924	3193	-9.2
APRIL							
4-1-93	6.96	1894	1671	11.8	9359	4206	55.1
4-12-93	10.56	21	205	-862.5	40	104	-160.0
4-26-93	6.88	270	225	16.7	503	443	11.9
MAY							
5-19-93	7.00	27	23	15.6	13	11	18.8
JUNE							
6-6-93	6.49	621	519	16.4	1384	1648	-19.1
TOTAL		**31043**	**22744**		**146392**	**74055**	
AVERAGE		**1242**	**910**	**-47.1**	**5856**	**2962**	**-46.3**
MINIMUM	**5.58**	**21**	**23**		**13**	**11**	
MAXIMUM	**10.56**	**8042**	**3415**		**90110**	**20579**	

Notes:

(A) No flow data available, loadings can not be calculated and removal rates can not be determined.



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