NPDES compliance summary report, fiscal year 2001

Massachusetts Water Resources Authority

Environmental Quality Department
Report ENQUAD 2001-08

NPDES COMPLIANCE SUMMARY REPORT
Fiscal Year 2001

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Executive Summary

Overview

This report presents and summarizes monitoring and compliance data collected and analyzed by the Massachusetts Water Resources Authority's (MWRA) Environmental Quality Department (ENQUAD) from July 1, 2000 to June 30, 2001. The Fiscal Year Summary Report, while not a regulatory requirement, provides a useful documentation of influent and effluent quality trends over the course of a fiscal year for the MWRA's Deer Island Treatment Plant (DITP) and Combined Sewer Overflow (CSO) facilities.

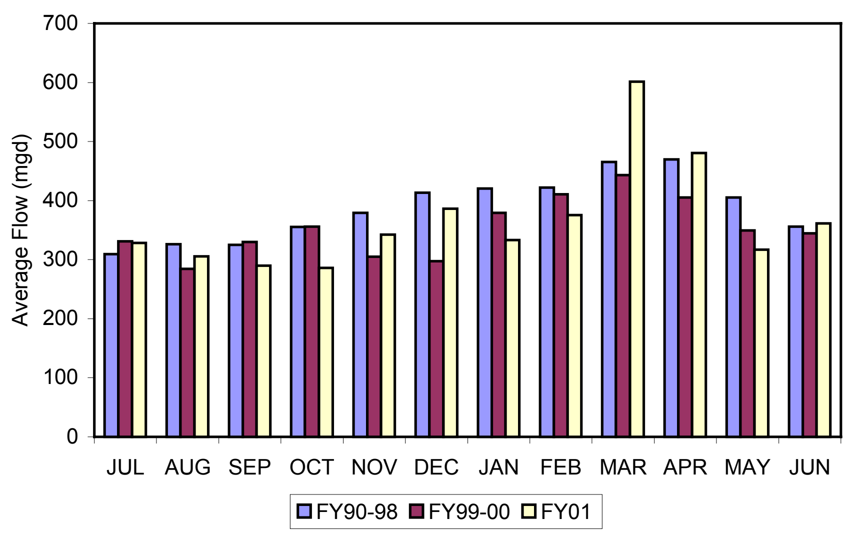
Deer Island Treatment Plant

The MWRA's NPDES permit requires the Authority to monitor its wastewater treatment plant at Deer Island for specific parameters. The MWRA currently operates under a new permit effective August 2000. The new permit calls for secondary treatment of wastewater and monitoring of the effects of the new outfall in the Massachusetts Bay. Secondary treatment began at DITP in August 1997 with the start-up of the first battery of secondary treatment (Battery A). In March 1998, Battery B was brought on-line. The final battery, Battery C, recently became operational in March 2001.

In addition to the completion of Battery C, the MWRA opened in FY01 a new 9.5-mile outfall tunnel that carries treated wastewater from DITP to Massachusetts Bay. The new outfall began operation on September 6, 2000. The new permit requires extensive monitoring of Massachusetts Bay to determine the effects of the outfall, if any exist.

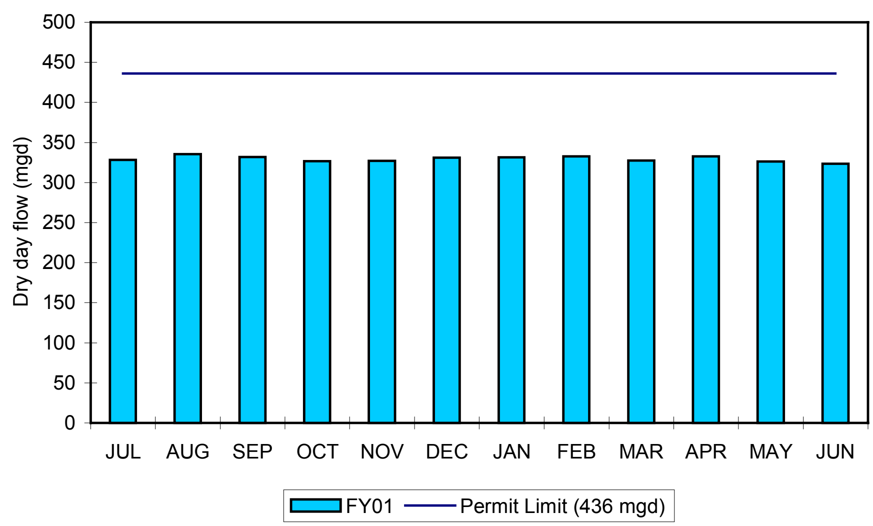
Figure 1 shows the Deer Island flow during each month of FY01, comparing the flow with the monthly averages of the previous nine years. The FY99-FY00 and FY01 data show total flows treated at Deer Island, while the FY90-FY98 data shows the combined flows from DITP and the former Nut Island Treatment Plant, now the headworks for South System influent to DITP.

Figure 1 Deer Island Flows



Restrictions on dry day flow are a part of the new NPDES permit. These restrictions act to control new connections, ensuring that the collection system and the new treatment plant retain adequate capacity. Monthly dry day flows are calculated by averaging the flows on dry days over the previous year. A dry day is defined as a day with 0.09 inches of precipitation or less and no snow melt with the following restrictions: the precipitation on the previous day is less than 0.3 inches, the precipitation two days prior is less than 1.0 inch, and the precipitation three days prior is less than 2.0 inches. A day with snowmelt is defined as a day when there is snow on the ground and the air temperature is above 32°F. Figure 2 shows the dry day flow for Deer Island during each month of FY01. The solid line represents the dry day flow limit of 436 mgd for the new NPDES permit. In FY01, no violations of the dry day flow limit occurred.

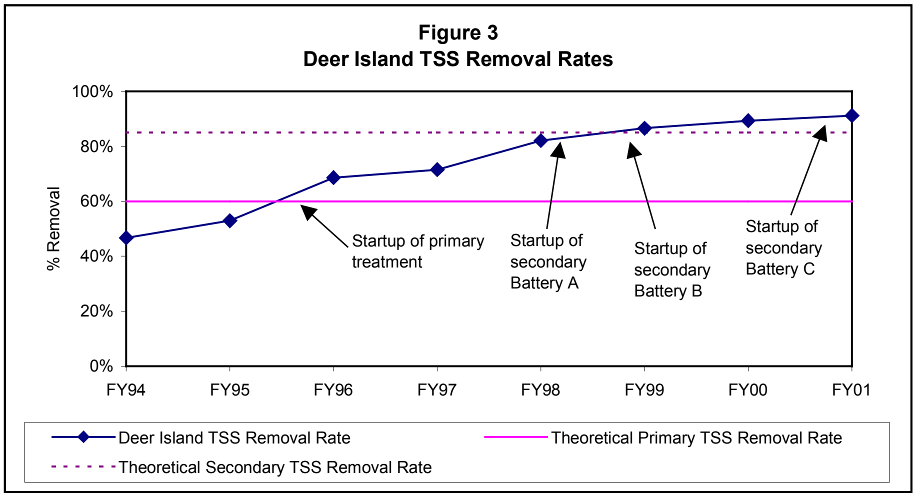
Figure 2
Deer Island Dry Day Flows

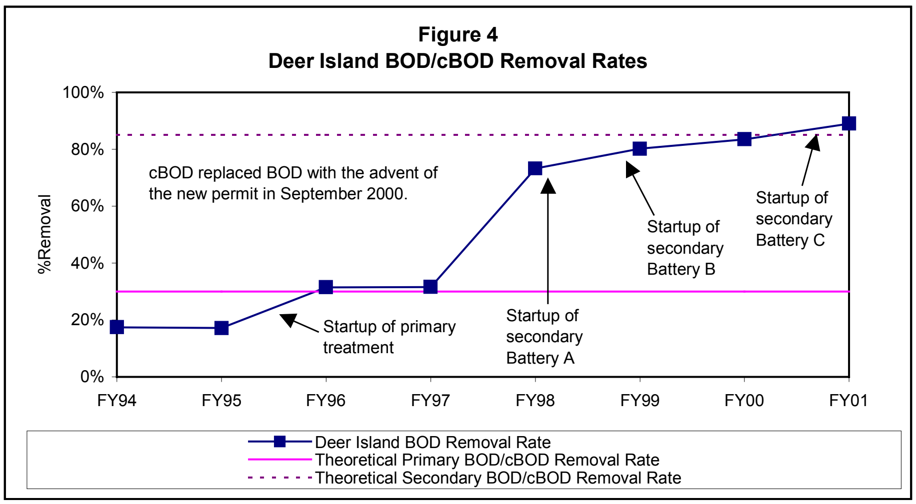


Since the new primary treatment plant came on-line on January 21, 1995, appreciable improvements have been seen in effluent quality. The removal rates for both TSS and BOD/cBOD (cBOD has replaced BOD in the new permit as the measure of oxygen demand) have improved significantly (see Figures 3 and 4, respectively on the following page). In FY96 and FY97, removal efficiencies compared favorably to theoretical removal efficiencies for primary treatment. In FY98, efficiencies continued to improve, especially for BOD, with a removal rate well above the theoretical range.[1] This coincided with the start-up of Batteries A and B of secondary treatment. Since FY99, the removal efficiencies for both BOD and TSS have continued to increase. The TSS removal rate approached 90% and the BOD rate exceeded 80%. These

[1] Metcalf & Eddy, Inc. 1972. *Wastewater Engineering: Collection, Treatment, Disposal*. New York: McGraw-Hill Book Company. p. 446.

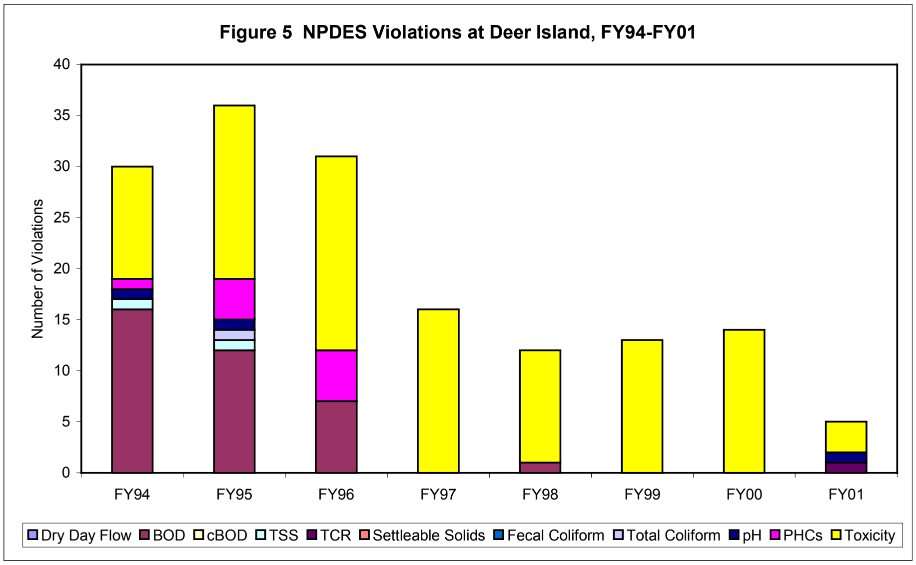
trends continued in FY01, as TSS removal rates exceeded the theoretical removed for secondary treatment.





Annual numbers of NPDES violations have decreased dramatically due to improved treatment at DITP. Figure 5 (next page) compares the number of NPDES permit violations at Deer Island in FY01 to previous years. No non-toxicity NPDES violations occurred in FY00, FY99, or FY97. One non-toxicity violation occurred in FY98 and 4 in FY01, compared to 12 in FY96 and 19 in both FY95 and FY94.

Figure 5 does not include pH violations during FY00. On 164 occasions, the pH fell below the minimum regulatory limit of 6.5 under the old NPDES permit. However, these violations resulted from the use of approved treatment technologies. The secondary treatment system uses pure oxygen to promote bacterial growth. Carbon dioxide resulting from bacterial respiration dissolves into the effluent, lowering the pH. The new NPDES permit accounts for the expected lowered pH by expanding the pH limits to 6.0-9.0. In FY01, only one pH violation occurred under the new permit. Details of the specific violations can be found in Part II.B.

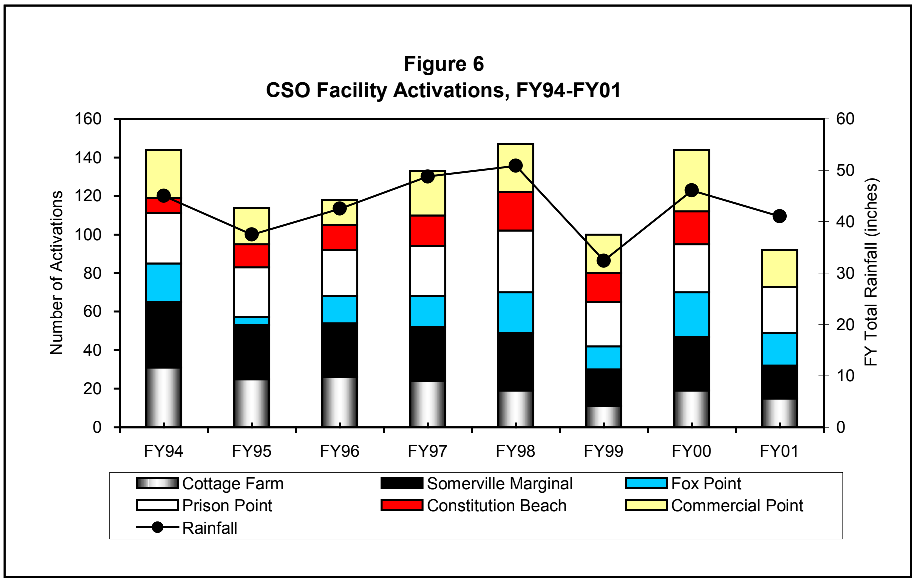


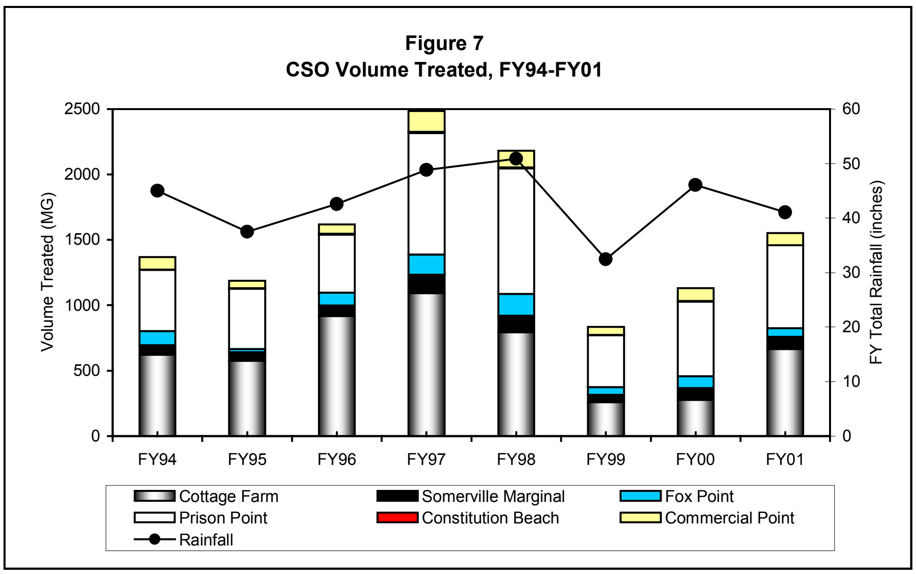
Since the opening of the new plant, Deer Island has seen significant improvements in effluent metals loadings. These improvements are probably due to two sources: first, corrosion control activities and source reduction programs may have helped to lower metals in the incoming influent. Second, the new plant may be able to better capture metals in the treatment process. Given the added dilution provided by Massachusetts Bay with the new outfall, none of the metals exceeded the EPA's water quality standards.

Combined Sewer Overflow Facilities

MWRA monitors five Combined Sewer Overflow (CSO) facilities – Cottage Farm, Prison Point, Somerville Marginal, Fox Point, and Commercial Point – under the new NPDES permit. The Constitution Beach facility is also included under the new permit. However, MWRA decommissioned and stopped monitoring the Constitution Beach facility in September 2000 following the completion of a sewer separation project in East Boston.

Figures 6 and 7 on the next page show the number of activations and the total volume treated, respectively, at the six CSO facilities since FY94. The correlation between rainfall and CSO activation can be seen in both figures. Note that although total rainfall is correlated to CSO activation, the intensity of the rainfall and frequency of storms will have an important effect. These storm characteristics influence the degree of ground saturation, affecting the volume treated at the CSO facilities during a storm.



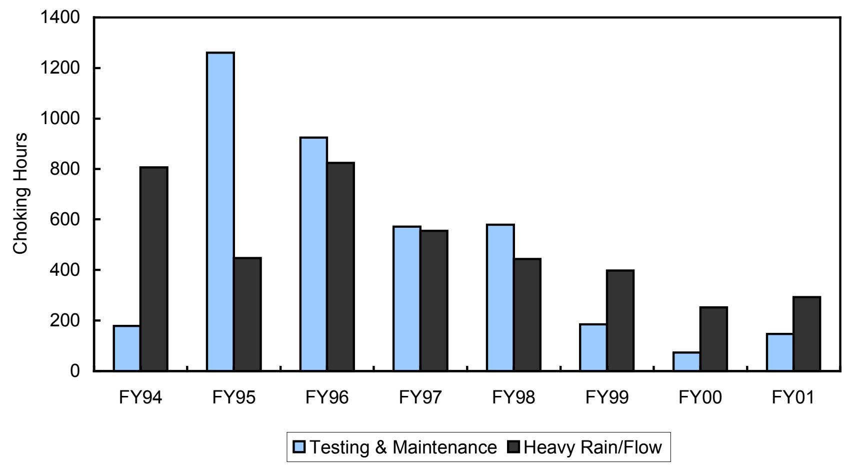


Collection and Transport System

The MWRA monitors the capacity of the wastewater collection and transport system. One of the system capacity parameters in the North System is choking, which occurs at the remote headworks. Choking is a reduction or stopping of flow to Deer Island by the remote headworks, either when heavy flow exceeds the capacity of the treatment plant or when maintenance or construction is performed at the plant.

As Figure 8 on the following page shows, the number of hours of choking increased slightly in FY01 relative to FY00 mostly due to an increase in functional testing associated with the construction of the third battery of secondary treatment and the opening of the outfall tunnel. MWRA performs maintenance- and testing-related choking at off-peak times so not to cause any backups in the system upstream.

Figure 8
Headworks Choking, FY94-FY01



The MWRA also monitors the occurrence of Sanitary Sewer Overflows, or SSOs associated with MWRA-owned sewage lines. These overflows occur in areas where the collection system becomes overloaded by heavy flows. In FY95, the MWRA's Transport Department started to locate and visually monitor these SSOs in the North and South Systems. Table 1 on the next page summarizes the SSOs observed by MWRA personnel in FY01.

Table 1 Sanitary Sewer Overflows, FY01

Location	Number of Overflows
North System	1
Section 80 Arlington (Dudley Street)	1
Section 80 Arlington (Brattle Court)	1
Section 91B Arlington (Headhouse)	1
Section 91B Arlington (Manholes)	1
Section B Cambridge	2
Section 43/B Cambridge (Alewife Brook Pump Station)	1
Section 41 Malden	1
Section 95 Malden	2
Section C Medford	1
Section 91B Medford (Headholes)	2
Section 107 Medford	1
Section 51 Melrose	1
Section 204 Wakefield (Hayes Pump Station)	1
Section 212 Waltham (old 4A)	1
Section 47 Winchester	2
Section 113 Winchester	1
Section 114 Winchester	
South System	
Section 570 Boston (Archdale Street)	2
Section 571 Boston (Arboretum)	1
Section 628 Braintree (Pearl Street)	2
Section 626 Braintree/Weymouth (Smelt Brook)	3
Section 561 Milton	1
Section 530 Newton	1
Section 655 Randolph (Headhouse)	2

Future Outlook

The startup of the new primary treatment plant at Deer Island in FY95 was just the first of several changes and improvements in the MWRA's facilities. In August 1997, DITP introduced the first of three batteries of secondary treatment. At the end of FY01 (June 2001), all three batteries of secondary treatment are fully operational. On July 8, 1998, the MWRA decommissioned the Nut Island Treatment Plant and opened the Inter-Island Tunnel to transport South System flows to DITP. The new outfall tunnel discharging into Massachusetts Bay opened in September 2000. The MWRA no longer discharges effluent into Boston Harbor and the Authority is currently monitoring the effects of these changes on water quality in the Harbor and Massachusetts Bay.

The new NPDES permit issued in September 2000 regulates effluent discharges from the new outfall tunnel. This comprehensive permit, the first of its kind, includes several new concepts. In addition to the usual effluent monitoring, an ambient monitoring plan has been put into place for the new outfall site, as well as a contingency plan to ensure that the discharge does not adversely impact Massachusetts Bay. Other requirements include water conservation measures, pollution prevention plans, and best management practices to stop pollution before it reaches the treatment facility. A stepped-up industrial waste program helps industry meet local limits for pollutants. Intensified sampling at CSO facilities better characterizes the quality of CSO effluent. As MWRA completes its new facilities, the next challenge will be to effectively implement these new programs and provide the Authority-wide coordination needed to meet these new NPDES reporting requirements.

I: Introduction

Overview

This report presents and summarizes the National Pollutant Discharge Elimination System (NPDES) monitoring and compliance data compiled and analyzed by the Massachusetts Water Resources Authority (MWRA) Environmental Quality Department during the period of July 2000 to June 2001. MWRA's Deer Island Treatment Plant (DITP) and Combined Sewer Overflow (CSO) facilities serve large communities' needs for sewer systems while maintaining healthy water environments for recreation and wildlife.

The monitoring results for DITP are presented and discussed in Chapter II, along with the new Contingency Plan and Ambient Monitoring Plan requirements. Chapter III describes the results for the five CSO facilities. Chapter IV discusses sludge processing operations at DITP and the MWRA's Fore River pelletizing facility. Chapter V discusses transport and sewer system capacity issues. Finally, Chapter VI discusses an array of miscellaneous topics introduced by the new permit. Appendices A-F provide detailed monthly data for the Deer Island plants and for the five CSO facilities. Appendix G provides background information about MWRA's regulatory requirements, and Appendix H describes the MWRA sewer system and facilities. Appendix I defines the types of detection limits encountered in chemical analyses. Appendix J lists pollutants of concern. Finally, Appendix K is a glossary of the terms and phrases used throughout this report.

II: Deer Island Treatment Plant

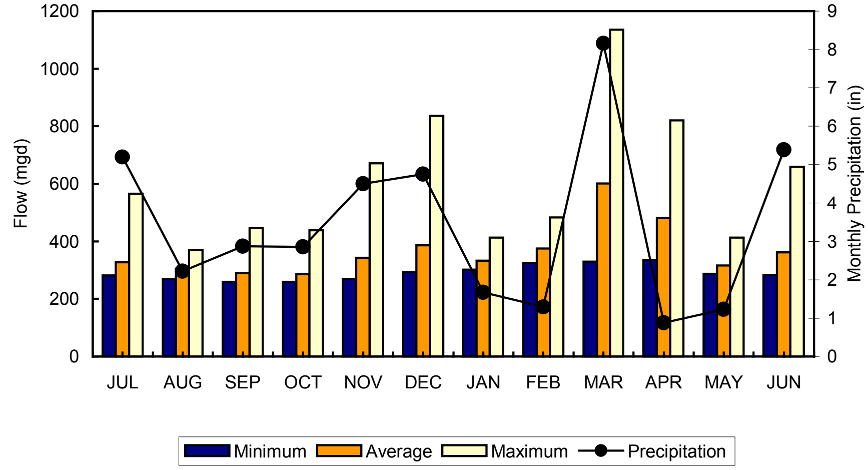
Overview

This chapter presents and discusses monitoring information for the Deer Island Treatment Plant (DITP). The characteristics examined include flow, conventional parameters, nutrients, priority pollutants (metals, cyanide, pesticides/PCBs, and organic compounds), fecal coliform bacteria, and whole effluent toxicity. Since a number of limits in the Contingency Plan set forth by the new National Pollutant Discharge Elimination System (NPDES) permit deal with effluent quality, this section finishes up with a description of the Contingency Plan and the closely related Ambient Monitoring Plan.

II.A.1
Influent Flow

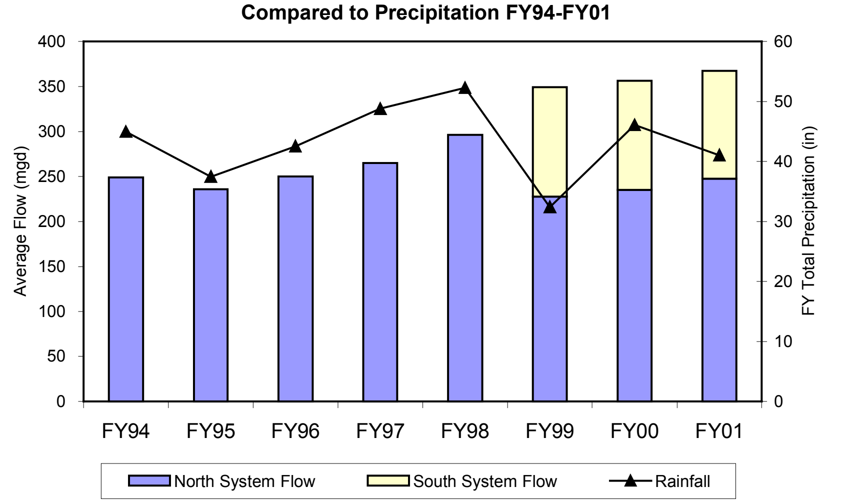
The average flow to DITP in FY01 was 367.3 million gallons per day (mgd). Figure II.A.1 shows that precipitation influences the amount of flow to the plant. This occurs because several of the larger communities in the North System (Boston, Cambridge, Somerville, and Chelsea) have combined sewers.

Figure II.A.1
Deer Island Flow Compared to Precipitation, FY01



The impact of rainfall on flows can also be seen in Figure II.A.2, which tracks average flow and precipitation over the past 8 fiscal years. The completion of the Inter-Island Tunnel from Nut Island to Deer Island in early FY99 resulted in increased flow to DITP, as DITP treated South System sewage previously treated at the Nut Island Treatment Plant. Despite the decreased rainfall in FY01 (41.02 versus 46.08 inches in FY00), average flows to DITP remained similar to flows in FY00 (356 mgd in FY00 versus 367 in FY01).

Figure II.A.2
Deer Island Average Flow
Compared to Precipitation FY94-FY01



II.A.2 Influent Conventional Parameters and Nutrients

As Table II.A.1 indicates, Deer Island influent in FY01 can be classified as weak/medium.[1] A summary of Deer Island influent characteristics from FY94-FY01 is provided in Table II.A.2. Note that cBOD only became a measured parameter with the debut of the new NPDES permit, so no historical data is available.

Table II.A.1 Classification of Deer Island Influent (mg/L), FY01

Parameter	Value	Weak	Medium	Strong
TSS	176	100	200	350
TKN	30	20	40	85
Ammonia	18	12	25	50

Table II.A.2 Deer Island Influent Characterization, FY94-FY01

PARAMETER	FY94*	FY95*	FY96*	FY97*	FY98*	FY99	FY00	**FY01**
Flow (mgd)								
Minimum	171	167	147	167	159	233	219	**260**
Average	249	236	250	265	296	350	356	**367**
Maximum	528	565	526	649	917	824	901	**1136**
Total Suspended Solids (TSS)								
Min Conc (mg/L)	93	102	56	50	32	43	86	**63**
Avg Conc (mg/L)	137	138	140	144	141	160	167	**176**
Max Conc (mg/L)	175	160	432	284	382	564	379	**336**
Average Loading (tons/d)	142	136	146	159	175	234	248	**269**
Carbonaceous Biochemical Oxygen Demand (cBOD)								
Min Conc (mg/L)	SAMPLES NOT COLLECTED							**29**
Avg Conc (mg/L)								**111**
Max Conc (mg/L)								**242**
Average Loading (tons/d)								**170**
Settleable Solids								
Min Conc (mL/L)	1.9	3.5	0.1	1.5	0.1	0.1	0.7	**0.3**
Avg Conc (mL/L)	3.9	5.6	7.0	6.9	6.3	5.9	5.3	**5.8**
Max Conc (mL/L)	5.6	7.3	18.0	17.0	20.0	34.2	24.6	**15.5**
Average Loading (tons/d)	4.0	5.5	7.3	7.7	7.8	8.6	7.9	**8.9**
Total Kjeldahl Nitrogen								
Min Conc (mg/L)	11.2	14.0	11.6	8.7	13.6	14.6	13.2	**16.3**
Avg Conc (mg/L)	21.9	21.9	26.3	24.2	26.4	29.2	27.7	**30.1**
Max Conc (mg/L)	29.3	29.1	56.3	48.1	37.7	45.6	46.5	**46.5**
Average Loading (tons/d)	22.7	21.5	27.4	26.8	32.6	42.7	41.1	**46.1**
Ammonia-Nitrogen								
Min Conc (mg/L)	5.6	7.3	6.8	2.5	4.8	6.0	6.1	**6.8**
Avg Conc (mg/L)	12.3	13.7	15.0	13.3	14.5	16.6	16.3	**17.8**
Max Conc (mg/L)	17.9	18.0	24.0	18.6	23.1	30.8	25.0	**24.2**
Average Loading (tons/d)	12.8	13.5	15.6	14.6	17.8	24.2	24.2	**27.2**
Nitrates								
Min Conc (mg/L)	0.10	0.02	0.01	0.01	0.01	0.01	0.00	**0.00**
Avg Conc (mg/L)	0.80	0.15	0.14	0.22	0.36	0.06	0.13	**0.17**
Max Conc (mg/L)	2.70	0.59	1.42	2.31	1.95	1.21	1.56	**1.53**
Average Loading (tons/d)	0.83	0.15	0.15	0.24	0.44	0.09	0.19	**0.26**
Nitrites								
Min Conc (mg/L)	0.00	0.02	0.01	0.01	0.01	0.01	0.01	**0.00**
Avg Conc (mg/L)	0.10	0.06	0.07	0.09	0.08	0.05	0.14	**0.15**
Max Conc (mg/L)	0.20	0.19	1.66	0.35	0.46	0.45	0.72	**0.47**
Average Loading (tons/d)	0.10	0.06	0.07	0.10	0.10	0.07	0.21	**0.23**

* DITP and the North System only; the transfer of South System flows to DITP occurred at the start of FY99.

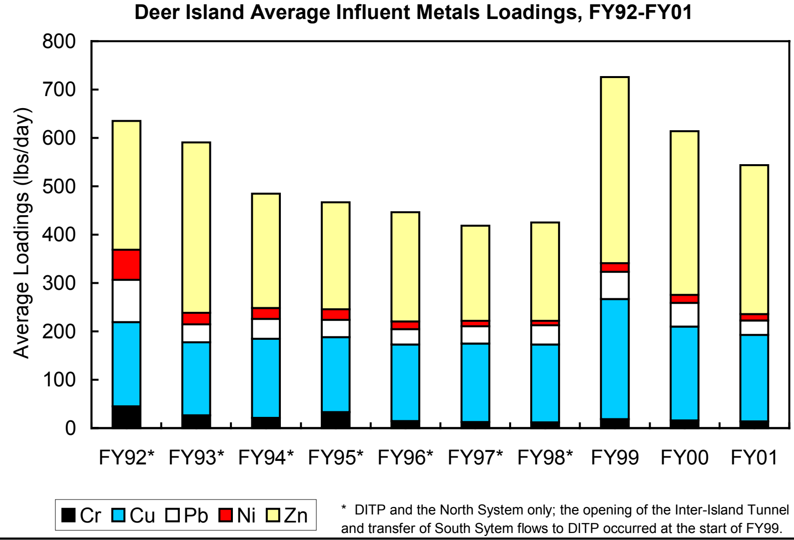
[1]Metcalf & Eddy, Inc. 1972. *Wastewater Engineering: Collection, Treatment, Disposal*. New York: McGraw-Hill Book Company, p. 231.

II.A.3 Influent Priority Pollutants

The results of a complete priority pollutant scan of Deer Island influent can be found in Table A-2 (concentrations) and Table A-3 (loadings) of Appendix A. For levels below detection limits, one half of the method detection limit for inorganics or one tenth of the quantitation limit for organics was substituted. Appendix I provides a detailed discussion of detection and quantitation limits.

Figure II.A.3 compares FY01 average influent loadings for several key metals to historical values. The MWRA samples for these pollutants a few times a month. Before 1999, metals loadings in the North System decreased steadily, as MWRA made strides in toxic and corrosion control efforts involving both water supply and wastewater transport. Using the measured concentration and the flow on the day on which the sample was taken, daily loads can be calculated. Since the South System flow was transferred from Nut Island to Deer Island at the start of FY99, the data since includes the South System flow. This larger, combined flow explains the increase in loadings of metals from FY92-98 to FY99-01. However, since FY99, influent loadings have decreased significantly despite the larger flows.

Figure II.A.3
Deer Island Average Influent Metals Loadings, FY92-FY01

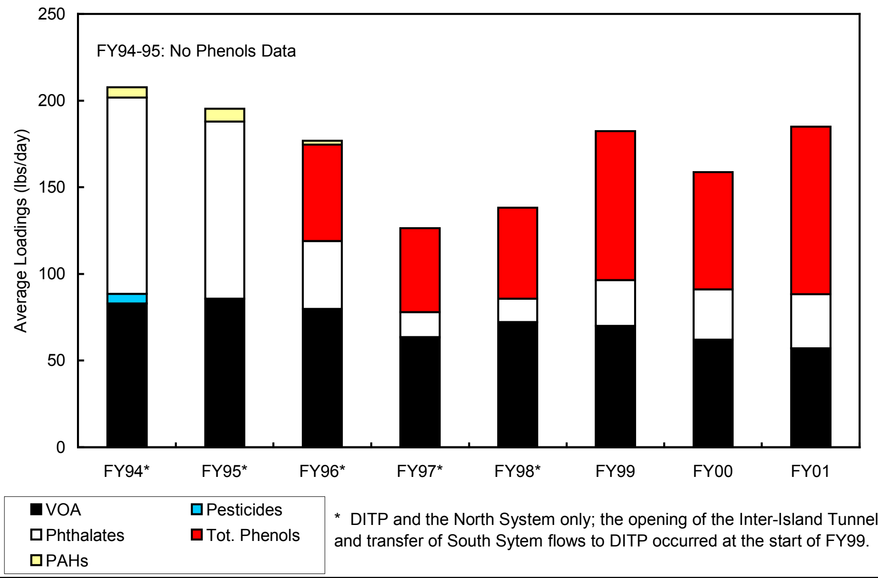


* DITP and the North System only; the opening of the Inter-Island Tunnel and transfer of South Sytem flows to DITP occurred at the start of FY99.

Figure II.A.4 (following page) compares influent loadings of certain representative organic priority pollutants to the loadings in previous years (see Appendix A, Table A-3). The opening of the Inter-Island Tunnel in FY99 had an identical effect on organics loadings as it did on metals loadings; they increased greatly due to the added flow from the South System.

Figure II.A.4 shows the annual average of the daily loads; however, it does not reflect how often the pollutant was detected during the year. A pollutant is included whether it was detected just once or 37 times over the course of a year. Moreover, the average loading of a pollutant may be artificially high, since when the pollutant is not detected, one tenth of the reporting limit is listed (see Appendix I). Therefore, when this concentration is converted to a loading, it is recorded as a non-zero value, even though the constituent may not have been present in the sample. Note that these caveats also apply to the metals loadings, although since metals are commonly detected in almost every sample, the notes raised above are less of an issue. Since the South System transfer in FY99, the values have held relatively steady.

Figure II.A.4
Deer Island Average Influent Organics Loadings, FY94-FY01



II.A.4 Effluent Conventional Parameters and Nutrients

Table II.A.3 compares DITP's removal efficiencies for TSS and cBOD with theoretical removal efficiencies.[2] The removal efficiencies are determined from the average effluent and influent concentrations for TSS and cBOD as reported in Table A-1 of Appendix A.

Table II.A.3 Deer Island Removal Efficiency, FY01

Parameter	DITP Removal Efficiency*	Theoretical Removal Efficiency	
		Primary Treatment	Secondary Treatment
TSS	91%	50-65%	85%
cBOD	89%	25-40%	85%

* Removal efficiencies were determined using the average influent and effluent concentration values as reported in Table A-1, Appendix A. Note that only a portion of the total flow each month went through secondary treatment. See Table II.A.4 for more information.

Table II.A.4, on the next page, shows how degree of secondary treatment can affect TSS and cBOD removal efficiencies. The table lists TSS and cBOD removal efficiencies and the percentage of flow that received secondary treatment on a monthly basis. The degree of secondary treatment is the average

[2]Metcalf & Eddy, Inc. 1972. *Wastewater Engineering Collection, Treatment, Disposal*. New York. McGraw-Hill Book Company, p. 446.

flow through secondary treatment (mgd) during the month divided by the average plant flow (mgd) for that month.

For the year, almost 88% of DITP flow went through secondary treatment and removal efficiencies for TSS were greater than 90%. For cBOD, the plant achieved 89% removal efficiency. Heavy rains and consequent high flows in March account for the low levels treated to secondary standards for that month. Note the drop in removal efficiencies for March as a result.

Table II.A.4

Removal Efficiencies vs. Degree of Secondary Treatment, FY01

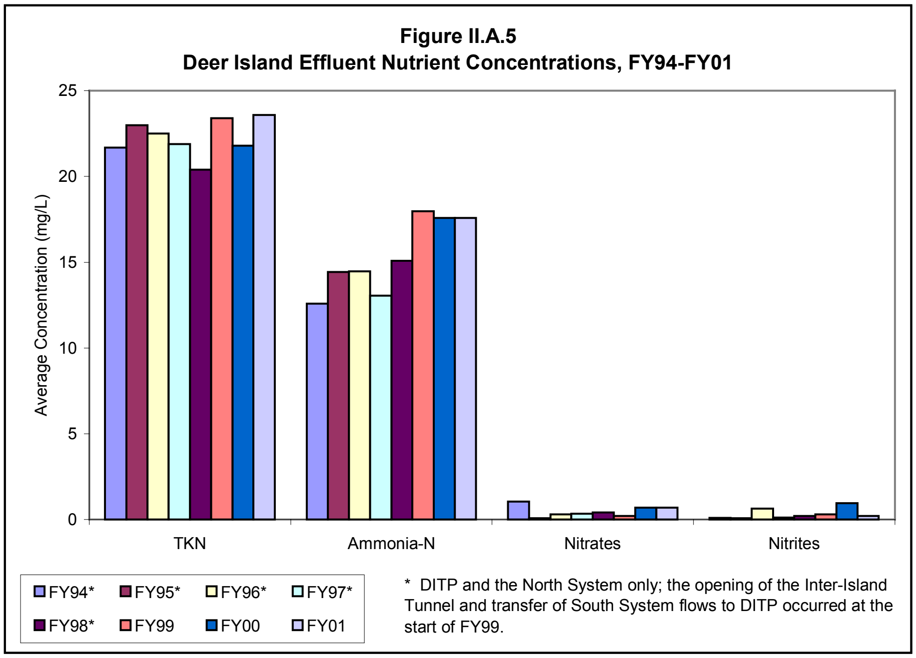
	TSS Removal Efficiency	cBOD Removal Efficiency	% of Flow Treated at Secondary Levels
July	93%	88%	89%
August	91%	90%	93%
September	90%	89%	92%
October	94%	94%	93%
November	92%	91%	86%
December	90%	85%	80%
January	90%	87%	91%
February	87%	84%	85%
March	85%	83%	66%
April	92%	91%	90%
May	95%	94%	100%
June	92%	89%	88%
Average	91%	89%	88%

Table II.A.5 (next page) summarizes the conventional parameters and nutrients in Deer Island effluent over the past eight years. The significant drop in several parameters that occurred between FY95 and FY96 is due to the improved removal efficiency of the primary treatment plant. The implementation of secondary treatment in FY98 can explain the drop in TSS and BOD concentrations since FY97. Secondary treatment is also responsible for the increase in ammonia concentrations over the same period.

Table II.A.5 Deer Island Effluent Characterization, FY94-FY01								
PARAMETER	FY94*	FY95*	FY96*	FY97*	FY98*	FY99	FY00	**FY01**
Flow (mgd)								
Minimum	171	167	147	167	159	237	219	**260**
Average	249	236	250	265	296	350	356	**367**
Maximum	528	565	526	649	917	757	900	**1136**
Total Suspended Solids (TSS)								
Min Conc (mg/L)	65	52	17	16	4	3	5	**4**
Avg Conc (mg/L)	73	65	44	41	25	22	18	**15**
Max Conc (mg/L)	86	90	136	100	140	69	62	**47**
Average Loading (tons/d)	76	64	46	46	31	31	26	**24**
Carbonaceous Biochemical Oxygen Demand (cBOD)								
Min Conc (mg/L)	NO SAMPLES COLLECTED							**4**
Avg Conc (mg/L)								**12**
Max Conc (mg/L)								**36**
Average Loading (tons/d)								**19**
Settleable Solids								
Min Conc (mL/L)	0.1	0.1	0.1	0.1	0.1	0.1	0.0	**0.1**
Avg Conc (mL/L)	0.5	0.4	0.2	0.2	0.2	0.2	0.1	**0.1**
Max Conc (mL/L)	0.9	0.7	2.0	1.6	7.0	3.0	3.1	**1.9**
Average Loading (tons/d)	0.5	0.4	0.2	0.2	0.2	0.3	0.1	**0.2**
Total Kjeldahl Nitrogen								
Min Conc (mg/L)	12.8	13.7	10.6	10.9	9.1	11.2	8.2	**12.2**
Avg Conc (mg/L)	21.7	23.0	22.5	21.9	20.4	23.4	21.8	**23.6**
Max Conc (mg/L)	32.8	28.6	32.5	27.6	32.4	34.3	32.4	**33.3**
Average Loading (tons/d)	22.5	22.6	23.4	24.3	25.2	34.2	32.4	**36.1**
Ammonia-Nitrogen								
Min Conc (mg/L)	6.08	7.28	5.55	4.43	3.48	5.42	5.00	**5.1**
Avg Conc (mg/L)	12.58	14.43	14.48	13.07	15.08	17.99	17.60	**17.6**
Max Conc (mg/L)	18.51	19.60	21.90	18.00	22.70	26.40	25.20	**24.9**
Average Loading (tons/d)	13.06	14.20	15.10	14.45	18.63	26.23	26.16	**27.0**
Nitrates								
Min Conc (mg/L)	0.13	0.03	0.01	0.01	0.01	0.01	0.00	**0.0**
Avg Conc (mg/L)	1.04	0.08	0.30	0.34	0.42	0.22	0.69	**0.7**
Max Conc (mg/L)	5.98	0.28	1.95	2.58	1.49	1.93	2.96	**4.2**
Average Loading (tons/d)	1.08	0.08	0.31	0.37	0.52	0.32	1.03	**1.1**
Nitrites								
Min Conc (mg/L)	0.01	0.02	0.01	0.01	0.01	0.01	0.04	**0.0**
Avg Conc (mg/L)	0.10	0.08	0.63	0.11	0.20	0.30	0.95	**0.2**
Max Conc (mg/L)	0.26	0.22	1.90	0.62	1.15	1.99	3.06	**1.1**
Average Loading (tons/d)	0.10	0.08	0.66	0.12	0.25	0.44	1.41	**0.3**

* DITP and the North System only; the transfer of South System flows to DITP occurred at the start of FY99.

A summary of nutrient concentrations in Deer Island effluent from FY94-FY01 is provided in Figure II.A.5 on the following page. The introduction of the new primary treatment plant in FY95 did not affect nutrient concentrations, as primary treatment has no effect on nutrients. DITP's secondary treatment plant uses bacteria to promote efficient and rapid breakdown of wastes. This bacterial breakdown results in changes in the proportions of nitrogen species. For example, total Kjeldahl nitrogen (TKN) consists of NH_3-N plus organic nitrogen. Effluent NH_3-N concentrations have risen while total Kjeldahl nitrogen (TKN) concentrations have remained relatively stable. Therefore, the proportion of NH_3-N as a TKN component has increased. Elevated levels of NH_3-N are characteristic of the activated sludge process used in the DITP secondary treatment plant.



II.A.5 Effluent Priority Pollutants

Appendix A, Tables A-8 and A-9 provide a summary of priority pollutant concentrations and loadings in DITP effluent for FY01. Metals loadings over the past thirteen years are summarized in Figure II.A.6, while Figure II.A.7 (next page) graphs organic pollutants from FY94-FY01. Two factors may explain the long-term decrease in loadings. First, the MWRA has instituted a more aggressive industrial pre-treatment program coupled with stricter enforcement of local limits. Second, the decrease may also be attributed to better capture of metals and organics at the plant.

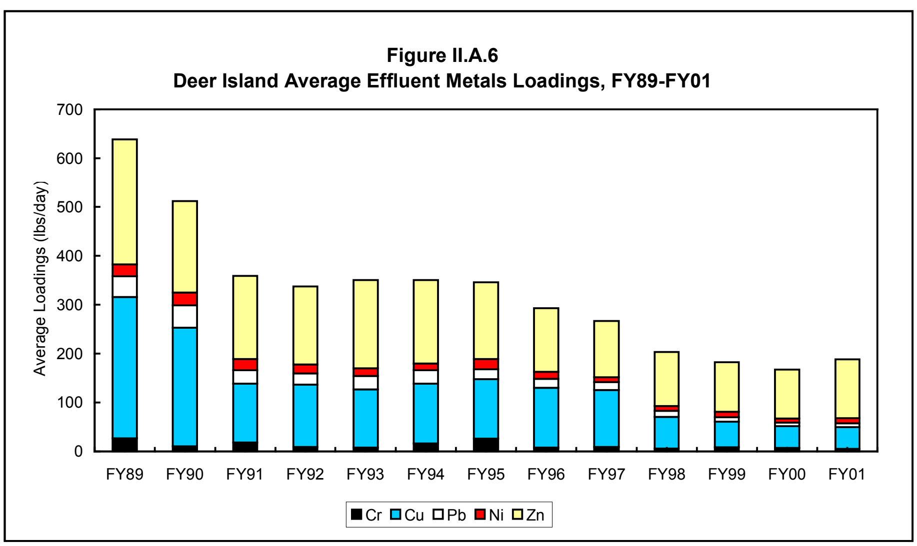
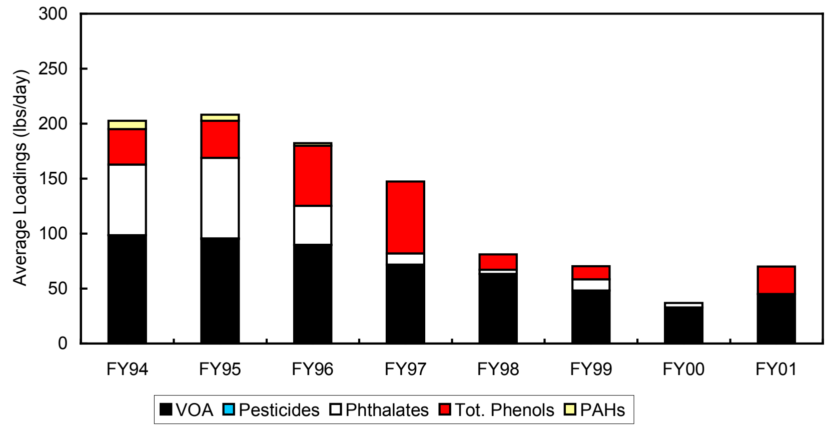


Figure II.A.7
Deer Island Average Effluent Organics Loadings, FY94-FY01



II.A.6 Whole Effluent Toxicity

The MWRA tests effluent toxicity every month at DITP. Effluent toxicity provides an overall view of the quality of the effluent, to ensure that the effluent does not adversely affect the environment. In 1989, the EPA found that the probable cause of most acute toxicity in DITP's wastestream was due to surfactants. Surfactants are most commonly used in household detergents to improve cleansing power. No acute toxicity could be attributed to metals or pesticides.

The new MWRA permit requires four tests for effluent toxicity testing. 48-hr acute static toxicity tests using the mysid shrimp *(Americamysis bahia)* and the silversides fish (*Menidia bisyllina*) measure the short term lethal effects caused by the effluent. A chronic survival and growth test using *Menidia* and a chronic fertilization test using the sea urchin (*Arbacia punctulata*) both measure subtle toxic impacts over a longer period of time. The results of these tests for August 2000 - June 2001 can be found in Table II.A.7. Results of toxicity testing under the old permit for July 2000 can be found in Table II.A.6. (Both tables are on the following page.) See the Fiscal Year 2000 NPDES Compliance Summary Report (ENQUAD Technical Report 2001-04) for details on the toxicity tests used in the old permit. (Note that the red algae *Champia* test violated in July 2000 has been withdrawn as a toxicity test by EPA due to reliability questions.)

The LC_{50} (Lethal Concentration 50%) is the concentration of effluent in a sample that causes mortality to 50% of the test population during the duration of the test. The NOEC (No Observed Effect Concentration) is the concentration of effluent in a sample to which organisms are exposed in a life cycle or partial life cycle test that has no adverse effects. An NOEC limit of 1.5% means that 1.5% of the sample is effluent, and the remainder dilution water. Any acute LC_{50} below 50% or chronic NOEC below 1.5% would violate the NPDES limit.

Table II.A.6 Deer Island Effluent, Results of Toxicity Testing, July FY01

	Mysid Shrimp acute		Sheepshead Minnow chronic		Red Algae chronic
			Survival	Growth	
	LC50	NOEC	NOEC	NOEC	NOEC
Limits (%)	None	20	10	10	10
July	>100	50	100	100	**0.05**
# of Violations	0	0	0	0	**1**

Note: Toxicity testing in July followed old permit requirements.

Table II.A.7 Deer Island Effluent, Results of Toxicity Testing, FY01

	Mysid acute	Menidia acute	Menidia chronic		Sea urchin chronic
			Survival	Growth	
	LC50	LC50	NOEC	NOEC	NOEC
Limits (%)	50	50	1.5	1.5	1.5
July	*	*	*	*	*
August	>100	52.5	50	50	6.25
September	>100	54.9	25	25	25
October	>100	65.6	50	50	50
November	>100	96.8	50	25	12.5
December	>100	52.3	50	50	1.5
January	>100	>100	50	50	**<1.5**
February	>100	79.1	12.5	12.5	25
March	>100	>100	100	100	50
April	>100	>100	100	**<1.5**	100
May	>100	>100	50	50	25
June	>100	76.3	50	50	50
# of Violations	0	0	0	**1**	**1**

Results in **bold** indicate a violation of the regulatory limits.
* See Table II.A.6 for July toxicity test results conducted under the old permit.

II.B.1 Compliance with Regulatory Limits

MWRA currently operates under a new permit limits for the existing Deer Island Treatment Plant. Plant performance at Deer Island is compared to permit limits in Table II.B.1 and Figures II.B.1 through II.B.6 on the following pages. The violations of the regulatory limits in FY01 were for toxicity testing (thrice), total chlorine residual, and pH (once each).

The pH violation occurred on December 7, 2000 when the pH in the final effluent dipped to 5.8. Investigations did not reveal any treatment plant upsets; however, further investigation showed that the sampling site used did not allow carbon dioxide produced by the bacteria used in secondary treatment to "outgas" or diffuse from the wastewater stream. This outgassing raises the pH of the effluent as it occurs. Outgassing of carbon dioxide occurs in the drop shaft to the outfall tunnel and in the outfall tunnel itself. Unfortunately, it is not feasible to sample in those locations. Modified laboratory procedures to simulate outgassing have been adopted by the MWRA, and further problems of this nature are not expected.

The total chlorine residual (TCR) violation occurred on December 14, 2000. A reading of 0.9mg/L exceeded the TCR daily maximum limit of 0.631mg/L. This figure is calculated from the average of the three TCR readings taken daily. A brief storm during the late morning to early afternoon taxed the dechlorination control system at the plant, resulting in a TCR reading of 2.64mg/L at the tail end of the storm. The other readings for the day were both

0.03mg/L. Automated TCR sensors were on order but not installed at the time of the event. Without the sensors, the dechlorination control system sensed decreasing flows as the storm subsided, but was unable to compensate for the rising amount of chlorine, resulting in the high TCR reading. Automated TCR sensors were installed within a few weeks of the incident, and no further TCR violations have occurred to date.

The third of the permit violations under the new permit occurred with the January 2001 toxicity tests. The *Arbacia* chronic fertilization test failed with an effluent concentration of <1.5%, under the 1.5% limit. Unlike the pH and TCR violations above there did not appear to be any mitigating factors.

Finally, the March 2001 *Menidia* chronic growth test failed at an effluent concentration of <1.5%, under the 1.5% limit. However, statistical anomalies made the result somewhat suspect. For example, fish grown in 12.5% and 50% effluent were not statistically different from the control group (i.e., the fish exposed to effluent at those concentrations showed no negative impacts on growth), while those in the 1.5%, 6.25%, 25%, and 100% effluent groups were statistically different. It was the statistical difference between the 1.5% and the control that caused the test to be termed a permit violation. In short, in some cases higher (and, presumably, more toxic) effluent concentrations had less of an effect on *Menidia* than lower (less toxic) effluent concentrations. EPA and MA DEP noted the anomalies but the test was still considered a violation of the NPDES permit.

In terms of actual changes to the permit, the new permit includes carbonaceous biochemical oxygen demand (cBOD), dry day flow, and total chlorine residual. Limits for biochemical oxygen demand (BOD), total coliform, and petroleum hydrocarbons (PHCs) have been removed. As mentioned in the previous section, changes have also been made to the toxicity testing protocols.

Table II.B.1 Deer Island Effluent Quality Compared to Permit Limits, FY01			
Parameter	**Permit Limits**	**Range of Values Exceeding Limits**	**Number of Violations**
Carbonaceous Biochemical Oxygen Demand (mg/L)			
Monthly Avg	25	N/A	0
Weekly Avg	40	N/A	0
Total Suspended Solids (mg/L)			
Monthly Avg	30	N/A	0
Weekly Avg	45	N/A	0
Total Chlorine Residual (ug/L)			
Monthly Avg	456	N/A	0
Daily Maximum	631	900	1
Fecal Coliform			
Weekly Geometric Mean (col/100mL)	14000	N/A	0
% of Samples > 14000	10	N/A	0
Consecutive Samples > 14000	3	N/A	0
pH (SU; see note)	6.0-9.0	5.8	1
PCB, Aroclors (ug/L)	0.000045	N/A	0
Acute Toxicity: Mysid Shrimp (%)	>=50	N/A	0
Acute Toxicity: Inland Silverside (%)	>=50	N/A	0
Chronic Toxicity: Inland Silverside (%)	>=1.5	< 1.5	1
Chronic Toxicity: Sea Urchin (%)	>=1.5	< 1.5	1
Dry Day Flow (MGD)	436	N/A	0
Total Number of Violations			**5***

* One chronic toxicity (*Champia*) violation occurred in July 2000 under the old permit.

Note: 3 pH minimum violations occurred in July 2000 under the interim pH limits. The interim lower pH limit was 6.5; however, this was routinely violated once the secondary plant came on-line. This behavior was expected and due to the pure-oxygen process used. Carbon dioxide, which lowers effluent pH, was released by respirating microorganisms used in the treatment process. These violations were excused and the new permit lowers the lower pH limit to 6.0. The toxicity violation noted above was not excused.

Table II.B.2 compares the number of NPDES violations in FY01 to previous years.

Table II.B.2 NPDES Violations at Deer Island, FY94-FY01

	FY94	**FY95**	**FY96**	**FY97**	**FY98**	**FY99**	**FY00**	**FY01**
Dry Day Flow	*	*	*	*	*	*	*	0
BOD	16	12	7	0	1	0	0	*
cBOD	*	*	*	*	*	*	*	0
TSS	1	1	0	0	0	0	0	0
TCR	*	*	*	*	*	*	*	1
Settleable Solids	0	0	0	0	0	0	0	*
Fecal Coliform	0	0	0	0	0	0	0	0
Total Coliform	0	1	0	0	0	0	0	*
pH	1	1	0	0	0	0	0	1
PHCs	1	4	5	0	0	0	0	*
Toxicity	11	17	19	16	11	13	14	3
Non-Toxicity Violations	19	19	12	0	1	0	0	2
Total Violations	30	36	31	16	12	13	14	5

* Not a permit limit at that particular time

For carbonaceous biochemical oxygen demand (cBOD) and total suspended solids (TSS), the permit limits monthly and weekly average concentrations. Figures II.B.1 and II.B.2 show that the monthly averages for cBOD and TSS never exceeded the regulatory discharge limits of 25 mg/L for cBOD and 30 mg/L for TSS for monthly average concentration. There were no violations of the weekly limit for either parameter.

Figure II.B.1
Deer Island Treatment Plant Effluent
cBOD Trend Analysis, FY01

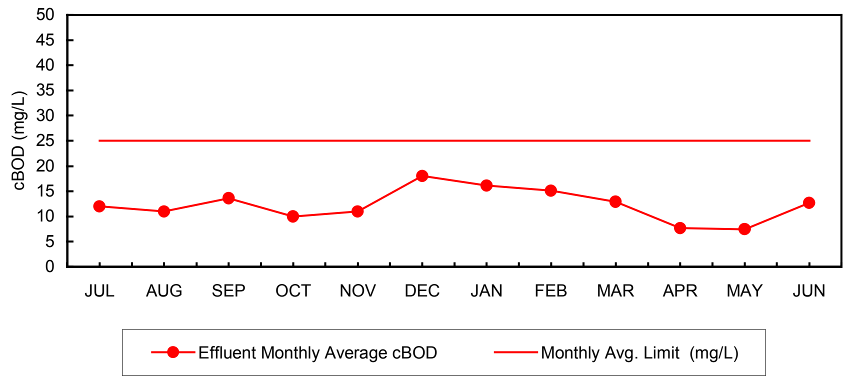
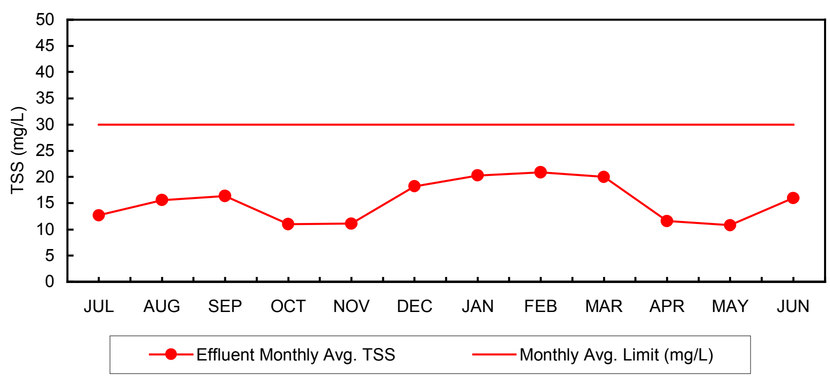
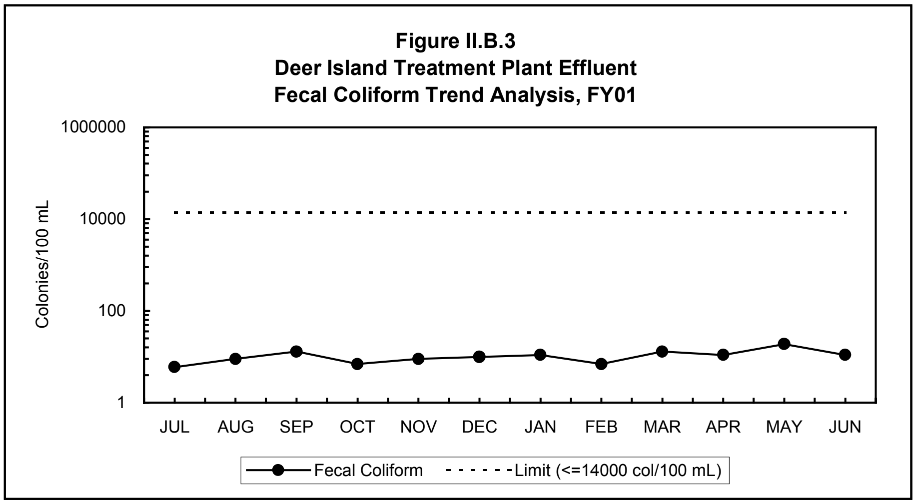


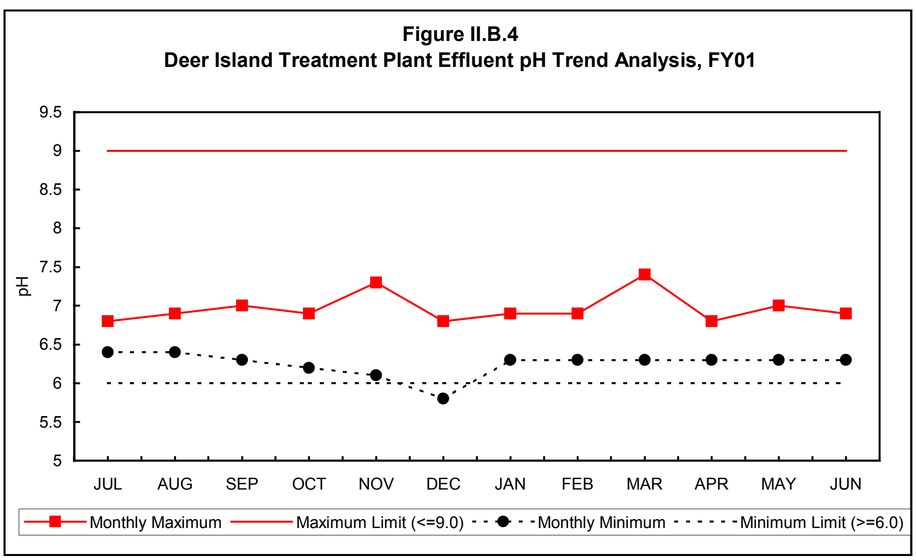
Figure II.B.2
Deer Island Treatment Plant Effluent
TSS Trend Analysis, FY01



For fecal coliform, the daily geometric mean of three samples per day has a discharge limit of 14,000 colonies/100 mL. The results for Deer Island were well below this limit, with the monthly geometric mean never exceeding 20 colonies/100 mL. Additional limits for fecal coliform present in the new permit include not more than three consecutive samples measuring over 14,000 colonies/100 mL and no more than 10% of the samples in a month measuring over 14,000 colonies/100 mL. Figure II.B.3 on the next page shows the effluent trends of fecal coliform in FY01.



The limits for pH are based on the maximum and minimum values for each month, with pH required to fall between 6.0 and 9.0. In FY01, the pH of the effluent was always below the maximum of 9.0 and only fell below the minimum value on one day (as mentioned earlier, the MWRA believes this violation was due to laboratory methods unable to capture the natural outgassing of carbon dioxide. The problem has been addressed and the minimum limit has not been approached since). The artificially lowered pH has no measurable impact on the quality of the receiving waters because of the buffering capacity of Massachusetts Bay water.



II.B.2 Effluent Quality Compared to Water Quality Standards

Table II.B.3 on the following page compares concentrations of priority pollutants in DITP effluent to water quality criteria. The majority of priority pollutant parameters were below detection levels. Those that were detected had relatively low concentrations.

Table II.B.3 Comparison of Deer Island Treatment Plant Effluent with Water Quality Criteria, FY01									
Parameter	Total Recoverable Max. Conc. (ug/L)	Total Dissolved Max. Conc. * (ug/L)	Total Recoverable Avg. Conc. (ug/L)	Total Dissolved Avg. Conc. * (ug/L)	Times Detected	Acute Criteria ** (ug/L)	Total Dissolved Max. Conc.: Acute Criteria	Chronic Criteria ** (ug/L)	Total Dissolved Avg. Conc.: Chronic Criteria
Arsenic	1.45	1.45	0.54	0.54	4 of 42	69.0	A	36.0	A
Copper	25.10	24.07	13.66	13.10	64 of 68	4.8	5:1	3.1	4:1
Lead	14.80	10.17	2.53	1.74	11 of 68	210.0	A	8.1	A
Mercury	0.22	0.19	0.03	0.03	56 of 62	1.8	A	0.94	A
Nickel	6.48	6.98	3.27	3.52	66 of 66	74.0	A	8.2	A
Silver	0.98	0.98 (C)	0.38	0.38 (C)	60 of 61	1.9	A	B	B
Zinc	72.30	59.20	36.90	30.21	66 of 66	90.0	A	81.0	A

A - Ratio lower than 1:1
B - No applicable criteria
C - No applicable conversion factor
* Calculated using the conversion factors in Appendix A of the Federal Register, December 10, 1998
** National Recommended Water Quality Criteria for Priority Toxic Pollutants, Federal Register, December 10, 1998

II.C.1 Ambient Monitoring Plan

The new permit requires ambient monitoring of the Harbor and Massachusetts Bay. The ambient monitoring plan has three main components: the Harbor and Bay monitoring plan; the maintenance of the Bays Eutrophication Model; and the implementation of plume tracking. Table II.C.1 (next page) summarizes the first and third components of the monitoring plan.

The Bays Eutrophication Model is a three-dimensional hydrographic model that is run annually to provide information on whether new limits are needed on the effluent discharge. The Model is designed primarily to examine nutrient inputs.

Table II.C.1 Post-Discharge Ambient Monitoring Plan Summary

Task	Objective	Sampling Protocol	Analyses
Effluent			
Effluent sampling	Characterize wastewater discharge from Deer Island Treatment Plant	Weekly Daily Several times monthly 3x/day Daily	Nutrients Organic material (cBOD) Toxic contaminants Bacterial indicators Solids
Water Column			
Nearfield surveys	Collect water quality data near outfall location	17 surveys/year 21 stations	Temperature Salinity Dissolved oxygen Nutrients Solids Chlorophyll Water clarity Photosynthesis Respiration Plankton Marine mammal observations
Farfield surveys	Collect water quality data throughout Massachusetts and Cape Cod bays	6 surveys/year 26 stations	
Plume-track surveys	Track locations and characteristics of discharge plume, measure dilution of discharge	To be implemented after the outfall begins operation	Rhodamine dye Salinity Temperature Currents Nutrients Solids Bacterial indicators
Mooring (USGS)	Provides continuous oceanographic data near outfall location	Continuous monitoring Single station 3 depths	Temperature Salinity Water clarity Chlorophyll
Remote sensing	Provides oceanographic data on a regional scale through satellite imagery	Available daily (cloud-cover permitting)	Surface temperature Chlorophyll
Sea Floor			
Soft-bottom studies	Evaluate sediment quality and benthos in Boston Harbor and Massachusetts Bay	20 nearfield stations 11 farfield stations	Sediment chemistry Sediment profile imagery Community composition
Hard-bottom studies	Characterize marine benthic communities in rock and cobble areas	1 survey/year 21 stations on 6 transects	Topography Substrate Community composition
Fish and Shellfish			
Winter flounder	Determine contaminant body burden and population health	1 survey/year 5 locations	Tissue contaminant concentrations Physical abnormalities, including liver histopathology
American lobster	Determine contaminant body burden	1 survey/year 3 locations	Tissue contaminant concentrations Physical abnormalities
Blue mussel	Evaluate biological condition and potential contaminant bioaccumulation	1 survey/year 4 locations	Tissue contaminant concentrations

Adapted from Werme, C. 2000. 1999 Outfall Monitoring Overview. MWRA Report ENQUAD 2000-14.

Figure II.C.1 following shows the locations of the water column sampling stations used by MWRA in the monitoring plan.

Figure II.C.1: MWRA Water Column Outfall Monitoring Stations

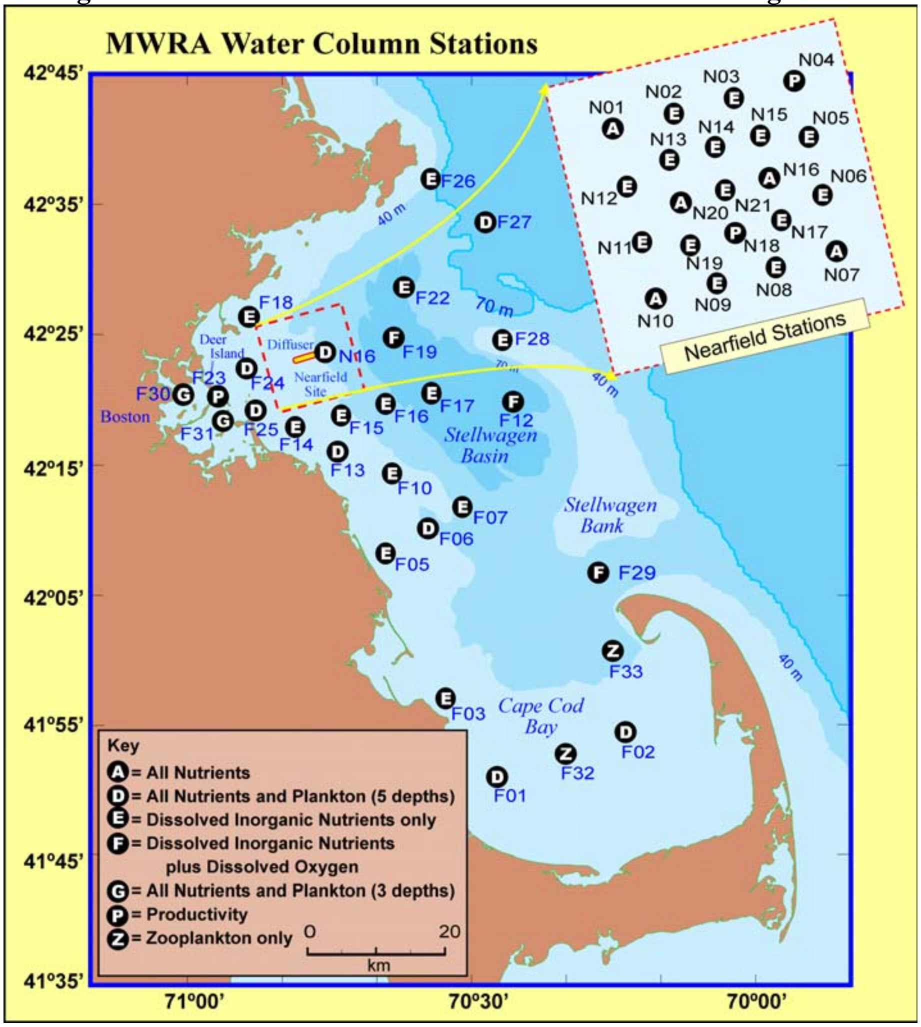
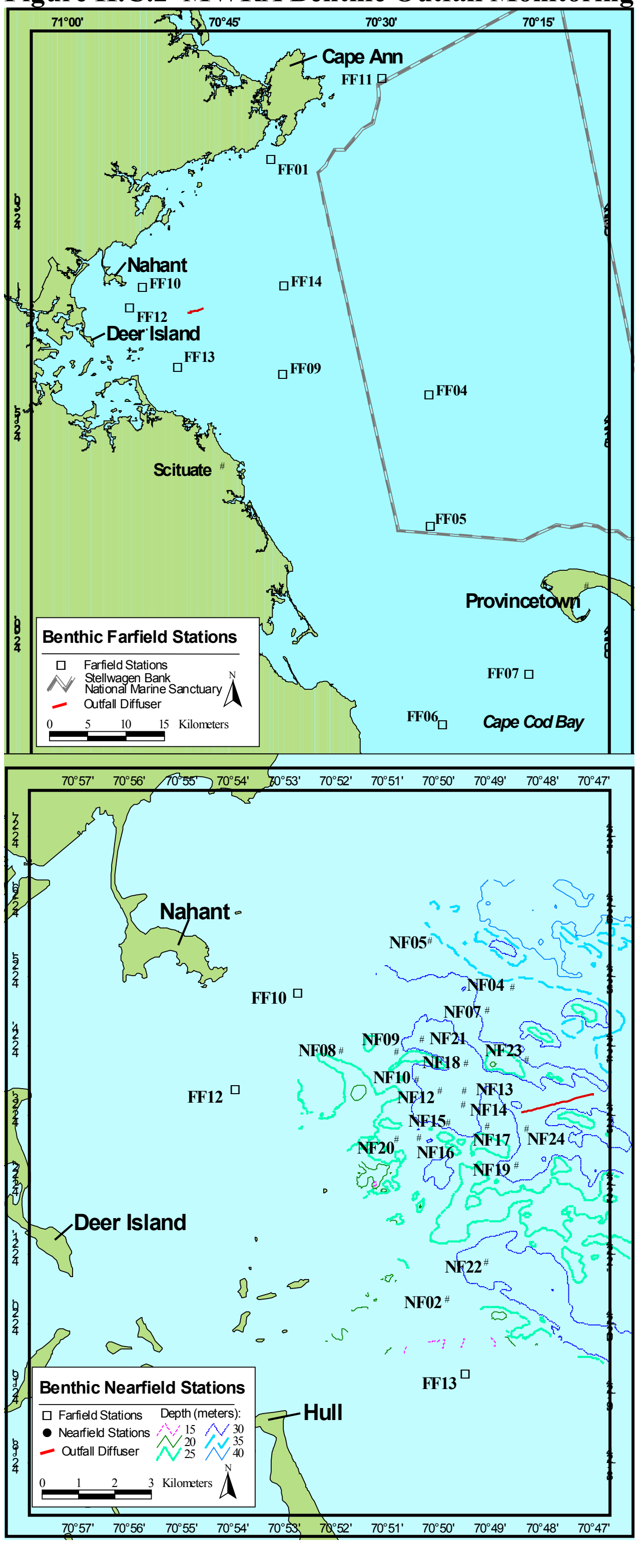


Figure II.C.2 on the following page shows the majority of the benthic monitoring stations surveyed. Not shown are the 22 hardbottom stations in the immediate vicinity of the diffuser, or the stations for the fish and shellfish monitoring. These fish and shellfish stations are located near Deer Island, the outfall, in Cape Cod Bay, Broad Sound (flounder only), and Nantasket Beach (also flounder only).

Figure II.C.2 MWRA Benthic Outfall Monitoring Stations



Finally, a panel of scientific experts convened by the EPA and MA DEP known as the Outfall Monitoring Science Advisory Panel (OMSAP) examines scientific data produced by the monitoring plan. OMSAP also serves as a peer review board for technical reports, and advises EPA and MA DEP on the implications of monitoring observations. Finally, OMSAP evaluates any exceedances under the Contingency Plan, described in the next section.

Much more information on the ambient monitoring plan is available on the Internet. Documents directly associated with the permit can be found at: http://www.mwra.state.ma.us/harbor/html/ambient.htm

Associated information and synthesis reports generated by ambient monitoring results can be found at:
Boston Harbor: http://www.mwra.state.ma.us/harbor/html/wklyintr.htm
Massachusetts Bay: http://www.mwra.state.ma.us/harbor/html/mbmon.htm

The OMSAP web page, including announcements for public meetings, is at: http://www.epa.gov/region1/omsap/index.html

II.C.2 The Contingency Plan

The new permit requires a contingency plan that defines a response plan required when a parameter threshold is exceeded. Reponses may include changes in laboratory procedures, changes in treatment plant process, or, in a worse case scenario, examining the feasibility of re-opening the Deer Island harbor outfalls. Tables II.C.2.a-c show the thresholds for the parameters. The effluent and toxicity thresholds are set to be equal to the NPDES permit limits. However, the Contingency Plan includes a number of new thresholds related to parameters monitored under the Ambient Monitoring Plan in Massachusetts Bay.

Table II.C.2.a Contingency Plan Thresholds: Toxic Contaminants

Parameter	Caution Level	Warning Level
Effluent chlorine	-	456 ug/L average monthly 631 ug/L maximum daily
Effluent PCBs	0.000045 ug/L monthly limit (as Arochlors)	-
Effluent toxicity	-	Acute: effluent LC50 < 50% for shrimp and fish; chronic: effluent NOEC for fish growth and sea urchin fertilization < 1.5%
Water column initial dilution of effluent	-	Effluent dilution predicted by EPA as basis for NPDES permit
Nearfield sediment toxics	-	NOAA Effects Range Median sediment guideline
Nearfield sediment toxics	90% EPA sediment criteria	EPA sediment criteria
Fish tissue mercury, near outfall	0.5 ug/g wet	0.8 ug/g wet
Fish tissue PCB, near outfall	1 ug/g wet	1.6 ug/g wet
Mussel tissue lead, near outfall	2 ug/g wet	3 ug/g wet
Fish tissue lipid-normalized toxics, near outfall	2 x baseline	-
Flounder liver disease incidence	Greater than harbor prevalence over time	-

Table II.C.2.b Contingency Plan Thresholds: Nutrients

Parameter	Caution Level	Warning Level
Effluent total nitrogen	12,500 mtons/year	14,000 mtons/year
Dissolved oxygen concentration, nearfield water column bottom, Stellwagen bottom (1)	6.5 mg/L for any survey during stratification (June-Oct.) unless background conditions are lower	6 mg/L for any survey during stratification (June-Oct.) unless background conditions are lower
Dissolved oxygen percent saturation, nearfield water column bottom, Stellwagen bottom (1)	80% saturation for any survey during stratification (June-Oct.) unless background conditions are lower	75% saturation for any survey during stratification (June-Oct.) unless background conditions are lower
Oxygen depletion rate, nearfield water column bottom	1.5 x baseline	2 x baseline
Nearfield water column chlorophyll	1.5 x baseline annual mean	2 x baseline annual mean
Nearfield water column chlorophyll	95th percentile of the baseline seasonal distribution	-
Nearfield water column nuisance algae (except Alexandrium)	95th percentile of the baseline seasonal mean	-
Nearfield water column zooplankton (2)	-	-
Nearfield water column Alexandrium tamarense (3)	100 cells/L	-
Farfield water column PSP extent (4)	New incidence	-
Redox potential discontinuity, nearfield sediments	0.5 x baseline	-

(1) Included in Contingency Plan as an interim modification pursuant to Part I.8.d of the MWRA's NPDES permit. MWRA will develop by July 1, 2001, and submit to OMSAP for its review, a proposed statistical approach to calculate the 5th- percentile of background conditions, as recommended in Attachment A of EPA's and MADEP's April 3, 2001 letter. Following OMSAP review, a final modification of the Caution and Warning Levels will be submitted by the MWRA to EPA and MADEP by November 15, 2001 pursuant to Part I.8.c of the permit.

(2) The MWRA will report annually on appreciable changes to the zooplankton community in its Annual Water Column Report and in the Outfall Monitoring Overview. The MWRA also will report to EPA, MADEP and OMSAP by December 31, 2002 on the results of special zooplankton studies and evaluate whether a scientifically valid zooplankton community threshold can be developed. The MWRA also makes every effort to participate in workshops to investigate food web pathways in Massachusetts and Cape Cod bays sponsored by NOAA Fisheries.

(3) Included in Contingency Plan as an interim modification pursuant to Part I.8.d of the MWRA's NPDES permit. By August 1, 2001, the MWRA will submit for OMSAP review either the 100 cells/liter threshold or an alternative caution level threshold value developed using a similar approach as recommended in Attachment A of EPA's and MADEP's April 3, 2001 letter. Following OMSAP review, a final modification of the Caution Level will be submitted by the MWRA to EPA and MADEP by November 15, 2001 pursuant to Part I.8.c of the permit. MWRA will also support a co-sponsored project in order to pursue targeted monitoring of Alexandrium. This effort will be conducted by an appropriate entity, upon EPA and MADEP approval.

(4) The MWRA is continuing to work on improvements to the calculation of this threshold as proposed in its October 13, 2000 letter to the EPA and MADEP.

Table II.C.2.c Contingency Plan Thresholds: Other Parameters

Parameter	Caution Level	Warning Level
Effluent cBOD	-	40 mg/L weekly 25 mg/L monthly
Effluent fecal coliform	-	14,000 fecal coliforms/100 ml
Effluent TSS	-	45 mg/L weekly 30 mg/L monthly
Nearfield benthic diversity	Appreciable change	-
Nearfield benthic opportunists	10%	25%
Effluent floatables (5)	-	-
Effluent oil and grease (petroleum)	-	15 mg/L weekly
Plant performance	5 violations/year	Noncompliance 5% of the time; pH <6 or >9 at any time; flow >436 for an annual average dry day

(5) Threshold value and sampling protocol to be developed by the MWRA by July 1, 2002 and submitted to OMSAP for its review, and thereafter to EPA and MADEP for review and approval. Pending inclusion of a new threshold value in the Contingency Plan, the MWRA will employ the following alternative measures: (i) MWRA will provide monthly reports of scum, fats, oil and grease removal at the treatment plant; (ii) MWRA will record and report in the shift supervisor's daily log any observations of floatables, followed by review and correction of problems observed by operators. MWRA will make shift supervisor log sheets available for EPA and DEP inspection on site; and (iii) MWRA will continue its ongoing program of monitoring and reporting observations and recording of contents of net tows, complemented by visual inspection of the water recorded in field logs at the nearfield outfall location in Massachusetts Bay during the 17 annual nearfield surveys.

Adapted from MWRA. 2001. *Contingency Plan Revision 1, May 2001*. MWRA Report ENQUAD ms-071.

Under the Contingency Plan, two types of thresholds exist: a caution level and a warning level. Figure II.C.3 (next page) details the processes required by the Contingency Plan in case of a threshold exceedance. Table II.C.3 below details the Contingency Plan exceedances in FY01; the last four are a result of the NPDES permit violations described two sections previous. For more information on these exceedances, please refer to the web site listed below.

Table II.C.3 Contingency Plan Exceedances, FY01

Date*	Threshold Level Exceeded	Threshold Exceeded
November 10, 2000	Caution (Ambient)	Dissolved oxygen % saturation < 80%, nearfield and Stellwagen Basin bottom waters
December 12, 2000	Warning (Effluent)	pH < 6.0 in DITP final effluent
December 14, 2000	Warning (Effluent)	Total chlorine residual > 631 ug/L maximum daily in DITP final effluent
February 23, 2001	Warning (Effluent)	*Arbacia* chronic fertilization toxicity test < 1.5%
May 18, 2001	Warning (Effluent)	*Menidia* chronic growth toxicity test < 1.5%

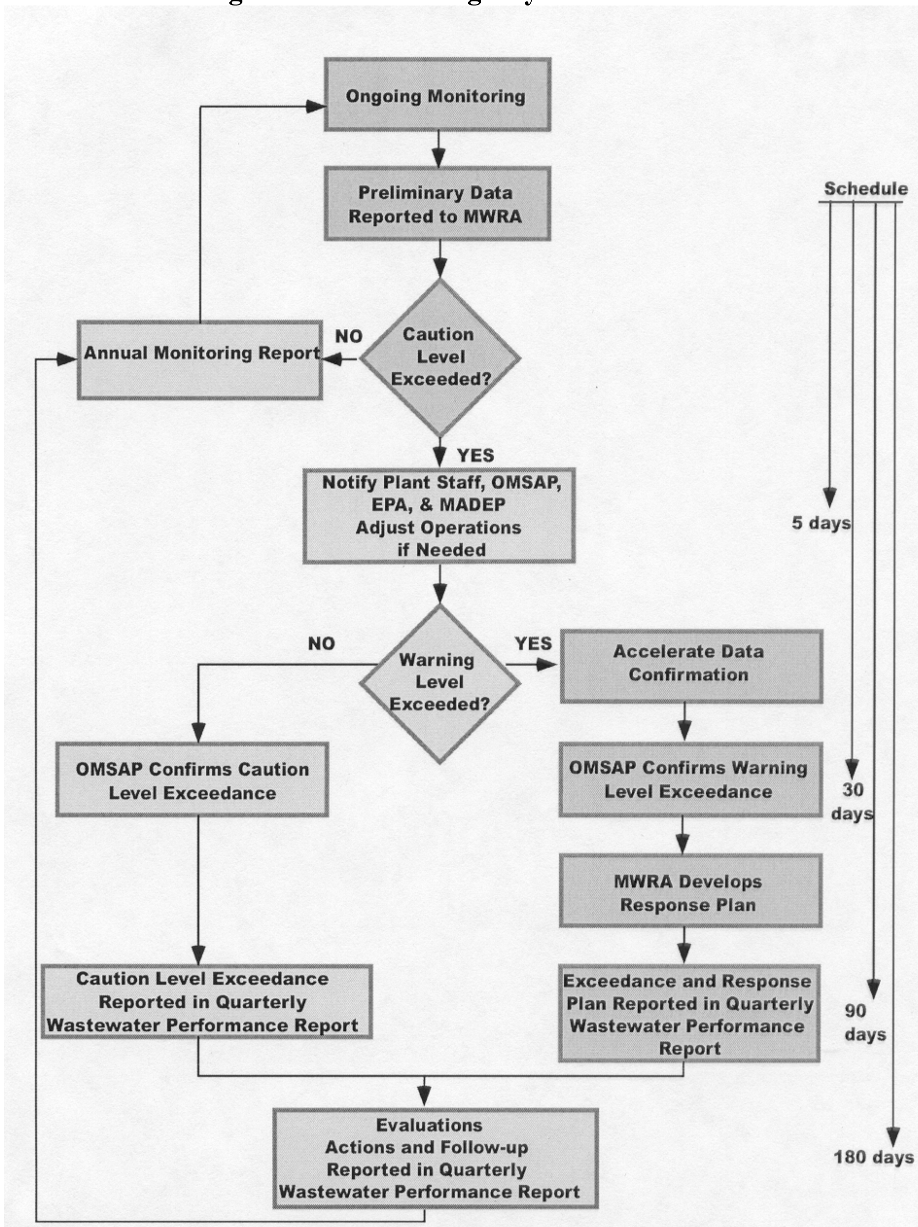
* Notification date; typically within 5 days of knowing of the violation.
Note: The July 2000 *Champia* toxicity violation was pre-Contingency Plan, so it is not included here.

In addition to the thresholds, the Contingency Plan also requires several other unrelated items. First, the MWRA must update annually a technical survey regarding tertiary treatment systems designed to remove nutrients. Second, the Authority must develop a nitrogen monitoring program at DITP to examine the need for tertiary treatment. Third, there must be a "dry run" of a Contingency Plan violation to assess the validity of the Contingency Plan structure. Fourth, $81 million must be held in reserve for emergency use. Finally, the old Boston Harbor outfalls must be maintained in case diversion of the effluent back to the Harbor is deemed necessary.

More information on Contingency Plan topics is on the Internet at:
http://www.mwra.state.ma.us/harbor/html/contingency.htm

Exceedance reports are posted at:
http://www.mwra.state.ma.us/harbor/html/exceed.htm

Figure II.C.3 Contingency Plan Flowchart



III: Combined Sewer Overflow Facilities

Overview

MWRA monitors five Combined Sewer Overflow (CSO) facilities in the North System. The monitoring results vary significantly between facilities because of differences in type and location.

Each CSO facility chlorinates combined wastewater (sewage and storm water) prior to discharge. Of the five CSO facilities, only the Cottage Farm and Prison Point facilities have pumping and tank storage capacity. Pumping and tank storage allows chlorinated wastewater to be held at these facilities up to their storage capacities prior to discharge. Stored wastewater can eventually be pumped back into the system and processed at Deer Island. Any wastewater exceeding the storage capacity will overflow and is discharged to CSO outfalls. The three other CSO facilities – Somerville Marginal, Fox Point and Commercial Point – are gravity CSO facilities, which means that combined wastewater arrives and leaves the CSO facility by gravity instead of pumping. The combined wastewater is disinfected and the chlorinated wastewater overflows to the receiving water as quickly as it arrives at the facility. A detailed description of the five CSO facilities can be found in Appendix H.

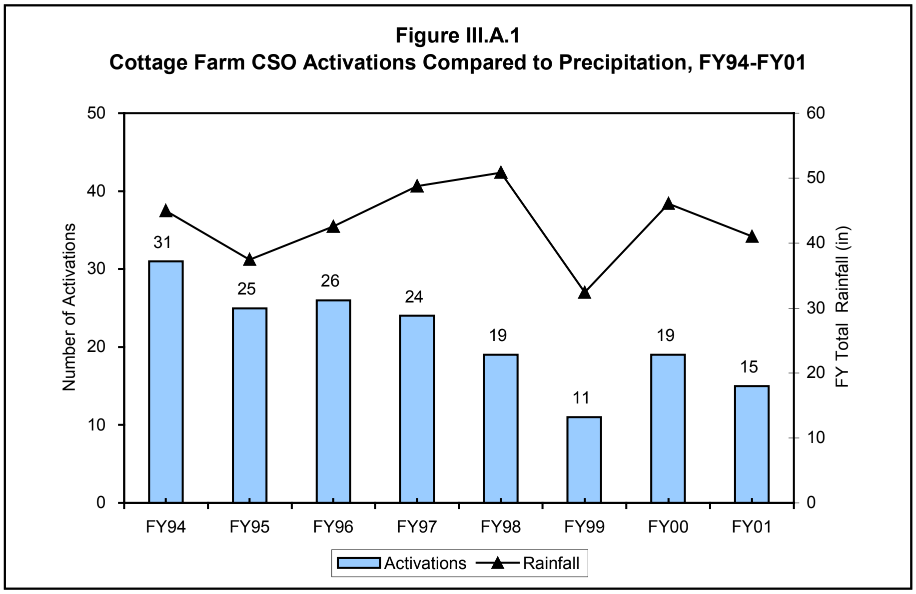
III.A.1 Cottage Farm Activations

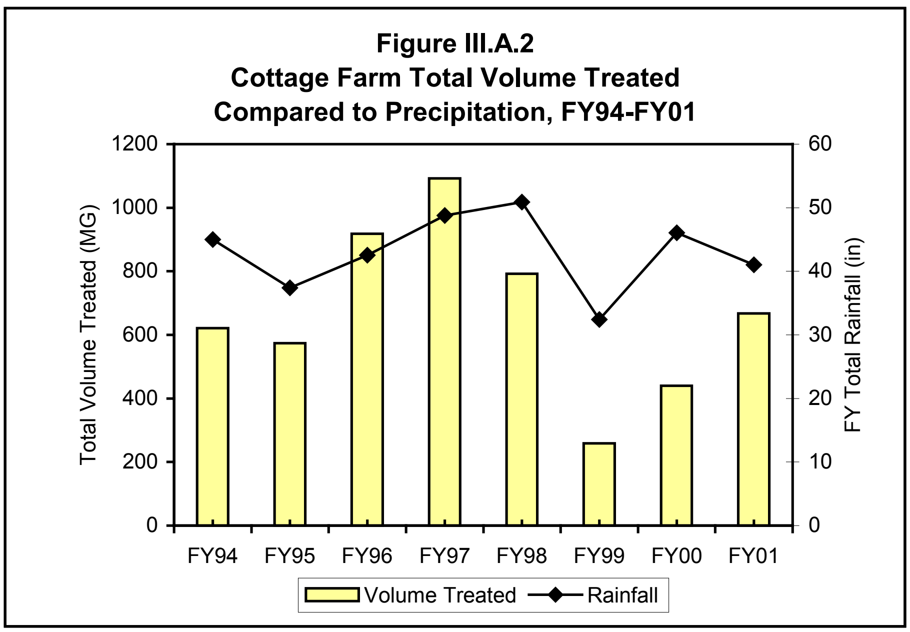
Table III.A.1 and Figures III.A.1 and III.A.2 (next page) summarize activation data for the Cottage Farm CSO facility. From FY00 to FY01, releases from Cottage Farm increased from 440 to 667 million gallons, while the number of activations decreased. The rainfall in FY01 was also slightly lower from that in FY00. Two particularly intense storms in March partially explain these unusual circumstances; these two activations provided 58% of the annual flow. However, the total volume treated is still well below the volumes seen in FY96-97.

Table III.A.1 Cottage Farm CSO Activations Summary

	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01
Number of Activations	31	25	26	24	19	11	19	**15**
Number of Days Activated	31	25	33	29	22	13	24	**18**
Total Volume Treated (MG)	621	574	918	1092	792	259	440	**667**
Maximum Flow (mgd)	123	100	94	199	114	47	86	**223**
Minimum Flow (mgd)	0.08	0.09	1.88	0.63	0.76	1.35	0.56	**0.22**
Average Flow (mgd)	20.03	22.96	27.83	37.66	36.01	19.923	18.34	**37.08**
Total Rainfall (in/year)	45.00	37.40	42.55	48.79	50.87	32.41	46.08	**41.02**

Average flow = Total volume treated divided by the number of days activated.





III.A.2 Cottage Farm Conventional Parameters

Table B-1 of Appendix B contains detailed data on conventional parameters in Cottage Farm effluent. Table III.A.2 summarizes this data.

Table III.A.2 Cottage Farm CSO Effluent Characteristics, FY01

Parameter	Min	Avg	Max
TSS (mg/L)	10	63	123
BOD (mg/L)	30	65	97
Fecal Coliform (col/100 mL)	10	84	5500
pH (units)	6.4		7.5

III.A.3 Cottage Farm Priority Pollutants

MWRA tests Cottage Farm effluent for priority pollutants whenever the CSO is sampled. The results of these tests are presented in Appendix B Tables B-2 and B-3. With the advent of the new permit in August 2000, sampling for pesticides, organic compounds, cyanide, and phenols ceased. However, metals and surfactants sampling continued. Metals were the most commonly detected priority pollutants, with the six target metals detected in nearly every sample.

Table III.A.3 summarizes average metals concentrations in Cottage Farm effluent in FY01.

Table III.A.3 Cottage Farm Metals, FY01

	Average Concentration (ug/L)	Times Detected
Cadmium	2.04	4 of 8
Copper	52.12	5 of 5
Lead	42.18	5 of 5
Mercury	0.25	5 of 5
Nickel	7.89	5 of 5
Zinc	132.76	5 of 5

III.B.1 Prison Point Activations

Activation data for the Prison Point CSO facility are summarized in Table III.B.1 and Figures III.B.1 and III.B.2 (next page).

Unlike the Cottage Farm CSO facility, the Prison Point facility is not hydraulically connected to the Deer Island Treatment Plant, so increased pumping at Deer Island will not affect Prison Point activation.

The volume treated at Prison Point in FY01 was lower than FY00. The number of activations was also lower in FY01 than in FY00. As with Cottage Farm, the two March storms comprised a significant percentage of the total flow – here, 43%.

Table III.B.1 Prison Point CSO Activations Summary

	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01
Number of Activations	26	26	24	26	32	23	25	**24**
Number of Days Activated	26	26	29	30	34	23	30	**26**
Total Volume Treated (MG)	449	460	445	926	958	396	740	**634**
Maximum Flow (mgd)	80	127	63	228	143	51	149	**188**
Minimum Flow (mgd)	3.01	1.63	1.24	1.50	2.00	1.40	2.50	**1.00**
Average Flow (mgd)	17.27	17.69	15.34	30.86	28.18	17.217	24.65	**24.39**
Total Rainfall (in/year)	45.00	37.40	42.55	48.79	50.87	32.41	46.08	**41.02**

Average flow = Total volume treated divided by the number of days activated.

Figure III.B.1
Prison Point CSO Activations Compared to Precipitation, FY94-FY01

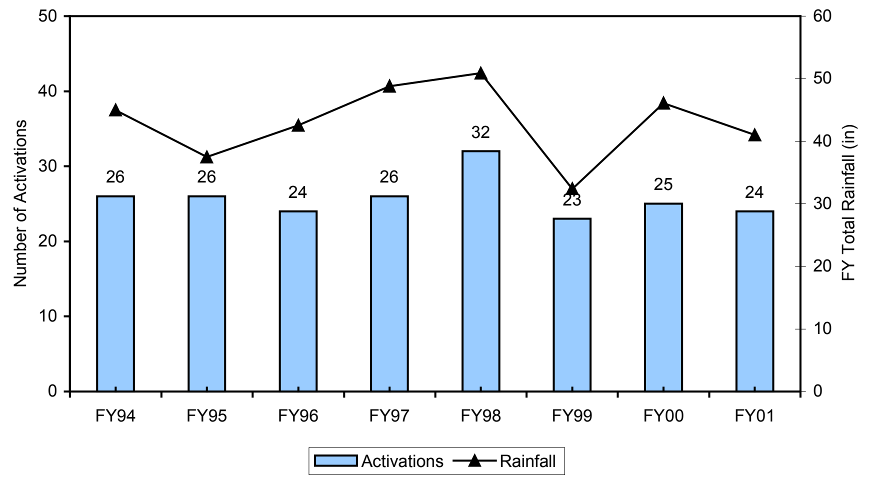
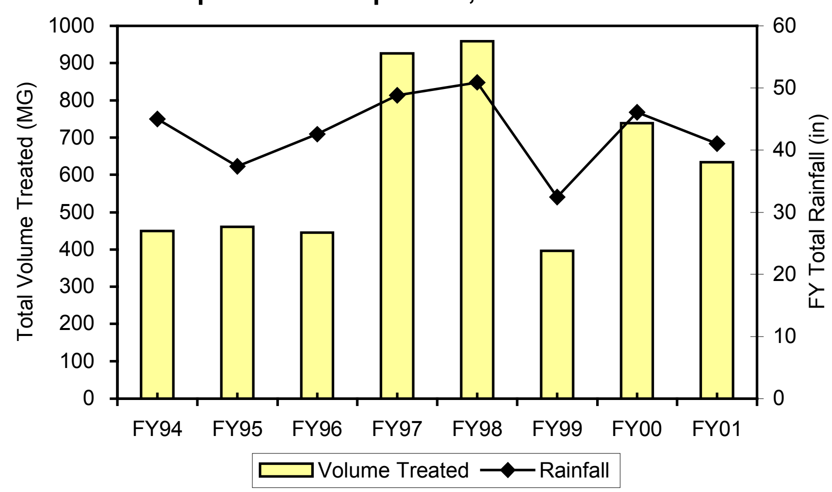


Figure III.B.2
Prison Point Total Volume Treated
Compared to Precipitation, FY94-FY01



III.B.2
Prison Point Conventional Parameters

Conventional parameter data for Prison Point influent and effluent are provided in Appendix C Tables C-1 and C-2 and summarized in Table III.B.2 (next page). Like the Cottage Farm facility, Prison Point is a CSO facility, so it cannot remove some contaminants as effectively as a full-fledged treatment plant.

Table III.B.2 Prison Point CSO Effluent Characteristics, FY01			
Parameter	Min	Avg	Max
TSS (mg/L)	29	114	225
BOD (mg/L)	20	30	44
Fecal Coliform (col/100 mL)	10	95	428
pH (units)	6.0		7.3

III.B.3 Prison Point Priority Pollutants

The results of priority pollutant testing for Prison Point can be found in Tables C-2 and C-3 of Appendix C. As with Cottage Farm, samplers detected metals in nearly all of the samples. Table III.B.3 summarizes average metals concentrations in Prison Point effluent in FY01.

Table III.B.3 Prison Point Metals, FY01		
	Average Concentration (ug/L)	Times Detected
Cadmium	2.29	5 of 7
Copper	141.08	4 of 4
Lead	330.60	4 of 4
Mercury	0.68	4 of 4
Nickel	19.71	4 of 4
Zinc	432.50	4 of 4

III.C.1 Somerville Marginal Activations

Table III.C.1 and Figures III.C.1 and III.C.2 (next page) summarize activation information for the Somerville Marginal facility. Recently, there has been increased attention to SSOs (sanitary sewer overflows); see Chapter V for more information. MWRA has intensified its monitoring efforts at areas known to overflow when there is a measurable rainfall event. As a result, MWRA has monitored its CSO facilities, especially the unmanned gravity facilities of Somerville Marginal, Fox Point and Commercial Point, more frequently. As a result, the statistics for FY98 and after may not be strictly comparable to the years before FY98.

Table III.C.1 Somerville Marginal CSO Activations Summary								
	FY94	**FY95**	**FY96**	**FY97**	**FY98**	**FY99**	**FY00**	**FY01**
Number of Activations	34	28	28	28	30	19	28	**17**
Number of Days Activated	34	28	30	29	31	19	34	**21**
Total Volume Treated (MG)	72	49	80	142	128	57.32	113.8	**90.9**
Maximum Flow (mgd)	11	14	9	64	22	10	25	**33**
Minimum Flow (mgd)	0.01	0.16	0.25	0.13	0.09	0.04	0.01	**0.09**
Average Flow (mgd)	2.12	1.75	2.67	4.90	4.12	3.02	3.35	**4.33**
Total Rainfall (in/year)	45.00	37.40	42.55	48.79	50.87	32.41	46.08	**41.02**

Average flow = Total volume treated divided by the number of days activated.

Figure III.C.1
Somerville Marginal CSO Activations Compared to Precipitation, FY94-FY01

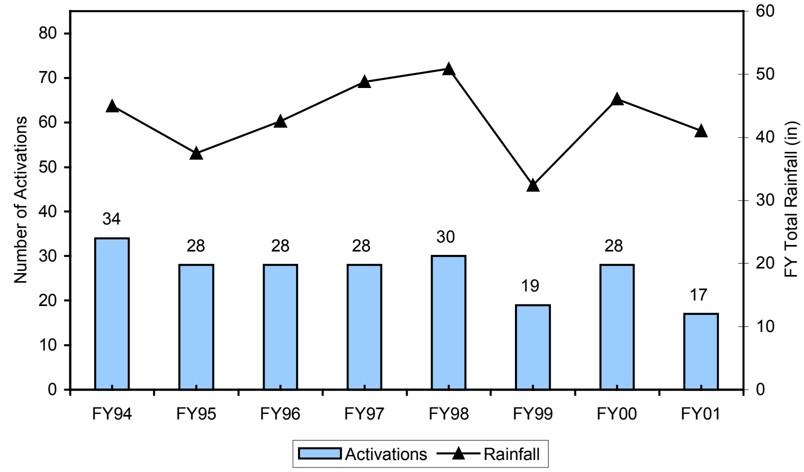
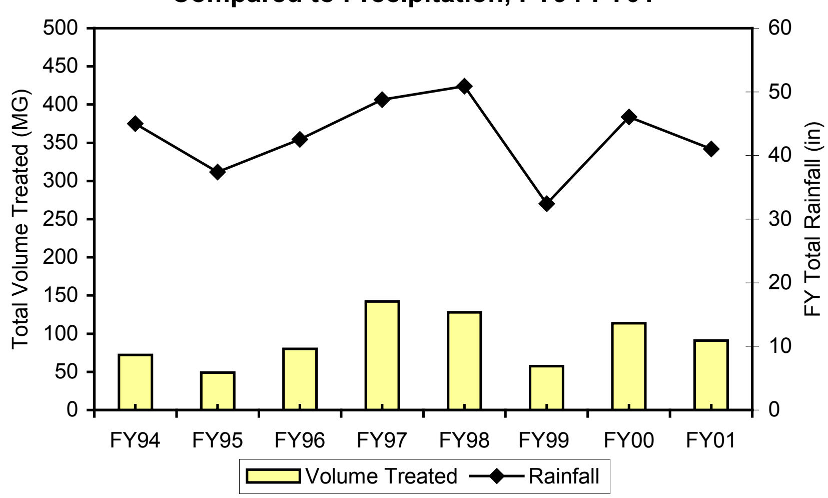


Figure III.C.2 shows the volume treated at the Somerville Marginal gravity CSO facility over the past eight years. Somerville Marginal flow measurements in previous years were underestimated because the measurements did not include flows when the flow meters were malfunctioning. Recent modifications to the in-line storage at the facility along with manual operation of the gates will result in a smaller number of activations in the future.

Figure III.C.2
Somerville Marginal Total Volume Treated Compared to Precipitation, FY94-FY01



III.C.2 Somerville Marginal Conventional Parameters

Somerville Marginal conventional parameter data is provided in Table D-1 of Appendix D, and are summarized in Table III.C.2. The Somerville Marginal treatment facility, like Cottage Farm and Prison Point, is not designed to remove some contaminants.

Table III.C.2 Somerville Marginal CSO Effluent Characteristics, FY01

Parameter	Min	Avg	Max
TSS (mg/L)	43	131	326
BOD (mg/L)	11	34	78
Fecal Coliform (col/100 mL)	10	70	1442
pH (units)	6.5		8.6

III.C.3 Somerville Marginal Priority Pollutants

The results of Somerville Marginal priority pollutant testing can be found in Appendix D Tables D-2 and D-3. As with the other CSO facilities, metals were detected in most of the samples. Table III.C.3 summarizes average metals concentrations in Somerville Marginal effluent in FY01.

Table III.C.3 Somerville Marginal Metals, FY01

	Average Concentration (ug/L)	Times Detected
Cadmium	0.87	5 of 11
Copper	52.87	6 of 6
Lead	117.80	6 of 6
Mercury	0.12	6 of 6
Nickel	12.61	6 of 6
Zinc	207.80	6 of 6

III.D.1 Fox Point Activations

Activation data for Fox Point are summarized in Table III.D.1 and Figures III.D.1 and III.D.2 (next page).

From FY94 to FY98, the volume treated at Fox Point increased, with the exception of FY95, when use of the facility decreased due to repair work requiring rerouting of flows. In FY01, there was a decrease in rainfall and a subsequent decrease in activations and total flows compared to FY00.

Table III.D.1 Fox Point CSO Activations Summary

	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01
Number of Activations	20	4	12	16	21	12	23	**17**
Number of Days Activated	20	4	14	18	24	12	25	**20**
Total Volume Treated (MG)	76	24	97	154	166	59.3	96.93	**65.69**
Maximum Flow (mgd)	12	10	17	45	39	15	25	**16**
Minimum Flow (mgd)	0.40	1.50	1.09	0.26	0.17	0.31	0.47	**0.03**
Average Flow (mgd)	3.80	6.00	6.90	8.55	6.92	4.94	3.88	**3.28**
Total Rainfall (in/year)	45.00	37.40	42.55	48.79	50.87	32.41	46.08	**41.02**

Average flow = Total volume treated divided by the number of days activated.

Figure III.D.1
Fox Point CSO Activations Compared to Precipitation, FY94-FY01

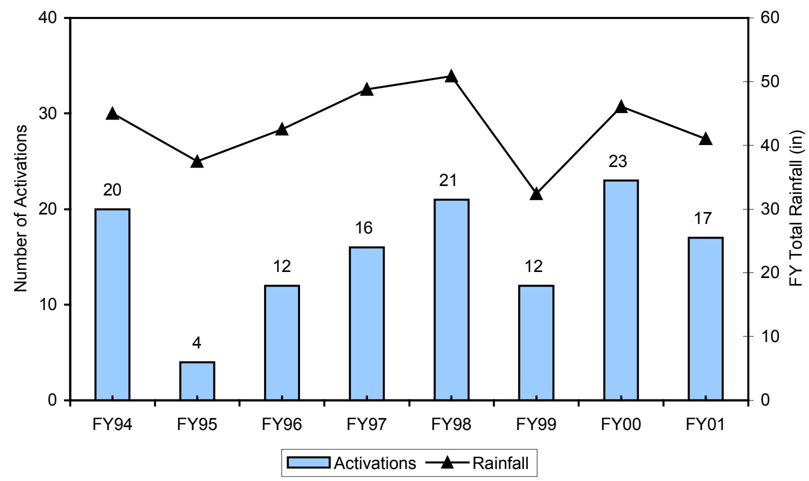
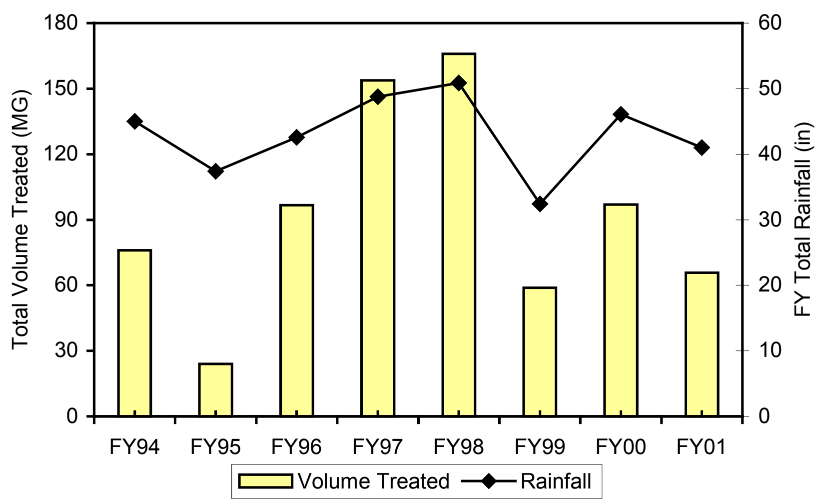


Figure III.D.2
Fox Point Total Volume Treated
Compared to Precipitation, FY94-FY01



III.D.2 Fox Point Conventional Parameters

Conventional parameter data for the Fox Point CSO facility are provided in Appendix E, Table E-1 and are summarized in Table III.D.2. Again, a wide range of values was reported for effluent.

Table III.D.2 Fox Point CSO Effluent Characteristics, FY01

Parameter	Min	Avg	Max
TSS (mg/L)	18	180	526
BOD (mg/L)	10	18	27
Fecal Coliform (col/100 mL)	10	20	100
pH (units)	6.5		8.1

III.D.3 Fox Point Priority Pollutants

Table III.D.3 summarizes data from Appendix E, Tables E-2 and E-3 regarding metals and other priority pollutants in Fox Point effluent. The six sampled metals were detected in nearly every sample.

Table III.D.3 Fox Point Metals, FY01

	Average Concentration (ug/L)	Times Detected
Cadmium	0.66	3 of 6
Copper	15.73	3 of 3
Lead	39.97	3 of 3
Mercury	0.05	3 of 3
Nickel	5.40	3 of 4
Zinc	85.90	3 of 3

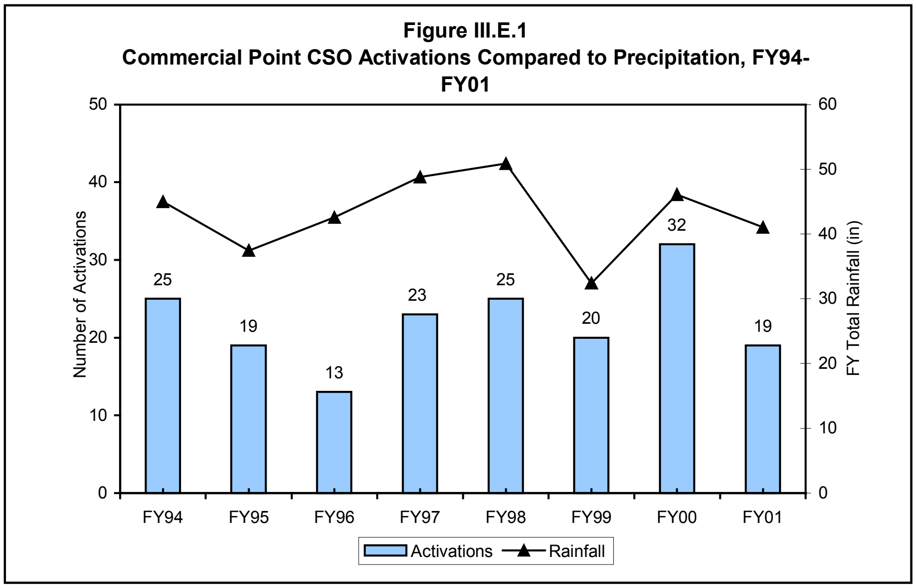
III.E.1 Commercial Point Activations

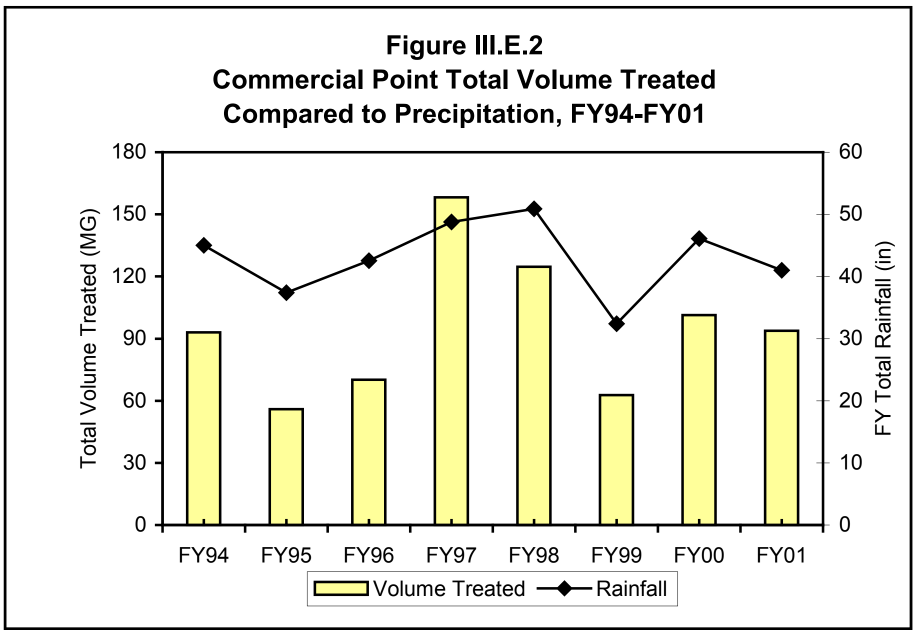
Commercial Point activation data are summarized in Table III.F.1 and Figures III.F.1 and III.F.2. FY01 data are generally comparable to FY00 data; although there were a smaller number of activations, the volume treated was larger; 56% of the total flow resulted from the two March storms.

Table III.E.1 Commercial Point CSO Activations Summary

	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01
Number of Activations	25	19	13	23	25	20	32	**19**
Number of Days Activated	25	19	14	24	28	20	36	**24**
Total Volume Treated (MG)	93	56	70	158	125	62.78	101.3	**93.77**
Maximum Flow (mgd)	17	17	18	54	25	12	30	**31**
Minimum Flow (mgd)	0.21	0.15	0.06	0.19	0.14	0.1	0.03	**0.06**
Average Flow (mgd)	3.72	2.94	5.01	6.59	4.46	3.14	2.81	**3.91**
Total Rainfall (in/year)	45.00	37.47	42.55	48.79	50.87	32.41	46.08	**41.02**

Average flow = Total volume treated divided by the number of days activated.





III.E.2 Commercial Point Conventional Parameters

Commercial Point conventional parameter data are provided in Appendix F, Table F-1. Again, effluent values for the pollutants varied widely.

Table III.E.2 Commercial Point CSO Effluent Characteristics, FY01

Parameter	Min	Avg	Max
TSS (mg/L)	64	93	147
BOD (mg/L)	16	30	55
Fecal Coliform (col/100 mL)	10	20	57
pH (units)	6.1		7.6

III.E.3 Commercial Point Priority Pollutants

Table III.E.3 summarizes data from Appendix F, Tables F-2 and F-3 regarding metals and other priority pollutants in Commercial Point effluent. As with the other CSO facilities, the six sampled metals were detected in nearly every sample.

Table III.E.3 Commercial Point Metals, FY01

	Average Concentration (ug/L)	Times Detected
Cadmium	0.84	3 of 5
Copper	43.13	3 of 3
Lead	98.97	3 of 3
Mercury	0.14	3 of 3
Nickel	6.76	3 of 3
Zinc	164.67	3 of 3

IV: Sludge Processing

Overview

In December 1991, the MWRA ceased discharge of sludge into Boston Harbor. The sludge was then sent to a new plant located on the Fore River in Quincy for processing into fertilizer pellets.

IV.A Pelletizing Process

The pelletizing process begins at the Deer Island Treatment Plant, where gravity thickeners handle sludge and scum from the plant's primary batteries. Centrifuges thicken secondary sludge and scum, with the help of added polymers. Centrate, or the liquid produced by these processes, is sent back to the head of the plant for treatment.

The thickened product is then transferred to Deer Island's most distinctive feature, the egg-shaped anaerobic digesters. In the digesters, bacteria break down the sludge into methane, carbon dioxide, organic material, and water. The methane is tapped and stored, to be used later to generate electrical power or heat for Deer Island. The digested sludge is centrifuged again and then is barged across the Harbor to the Fore River Pelletizing facility.

At the pelletizing plant, centrifuges dewater the sludge into "cake," and dryers further process the sludge into the fertilizer pellets. The centrate from the centrifuges is barged back to Deer Island for treatment. The pellets, marketed as "Bay State Fertilizer," are stored at the facility after production. They can either be packaged on-site, or loaded and shipped out in bulk by rail.

Bay State Fertilizer is available in limited quantities to the general public, and is more widely available to local municipalities and for wholesale purchase.

In the future, sludge will be transferred to the Fore River facility via two tunnels built inside the Inter-Island Tunnel, and a connection from Nut Island (the southern terminus of the Inter-Island Tunnel) to the pelletizing facility. This connection will obviate the need for barging sludge.

IV.B Sludge Pellet Regulations

Both the federal government and the Commonwealth of Massachusetts have regulations for the composition of fertilizer pellets. The federal government regulates copper, molybdenum, nickel, zinc, arsenic, cadmium, lead, mercury, and selenium. Massachusetts sets limits for all of the above except arsenic and selenium, while adding limits for boron and chromium. In most cases the Massachusetts standard are tougher than the federal standards. Meeting these regulations has generally not been a problem for the MWRA or its contractor, New England Fertilizer Company. Table IV.B.1 (next page) summarizes the applicable standards.

Table IV.B.1 Federal and State Limits for Sludge Pellet Metals

Metal	Federal Limit (ppm)	Massachusetts Type 1* Limit (ppm)
Arsenic	41	NR
Boron	NR	300
Cadmium	39	14
Chromium	NR	1000
Copper	1500	1000
Lead	300	300
Mercury	17	10
Molybdenum	75	25
Nickel	420	200
Selenium	100	NR
Zinc	2800	2500

NR: Not regulated
*: Type 1 pellets are certified for marketing and distribution in Massacusetts by MADEP

Due to the February 19 annual submittal date for sludge data, complete data is not available for FY01 operations. However, in calendar year 2000 (CY00; the latest available data), there were no violations of federal standards for sludge pellets. In three months there were violations of the Massachusetts standard for molybdenum. Table IV.B.2 summarizes the analytical results.
The plant processed 30,887 dry tons of sludge in CY00.

Table IV.B.2 Summary of Sludge Pellet Analysis, Calendar Year 2000

Metal	Jan-00	Feb-00	Mar-00	Apr-00	May-00	Jun-00	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	4.7	5.6	5.6	5.6	5.5	4.7	4.0	2.9	3.4	3.1	2.2	2.4
Chromium	51.5	49.7	57.3	62.4	64.1	64.0	57.7	60.8	51.6	51.9	51.4	51.0
Copper	760.8	768.5	795.8	770.0	766.3	744.0	758.0	772.4	779.0	780.0	742.4	669.8
Lead	255.0	222.3	246.4	265.3	256.3	255.6	226.0	233.2	221.5	216.5	193.0	175.3
Mercury	6.0	5.7	5.0	5.5	5.6	5.0	4.0	4.1	3.8	4.1	3.7	3.5
Molybdenum	18.2	15.2	15.0	13.0	12.4	14.0	16.0	21.2	**26.1**	**28.3**	**30.4**	22.4
Nickel	33.6	34.8	35.1	36.2	34.2	35.7	33.9	34.5	30.6	31.7	31.1	29.8
Selenium	3.1	4.1	3.8	4.5	4.2	3.8	4.7	3.0	3.5	3.8	3.4	4.2
Zinc	1192.5	1162.5	1190.0	1167.5	1117.5	1140.0	1130.0	1122.0	1227.5	1307.5	1164.0	1011.3

All results are in ppm.
ND: No data
Bold indicates violations of the MADEP limits for Type 1 sludge. There were no violation of the federal limits.

V: Transport Systems

V.A.1
North System Headworks Choking

Figure V.A.1 below shows the number of hours of maintenance- and rain-related choking at the remote headworks since FY94. Testing and maintenance hours have steadily declined as the MWRA has completed the new DITP. Testing of the new outfall tunnel and secondary Battery C is responsible for the increase in FY01 test and maintenance hours relative to FY00.

Figure V.A.1 Choking, FY94-FY01

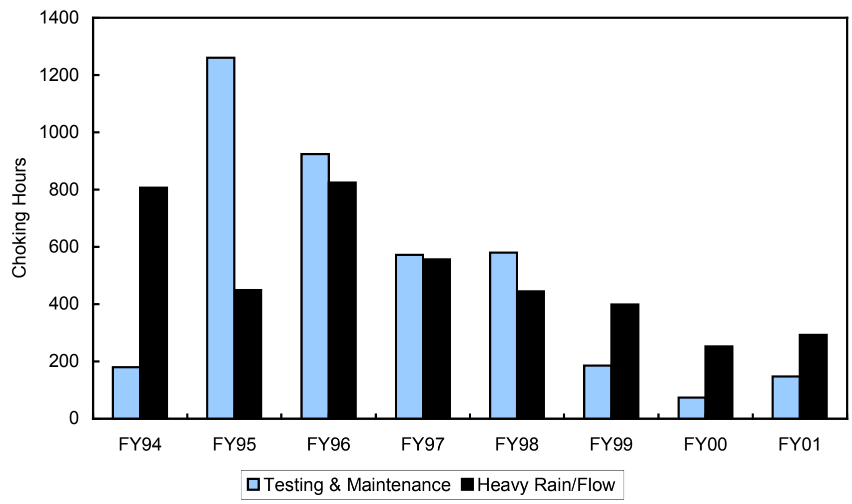
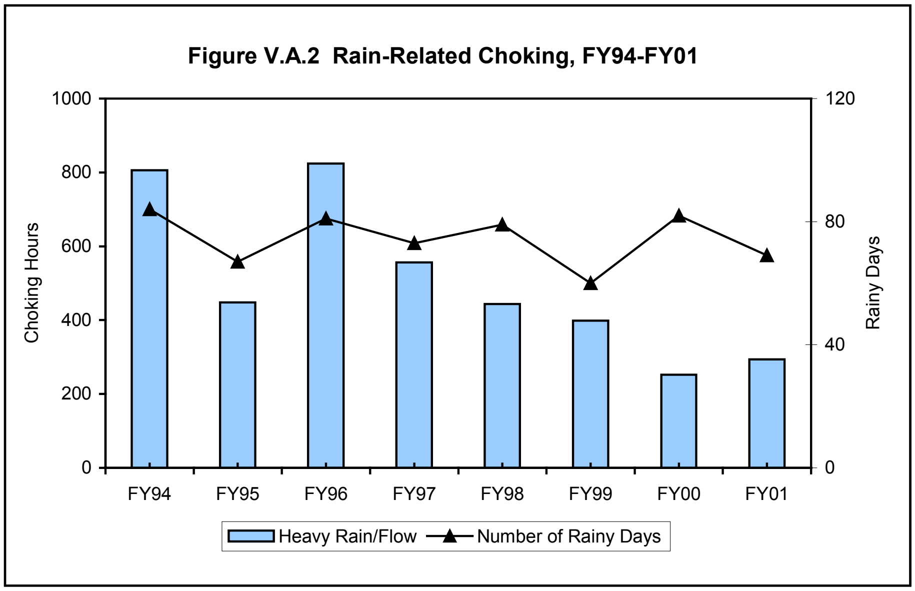
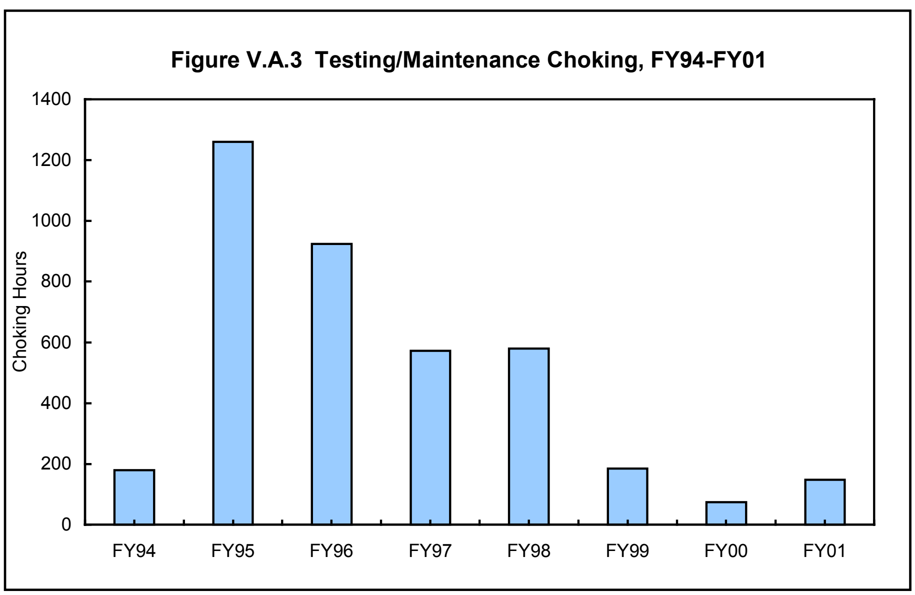


Figure V.A.2 (next page) shows the influence of the number of rainy days in a year on the hours of rain-related choking. A rainy day is defined as a day with at greater than 0.09 inches of rainfall. As this figure shows, FY01 had less rainy days than FY00 but more rain-related choking hours. However, nearly half of the rain-related choking hours occurred in March, when two major storms swept through the Boston area.



Choking for maintenance purposes is plotted in Figure V.A.3 below. Maintenance choking peaked in FY95 due to the maintenance and testing involved in bringing the new primary treatment plant on-line. The number of hours of maintenance-related choking continued to be fairly high from FY96 to FY98 because of maintenance and testing related to the startup of the new primary and secondary treatment plants. For example, in FY98, of the approximately 580 choking hours related to testing and maintenance, 442 hours were due to testing. Since there were no new systems to test in FY99, there was a significant decrease in the testing/maintenance choking hours from FY98 to FY99. Testing and maintenance choking hours increased in FY01, probably due to the opening of the new outfall tunnel and secondary Battery C.



V.A.2 North System Sanitary Sewer Overflows

MWRA monitors sanitary sewer overflows, which occur when extreme rainfall overwhelms the transport system, both visually and with meters in both the North and South Systems. Table V.A.1 lists the number of recorded overflows at several locations in the North System, comparing FY01 with the previous fiscal year. Note that the number of overflows refers to the number of events, rather than the number of days; one overflow can potentially last a number of days. There were 21 reported overflows in FY01 for the North System. This list includes only overflows at MWRA-owned overflow areas. There are also overflows for which the local municipalities are responsible. MWRA monitors these local overflows less frequently, and only when requested to do so by municipalities or notified of a problem by concerned citizens. A list of all the known overflow locations in MWRA lines is provided in Appendix H, Table H-4.

Note that SSOs (sanitary sewer overflows) differ from CSOs (combined sewer overflows) in that CSO relief points are pipes that were specifically designed to relieve the combined sewer system. When the system becomes overloaded, these CSOs discharge combined sewage and storm water into a receiving body of water, such as the Charles River. SSOs, on the other hand, are weak points in the separate system, such as manholes, which will overflow during heavy rain events.

Table V.A.1 Sanitary Sewer Overflows, North System, FY00 and FY01

	Number of Overflows	
Location	**FY00***	**FY01**
Section 80 Arlington (Dudley Street)	0	1
Section 80 Arlington (Brattle Court)	0	1
Section 91B Arlington (Headhouse)	0	1
Section 91B Arlington (Manholes)	0	1
Section B Cambridge	1	1
Section 43/B Cambridge (Alewife Brook Pump Station)	1	2
Section 41 Malden	0	1
Section 95 Malden	0	1
Section C Medford	2	2
Section 91B Medford (Headholes)	0	1
Section 107 Medford	3	2
Section 51 Melrose	0	1
Section 204 Wakefield (Hayes Pump Station)	0	1
Section 212 Waltham (old 4A)	0	1
Section 47 Winchester	0	1
Section 113 Winchester	1	2
Section 114 Winchester	0	1

* Not all FY00 SSOs shown; only those which overflowed in FY01 are listed.

V.B South System Sanitary Sewer Overflows

Table V.B.1 lists the observed overflows in the South System. There was an increase in the number of SSOs in the South System in FY01.

Table V.B.1 Sanitary Sewer Overflows, South System, FY00 and FY01

Location	Number of Overflows FY00*	FY01
Section 570 Boston (Archdale Street)	0	2
Section 571 Boston (Arboretum)	0	1
Section 628 Braintree (Pearl Street)	0	2
Section 626 Braintree/Weymouth (Smelt Brook)	2	3
Section 561 Milton	0	1
Section 530 Newton	1	1
Section 655 Randolph (Headhouse)	0	2

* Not all FY00 SSOs shown; only those which overflowed in FY01 are listed.

V.C Inflow and Infiltration

Inflow and infiltration (I/I) is a potentially serious problem that affects all sewerage systems. The new NPDES permit requires the MWRA to address issues associated with I/I. Inflow is defined as the introduction of non-sanitary sewer water such as stormwater, residential basement pump-out, and industrial cooling water, into sanitary sewers. Infiltration is the leakage of groundwater into sewage lines through cracks, inadequately sealed joints, etc. In both cases, this additional load decreases system capacity, potentially leading to SSOs. I/I poses both a wet and dry weather problem; however, wet weather exacerbates I/I problems.

A summary of all actions minimizing I/I is due annually from MWRA. In addition, the MWRA participates in a Regional I/I Task Force responsible for creating a Regional I/I Reduction Plan for both MWRA and local community collection systems. The I/I Task Force includes both MWRA staff and representatives from local communities. To reduce I/I, the MWRA "may consider incentive programs, rate structures, grant and loan programs, technical assistance and public education efforts as well as regulatory and enforcement mechanisms…" (permit section 18.bb.iv) As of the end of FY01, MWRA has submitted the Regional I/I Reduction Plan for regulatory review.

Find permit-related I/I materials at:
http://www.mwra.state.ma.us/harbor/html/operations.htm

VI: Miscellaneous NPDES Permit Requirements

Overview

The MWRA's new NPDES permit includes a number of other sections other than effluent quality for Deer Island and the CSO facilities, making it one of the most comprehensive permits ever issued by EPA.

VI.A Facility Best Management Practices Plans

Best Management Practices Plans (BMPs) are designed to minimize the environmental impact of MWRA facilities. The MWRA has developed plans for the following facilities:

- Deer Island Treatment Plant
- Nut Island Headworks
- Ward Street Headworks
- Columbus Park Headworks
- Chelsea Creek Headworks
- Cottage Farm CSO facility
- Prison Point CSO facility
- Somerville Marginal CSO facility
- Fox Point CSO facility
- Commercial Point CSO facility
- Fore River Pelletizing Plant

The objectives of BMPs are "(1) minimize the potential for violations of the permit, (2) protect the designated water uses of the surrounding water bodies, and (3) mitigate pollution from materials storage areas, site runoff, improper use of waste disposal system, accidental spillage, etc." (permit section 9.a)

BMPs are available at the above facilities or by request.

VI.B Water Conservation / Dry Day Flow Limit

As briefly described in the Executive Summary, one of the new requirements of the permit is the adherence to a 436 MGD dry day flow limit. In FY01, the MWRA was well within compliance for this limit. See Figure 2 in the Executive Summary for details. If dry day flow reaches 415 MGD, MWRA cannot accept new connections larger than 1.4 MGD.

Additionally, a report is due annually documenting the MWRA's demand management program. The demand management program, run with the cooperation of member communities, reviews historical water and wastewater use, and looks at the effectiveness of past and future conservation programs.

Find permit-related water conservation and dry day flow limit materials at:
http://www.mwra.state.ma.us/harbor/html/flow.htm

VI.C Pollution Prevention Program

The pollution prevention requirement of the new permit requires MWRA to develop strategies to reduce pollutant loadings from households and permitted industries in the service area. The main target of the program is polychlorinated biphenyls, or PCBs, a known human carcinogen. Manufacture of PCBs has been banned for several decades; however, quantities remain in the environment. The other main aspect of the program is the development of educational materials regarding domestic household hazardous waste, with the aim of preventing those materials from entering the MWRA sewerage system through proper disposal techniques.

For more information on the MWRA's pollution prevention program, visit: http://www.mwra.state.ma.us/harbor/html/pollution.htm

VI.D Groundwater Remediation

Currently, groundwater remediation site waters cannot be discharged into the MWRA sewer system. If this prohibition is ever relaxed, a comprehensive assessment of its effects on the sewage system and treatment process is required. As of the end of FY01, no action has been taken on this section.

VI.E Local Limits and Industrial Pretreatment Programs

These two related programs deal exclusively with non-domestic users, which are primarily industry. Under the local limits program, the MWRA develops and enforces specific limits on effluent from industrial users.

The industrial pretreatment program requires the MWRA to inspect and sample industrial users as specified by 40 CFR (Code of Federal Regulations) Part 403. 40 CFR Part 403 is designed as a source reduction program to limit the amount of pollutants in treatment plant influent.

Both programs result in cleaner influent to Deer Island, reducing stress on the plant and improving the efficiency of the treatment process. Additionally, the sludge produced is cleaner and more amenable to safe fertilizer production.

More information on local limits and the pretreatment program is on-line at: http://www.mwra.state.ma.us/harbor/html/local.htm

VI.F Reporting

Finally, the new permit also requires the MWRA to provide the public with easy access to permit compliance reports and other information.

MWRA maintains a NPDES permit website at:
http://www.mwra.state.ma.us/harbor/html/ditp_performance.htm

There is also an EPA listserv, or electronic mailing list, for announcements related to the permit:
http://www.epa.gov/region1/eco/mwra/listserv.html

Finally, there are two library repositories for permit documents:

MWRA Library Charlestown Navy Yard 100 First Avenue Boston, MA 02129	Hyannis Public Library 401 Main Street Hyannis, MA 02601

APPENDICES