NPDES Compliance Summary Report
Fiscal Year 2023
Deer Island Treatment Plant
And
Combined Sewer Overflow Facilities

Massachusetts Water Resources Authority
Environmental Quality Department
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NPDES COMPLIANCE SUMMARY REPORT
Fiscal Year 2023
Deer Island Treatment Plant
And
Combined Sewer Overflow Facilities

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I. Introduction

This report presents and summarizes the NPDES monitoring and compliance data compiled and analyzed by the MWRA Environmental Quality Department during the period of July 2022 to June 2023. While not a regulatory requirement, this report provides useful documentation of influent and effluent quality trends over the course of a fiscal year for MWRA’s Deer Island Treatment Plant (DITP) and Combined Sewer Overflow (CSO) facilities. This report is based on fiscal year data as this aligns with other required reporting, MWRA's DITP and CSO facilities serve large communities’ needs for sewer systems while maintaining healthy water environments for recreation and wildlife.

This report is organized into the following sections:

Section II of this report presents and discusses the monitoring results for DITP, along with Contingency Plan and Ambient Monitoring Plan requirements.

Section III describes the results for the four CSO facilities.

Section IV discusses sludge-processing operations at DITP and MWRA’s Fore River pelletizing facility.

Section V reports on the sewage collection and transport systems.

Section VI covers sewer system overflow events.

Section VII covers inflow and infiltration.

Section VIII covers miscellaneous topics introduced by the permit.

II. Deer Island Treatment Plant

A. OVERVIEW

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 permit issued July 10, 2000 and effective August 9, 2000. The permit calls for secondary treatment of wastewater and monitoring of the effects of the discharge into 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, became operational in March 2001. DITP was designed for an average design flow of 361 million gallons a day, a maximum secondary treatment capacity of 700 million gallons a day, and a hydraulic capacity of 1.2 billion gallons a day.

In addition to the completion of secondary treatment facilities, the MWRA opened on September 6, 2000 a 9.5-mile outfall tunnel that carries treated wastewater from DITP to Massachusetts Bay. The permit requires extensive monitoring of Massachusetts Bay to determine the effects of the outfall, if any exist.

This chapter presents and discusses monitoring information for DITP. The conventional parameters, nutrients, priority pollutants (metals, cyanide, pesticides/PCBs, and other organic compounds), bacteria and effluent toxicity are compared to water quality criteria. Since a number of limits in the Contingency Plan set forth by the NPDES permit deal with effluent quality, this section finishes up with a description of the Contingency Plan and the closely related Ambient Monitoring Plan.

B. MONITORING REQUIREMENTS AND EFFLUENT LIMITATIONS

Influent Flow

Figure II-1 shows the Deer Island flow during each month of FY23, comparing the flow with the monthly average rainfall. The average flow to DITP in FY23 was 278 million gallons per day (mgd).

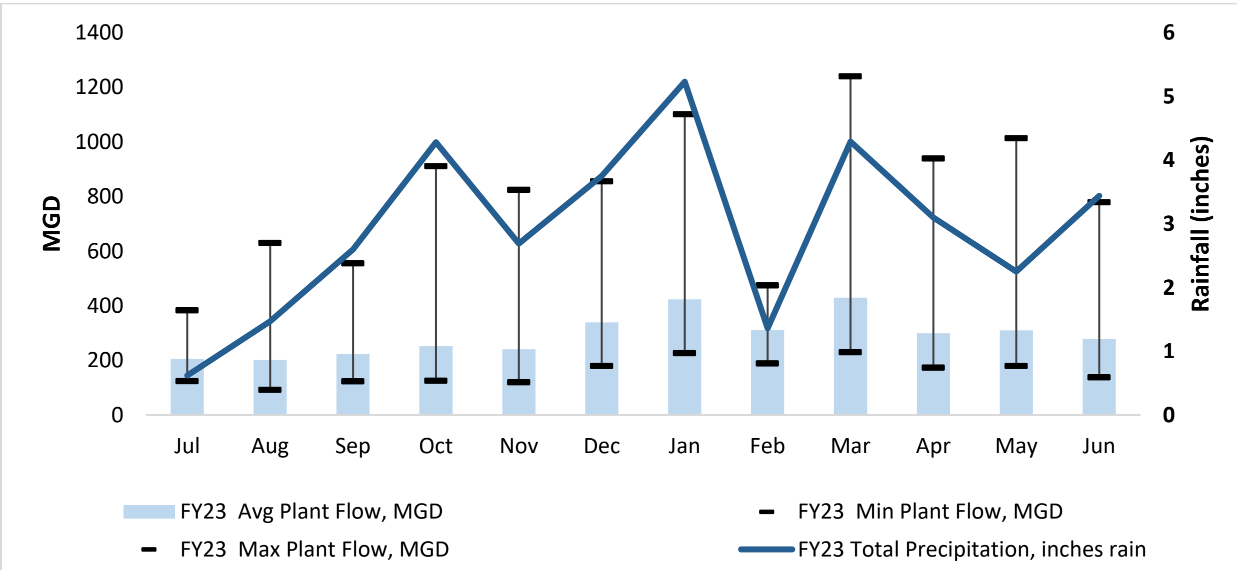

Figure II-1 FY23 Monthly Influent Plant Flow Compared to Precipitation

The impact of rainfall on flows is seen in Figure II-2**,** which tracks average flow and precipitation over the past eleven fiscal years. An increase in rain may lead to slightly higher average flows to DITP. Conversely, decreases in rainfall may lead to lower average flows to DITP.

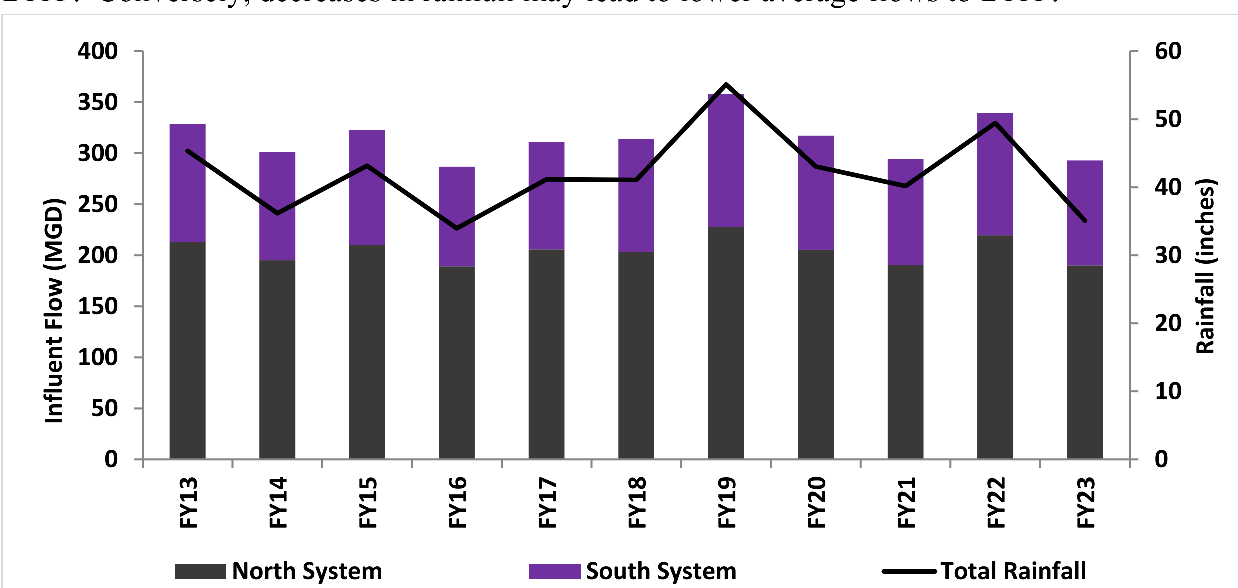

Figure II-2 DITP Yearly Influent Plant Flow Compared to Precipitation Total, FY13-FY23

Dry Day Flow

Restrictions on dry day flow are also part of the permit. These restrictions act to control excessive infiltration of groundwater into the collection system. 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.

MWRA has maintained the 365-calendar-day running average dry day wastewater flow well below the 436 MGD permit limit. For FY23 the 365-calendar-day running average dry day flow to the Deer Island Wastewater Treatment Plant was 257.2 MGD as shown in Figure II-3. Table II-1 presents the dry day average from 2013 to 2023; the eleven year average is 275.0 MGD.

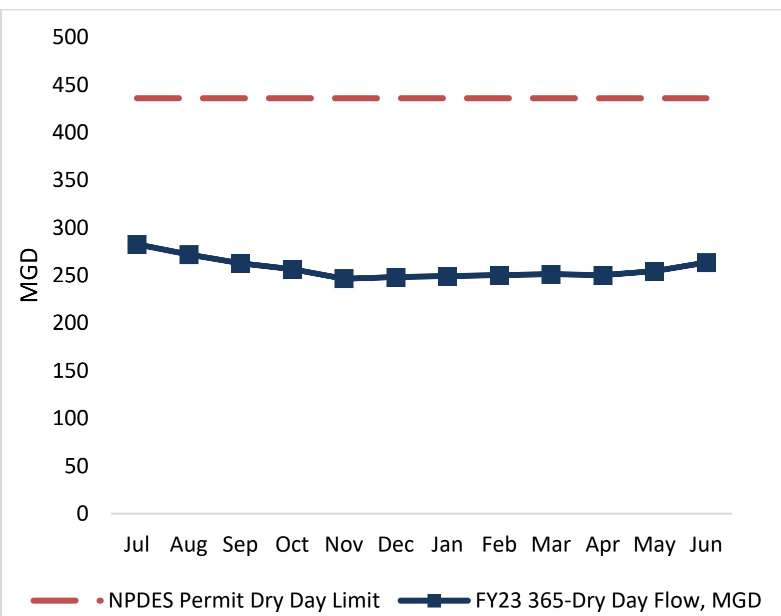

Figure II-3 DITP Dry Flow

Table II-1 365-Calendar Day Running Average

Fiscal Year	Running Dry Day Flow (mgd)
FY2013	271.7
FY2014	267.8
FY2015	273.9
FY2016	261.1
FY2017	270.6
FY2018	272.7
FY2019	307.9
FY2020	282.9
FY2021	262
FY2022	297
FY2023	257.2
Average	**275.0**

cBOD and TSS

The permit limits the monthly and weekly average concentrations for carbonaceous biochemical oxygen demand (cBOD) and total suspended solids (TSS). For cBOD, there were no exceedances of the monthly and weekly averages of 25 mg/L and 40 mg/L respectively see Figure II-4. For TSS, there were no exceedances of the regulatory discharge limits of 30 mg/L and 45 mg/L respectively. See Figure II-6 for FY23 monthly and weekly averages for TSS.

Figure II-5 and II-7 shows the yearly influent and effluent concentration of cBOD and TSS, respectively, from FY2013 to FY2023.

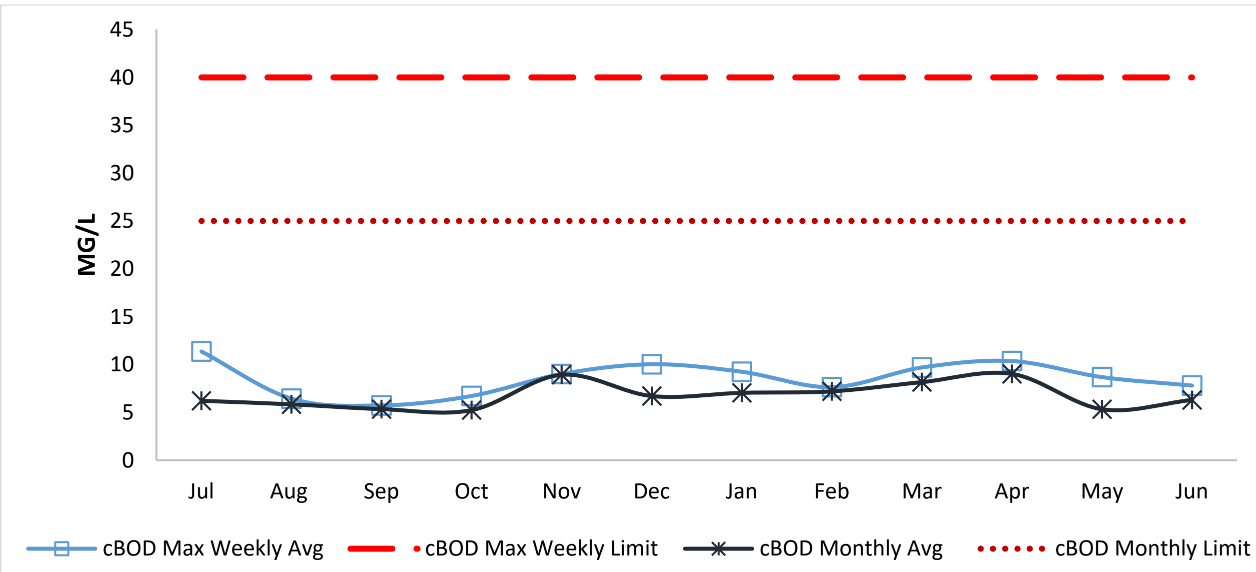

Figure II-4 DITP Effluent cBOD (Monthly Average)

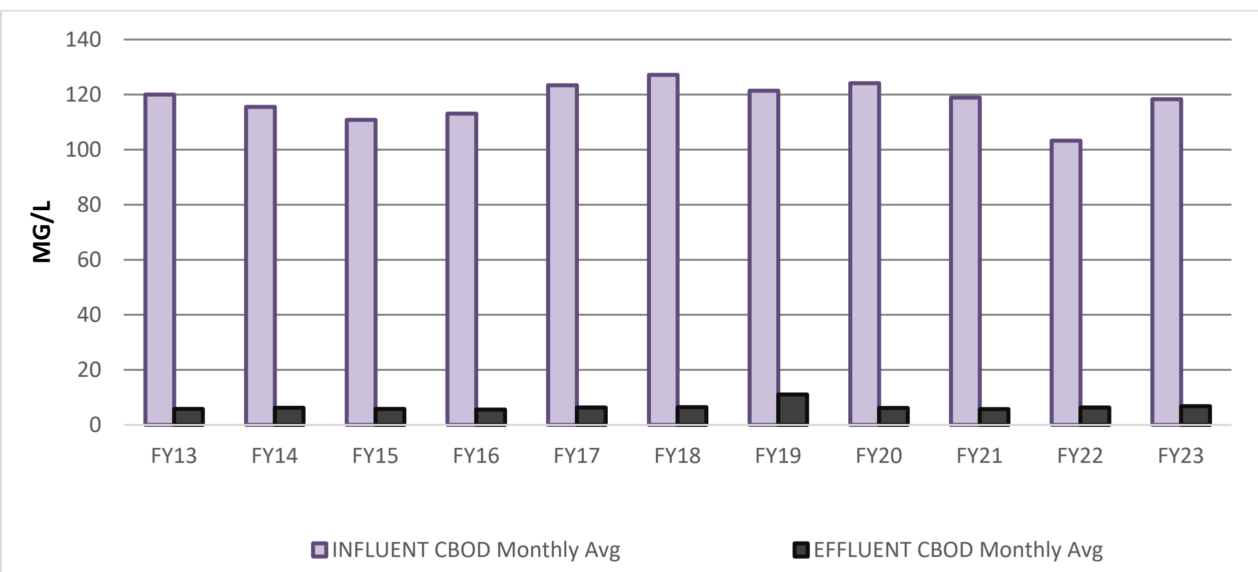

Figure II-5 DITP cBOD (Yearly Average) FY13- FY23

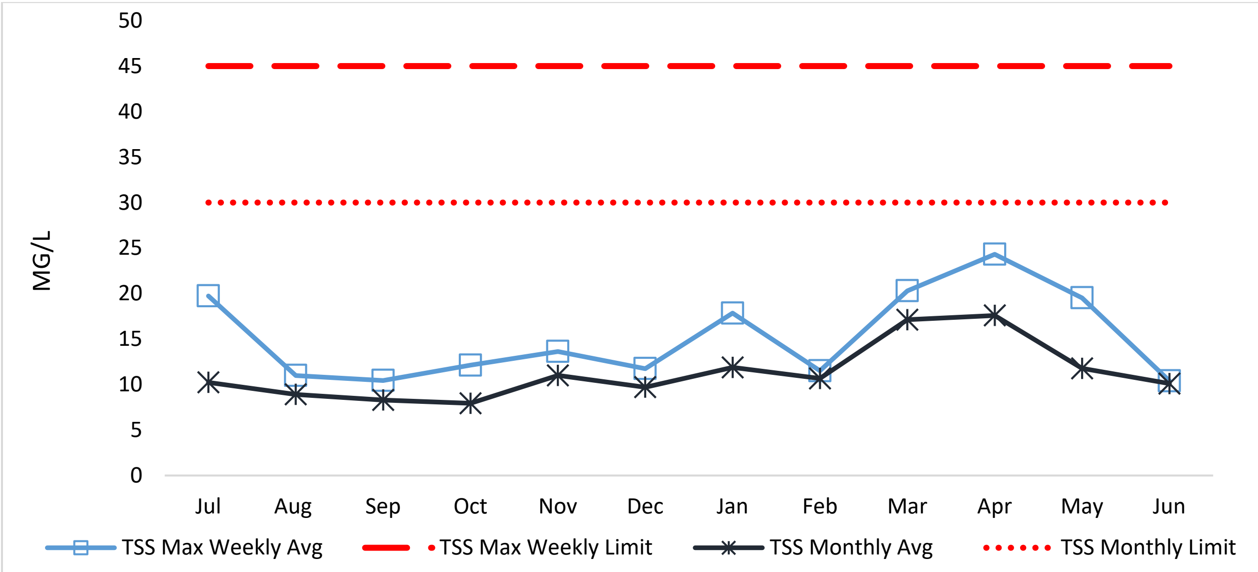

Figure II-6 DITP Effluent TSS (Monthly Average)

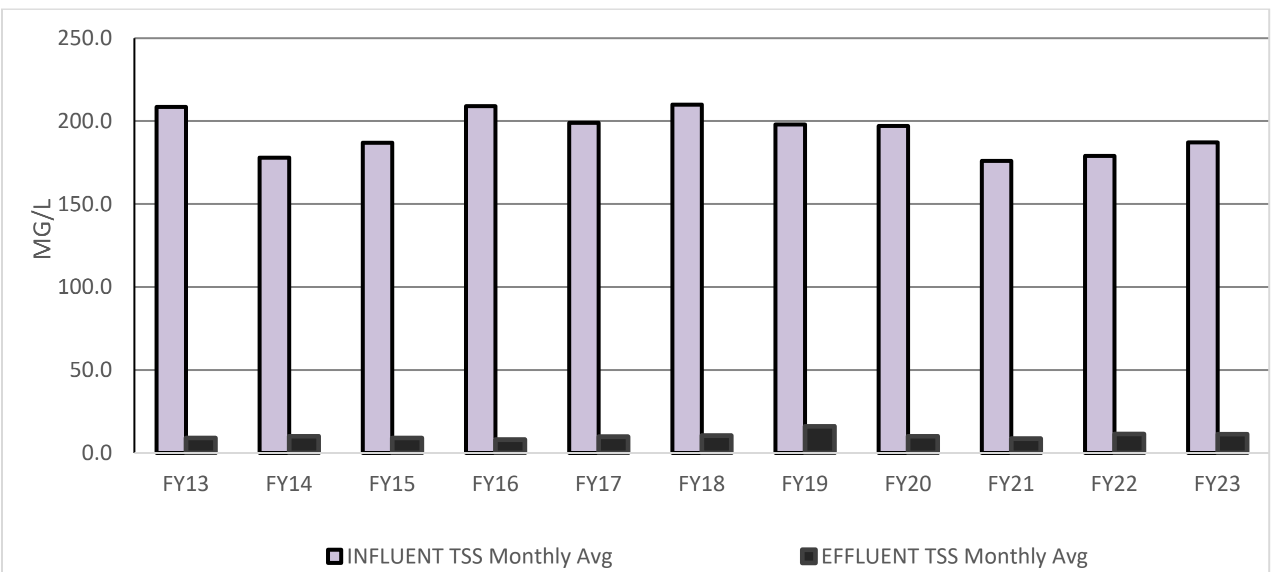

Figure II-7 DITP TSS (Yearly Average) FY13-FY23

Table II-2 compares DITP's removal efficiencies for TSS and cBOD with expected removal efficiencies. The removal efficiencies are determined from the average effluent and influent concentrations for TSS and cBOD as reported in Appendix A. For the fiscal year, 99.3% of DITP flow went through secondary treatment and removal efficiency for TSS was 93%. For cBOD, the plant also achieved 94% removal efficiency.

Table II-2 Deer Island Removal Efficiency, FY23

Parameter	DITP % Removal*	Theoretical % Removal for Secondary Treatment
TSS	93%	85%
cBOD	94%	85%

* Removal efficiencies were determined using the average influent and effluent concentration values as reported in Appendix A.

Fecal Coliform

In FY23, all permit conditions for Fecal Coliform were met. Fecal Coliform is an indicator for the possible presence of pathogens. The levels of these bacteria after disinfection are an indicator of how effectively the plant is inactivating many forms of disease-causing microorganisms.

Conditions in the permit that must be met for fecal coliform are: The effluent shall not exceed a daily and weekly geometric mean of 14000/ml fecal coliform bacteria. Additionally, not more than 10 percent of individual sample results collected in a given month shall exceed the maximum daily limit of 14000/ml, nor more than three consecutive samples shall exceed 1400/ml.

Figure II-8 shows the daily effluent trends of fecal coliform in FY23 on a logarithmic scale. Note that five colonies/100mL is the detection limit for the fecal coliform test, so there will not be results below that number. There were no exceedances of the daily or weekly limit. Figure II-9 shows the percentage of high sample counts (>14,000 colonies/100mL) by month – there were no violations of any of the limits.

Figure II-10 shows weekly Fecal Coliform averages from FY13 to FY23. There has been no exceedance of the weekly limit from FY13 to FY23.

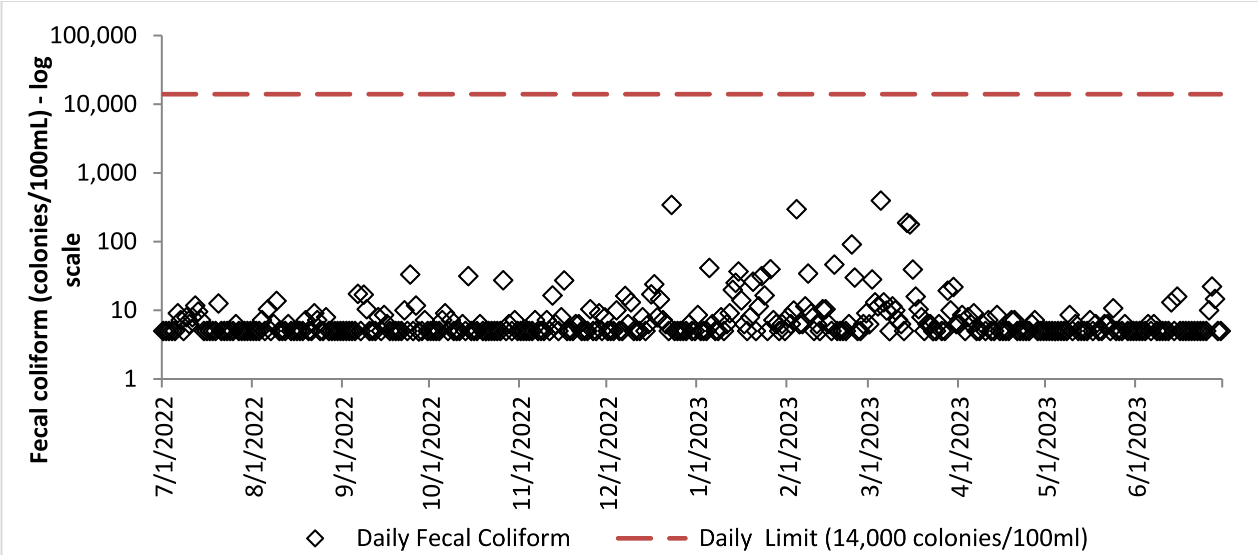

Figure II-8 DITP Effluent Fecal Coliform (Daily Geometric Mean)

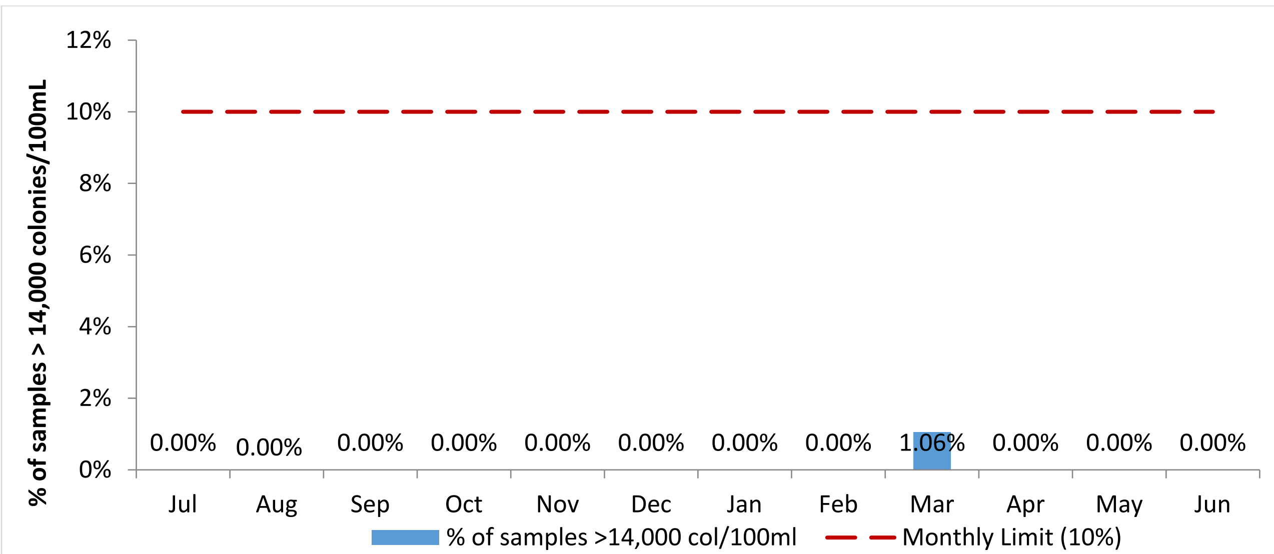

Figure II-9 DITP Effluent Fecal Coliform (High Sample Counts)

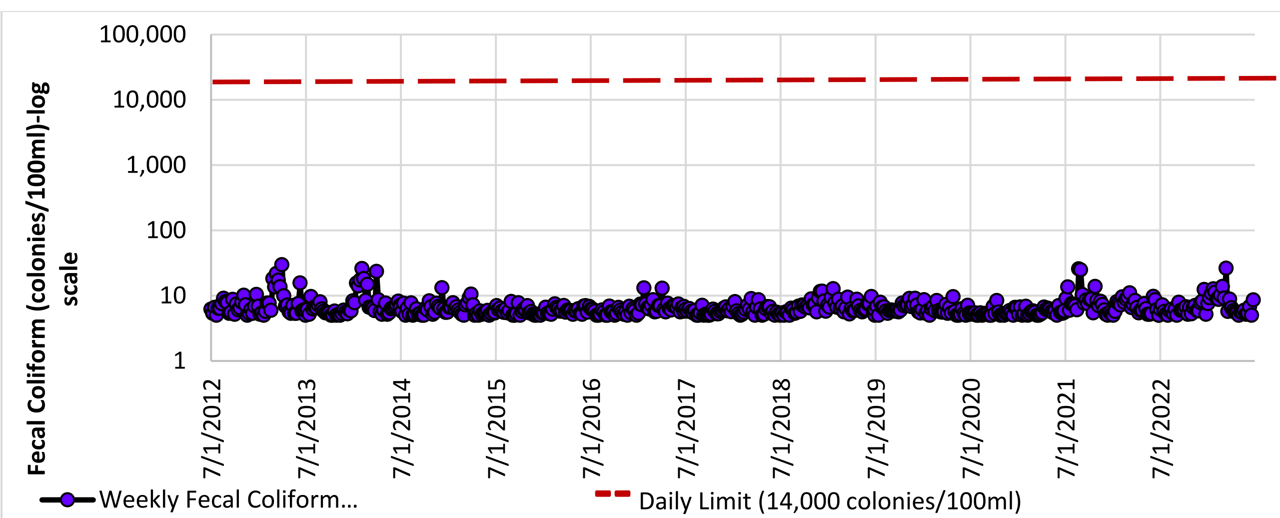

Figure II-10 DITP Weekly Fecal Coliform Average FY13-FY23

Total Chlorine Residual (TCR)

TCR, or Total Chlorine Residual, in the effluent is a measure of the amount of chlorine that remains after the disinfection/dechlorination process. If the chlorine residual in the effluent is too high, it may threaten marine organisms.

The permit regulates total chlorine residual through two limits: a monthly average of 456 µg/L and a daily maximum of 631 µg/L. Figure II-11 shows monthly average and daily max chlorine residual results versus the regulatory limit. The TCR Monthly average and the TCR Daily Max values were non-detectable at 40 ug/L, which is reported as zero, each month in FY23. TCR monthly average and daily max values have been well below the permit limit from FY13 to FY23.

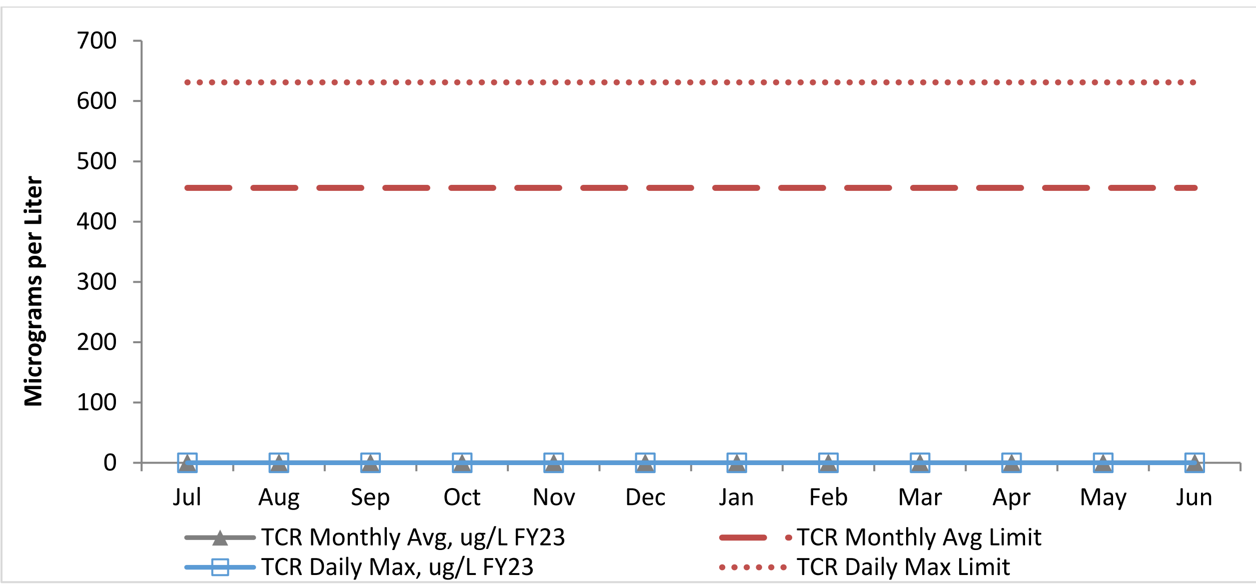

Figure II-11 DITP Effluent Total Chlorine Residual

pH

pH is a measure of the acidity or basicity of the effluent. Small fluctuations in pH do not have an adverse effect on marine environments. DITP uses pure oxygen in the activated sludge reactors, resulting in effluent pH at the lower end of the acceptable range. There were no pH violations in FY23. All measurements fell within the required range of 6.0 to 9.0. See Figure II-12. Figure II-13 shows the yearly average, minima and maxima for FY13-FY23.

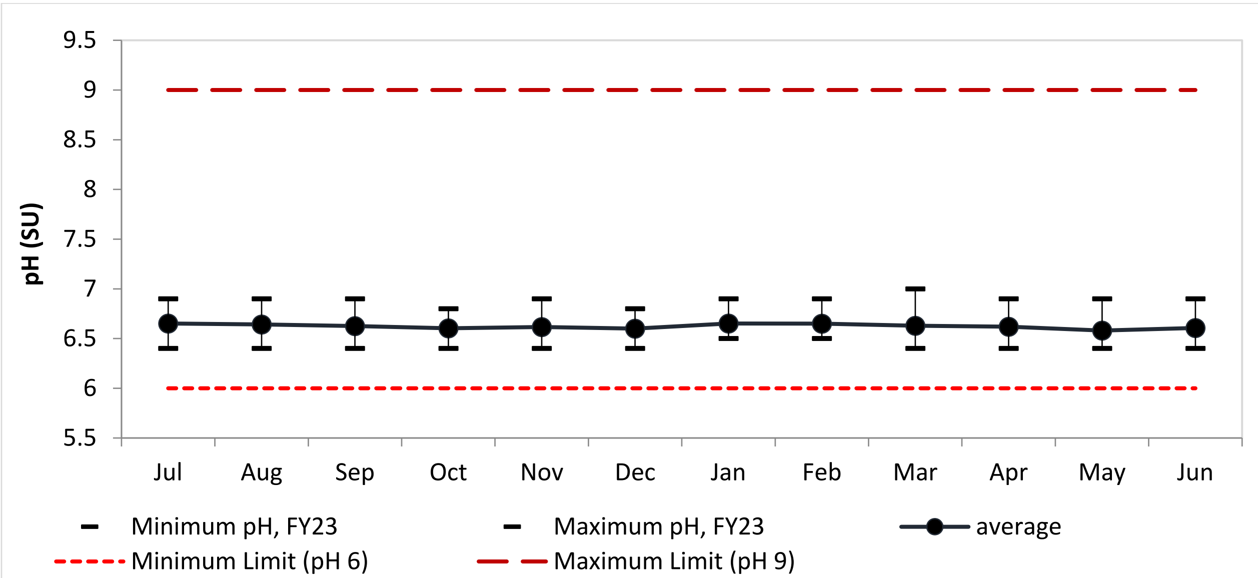

Figure II-12 DITP Effluent pH (Monthly Min, Max, Average)

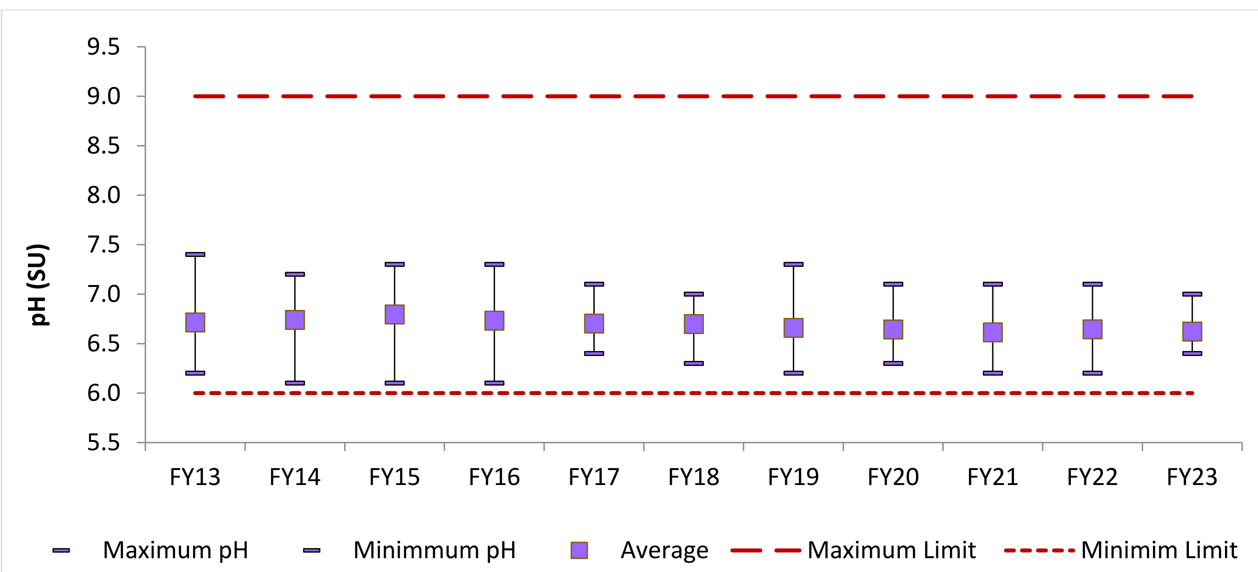

Figure II-13 DITP Effluent pH (Annual Min, Max, Average)

Whole Effluent Toxicity

MWRA tests effluent toxicity every month at DITP. Effluent toxicity provides an overall view of effluent quality, ensuring that the effluent does not adversely affect the environment.

The MWRA permit requires four tests for effluent toxicity testing. Forty-eight-hour acute static toxicity tests using the mysid shrimp (*Americamysis bahia*) and the inland silverside fish (*Menidia beryllina*) 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. The results of these tests for FY23, for which there were no violations, are found in Table II-3. Figure II-14 and II-15 shows the yearly minimum acute and chronic results from July 2012 to June 2023.

The LC50 (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 acute tests result are reported as LC50.

The NOEC (No Observed Effect Concentration) used in the chronic tests 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. A NOEC limit of 1.5% means that 1.5% of the sample is effluent, and the remainder dilution water. Any acute LC50 below 50% or chronic NOEC below 1.5% would exceed the NPDES limit.

Table II-3 Deer Island Wastewater Treatment Plant, Toxicity Test Results

	Mysid*	Arbacia**	Menidia***	Menidia***
	Acute	Chronic	Acute	Chronic
Limit	50%	1.5%	50%	1.5%
July 2022	> 100	100	> 100	50
August	> 100	100	> 100	25
September	> 100	50	> 100	50
October	72.9	25	77	25
November	91.4	100	92.6	25
December	> 100	100	> 100	50
January 2023	> 100	50	> 100	50
February	> 100	100	> 100	50
March	> 100	100	> 100	100
April	> 100	100	> 100	50
May	> 100	100	> 100	50
June	> 100	100	> 100	50

*Mysid is *Americamysis bahia*, a marine animal similar to a shrimp.
**Arbacia is *Arbacia punctulata*, a sea urchin. Chronic test measures fertilization.
***Menidia is *Menidia beryllina*, a small fish. Chronic test measures growth.

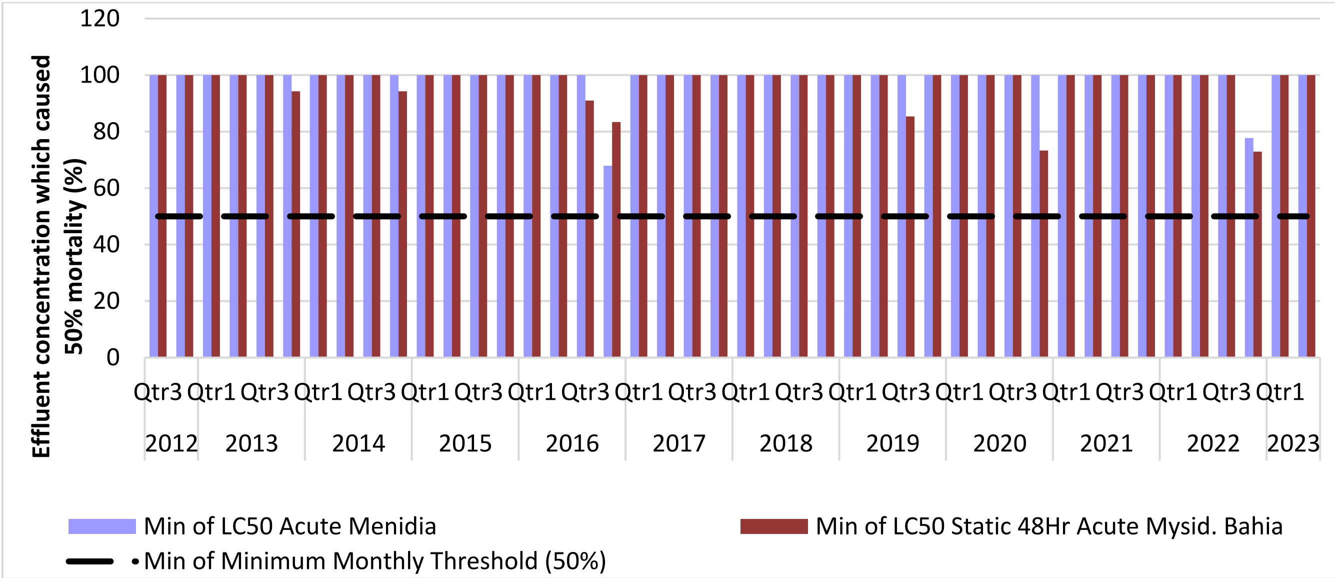

Figure II-14Quarterly minima of Acute Toxicity

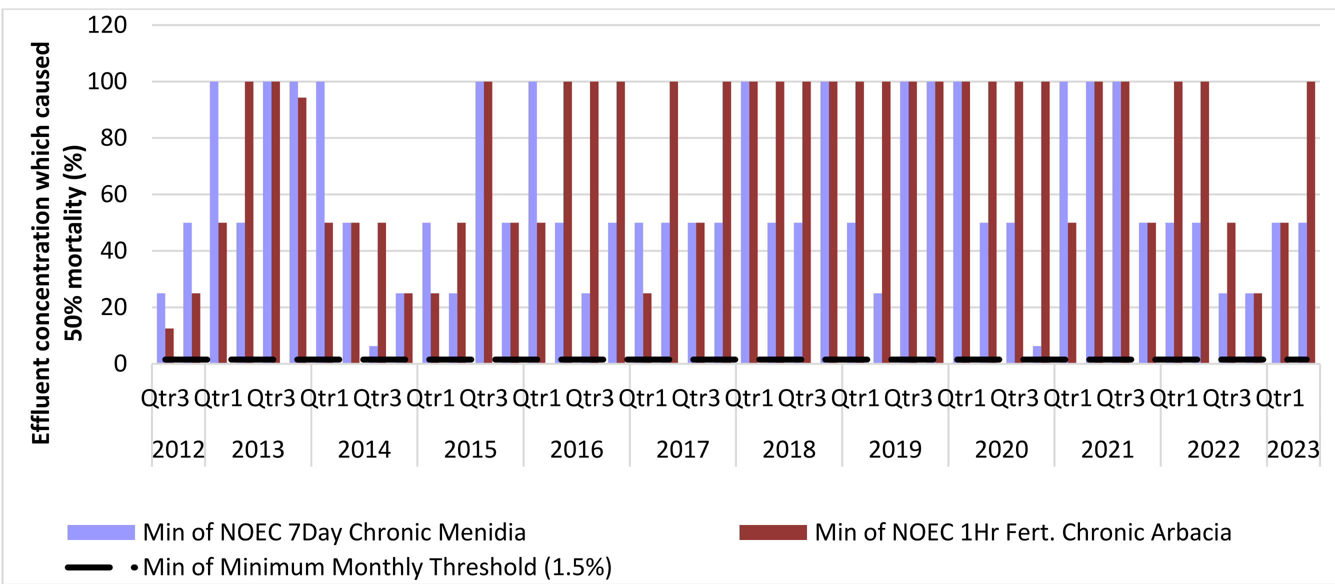

Figure II-15 Quarterly minima of Chronic Toxicity

Nutrients

The MWRA permit requires monitoring of nitrogen species which includes ammonia ($NH3^{-}$), nitrite ($NO2^{-}$), nitrate ($NO3^{-}$), and total Kjeldahl nitrogen (TKN), all expressed as nitrogen. TKN consists of ammonia and organic nitrogen. Total nitrogen (TN) is the sum of TKN, $NO3^{-}$, and $NO2^{-}$.

Figure II-16 shows the total nitrogen monthly average influent and effluent concentration, whereas figure II-17 shows the past eleven years of average influent and effluent concentrations.

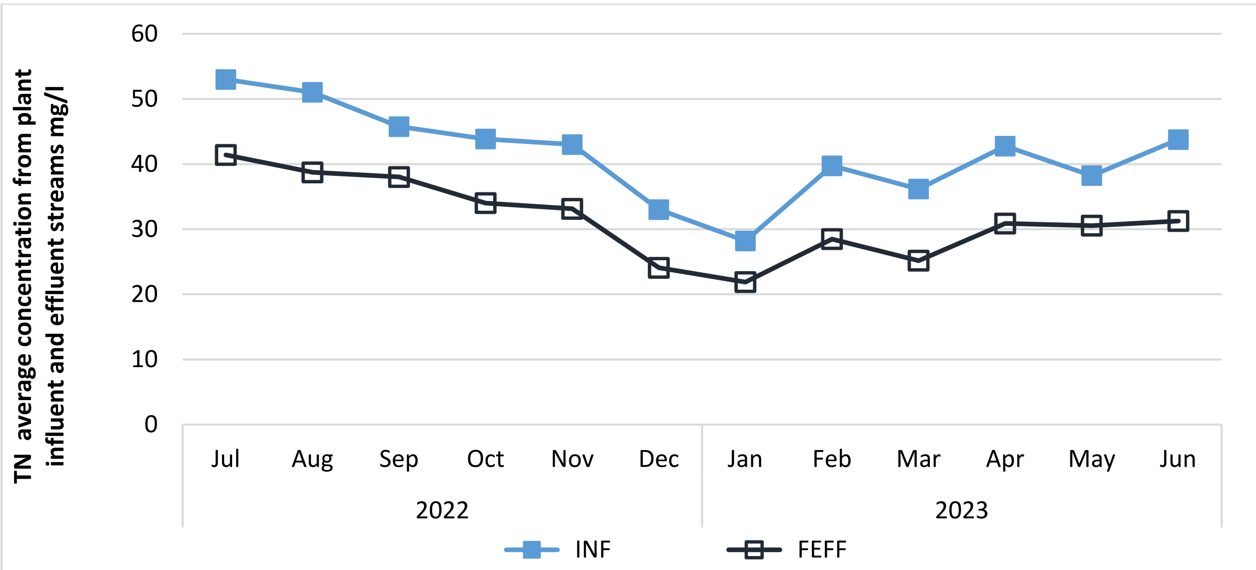

Figure II-16 Total Nitrogen Concentration from Plant Effluent Streams

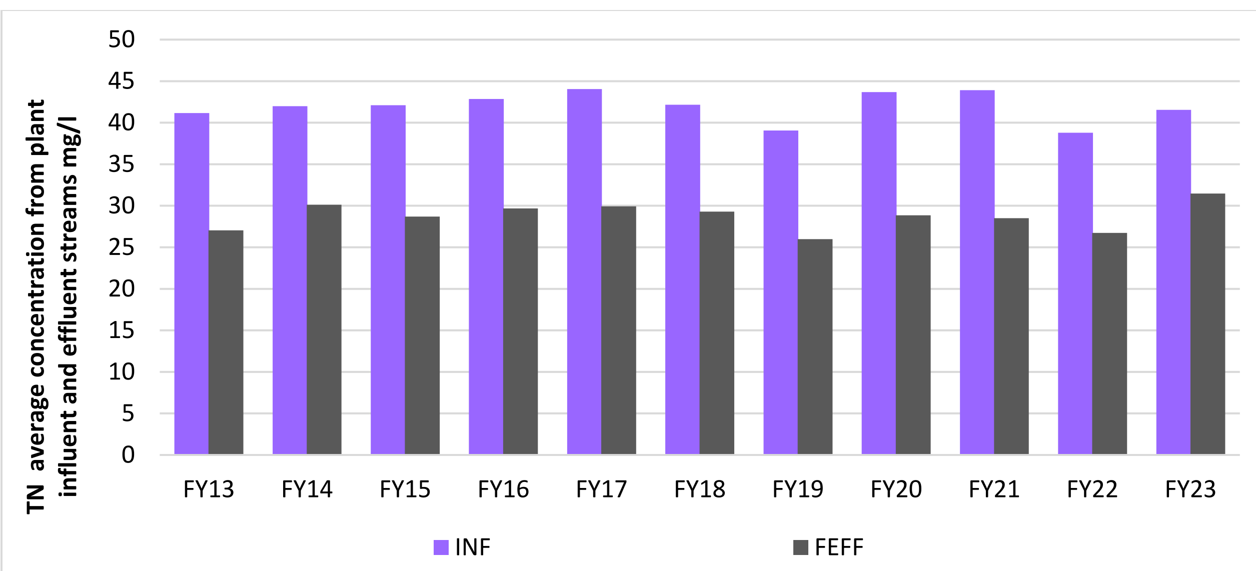

Figure II-17 Yearly Average of Nitrogen Concentration from Plant Influent & Effluent Streams

Priority Pollutants

MWRA regularly performs scans for priority pollutants on Deer Island Treatment Plant (DITP) influent and effluent samples. Additional non-priority pollutants are analyzed in support of meeting receiving water quality goals and the beneficial reuse standards for plant biosolids.

Appendix A presents the analyses of influent and effluent samples from DITP using both EPA-approved methods and (for some organic contaminants) non-EPA-approved ultra-low detection methods. Results are presented as flow-weighted monthly averages of all the samples analyzed during the fiscal year. For levels below reporting limits, one half of the reporting limit for inorganic compounds or one tenth of the quantitation limit for organic compounds was substituted to calculate concentrations. This allows the data to be used without the less conservative assumption that non-detect values are zero. Analyses performed using non-EPA-approved ultra-low detection methods generally confirm that this methodology for handling non-detects is a conservative way to estimate the concentrations of otherwise non-detected pollutants.

Influent: As would be expected for a large urban system, fats, oils and grease, nutrients, and most metals were detected regularly. Of the samples analyzed using EPA-approved detection methods for volatile organic compounds, acetone (used in paints, varnishes, and lacquers manufacturing) and benzoic acid (used primarily as a food preservative and in pharmaceutical and cosmetic preparations) were detected regularly. Benzyl alcohol (used as a general solvent for inks, paints, perfumes, and waxes), 4-methylphenol (*p*-cresol) (an intermediate in the manufacture of chemicals, dyes, plastics, and antioxidants), 2-butanone (methyl ethyl ketone) (widely used as a solvent and intermediate product in the manufacture of ketones and amines), and carbon disulfide (a chemical used in the manufacture of rayon, cellophane, rubber chemicals, and flotation chemicals), were detected in about a third of the samples. Toluene (a solvent and a chemical used in the manufacture of benzene derivatives, dyes, and perfumes) was not detected. Styrene (used in the manufacture of synthetic rubber, plastics, resins, and protective coatings) and tricholorethene (used in removing grease from metals and in the production of some textiles) were not detected in any of the samples.

Of the pesticides and PCBs in tests with EPA-approved methods, total AMP PCBs (20 PCB congeners specific to MWRA's ambient monitoring plan) were detected regularly. Alpha-chlordane and gamma-chlordane were detected in 36 and 40 percent of the samples respectively.

Effluent: The activated sludge secondary process removes from the effluent most of the organic pollutants and pesticides and PCBs. Of the samples analyzed with EPA-approved methods, total AMP PCBs were detected regularly. The DITP NPDES permit has no numerical permit limits for any priority pollutants except for arochlors, because of the low concentrations in the effluent and high available dilution. In fact, toxic contaminants generally meet water quality criteria in the effluent even before dilution. There were no arochlors detected in either the influent or effluent in FY23.

Tables II-4 evaluates the percent reduction of compounds detected in the influent in FY23. Figure II-15, 16 and 17 shows trends of compounds detected in either the influent or effluent from FY13 to FY23. Table II-4 Deer Island Organic Percent Reduction

	FY 2023% Reduction
Pesticides	
Arochlors	100%
Total AMP	100%
alpha-Chlordane	100%
gamma-Chlordane	100%
VOAs	
2-Butanone	100%
Acetone	99%
Carbon disulfide	100%
Styrene	100%
Tetrachloroethene	100%
Toluene	100%

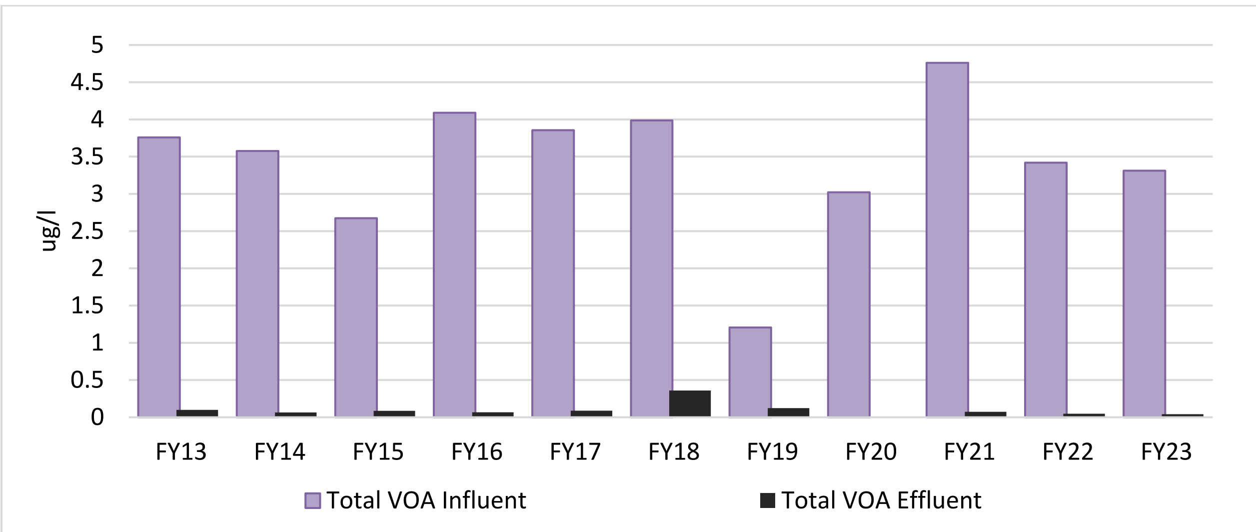

Figure II-18 Yearly Average of Total Volatile Organic Compounds Concentration from Plant Influent & Effluent

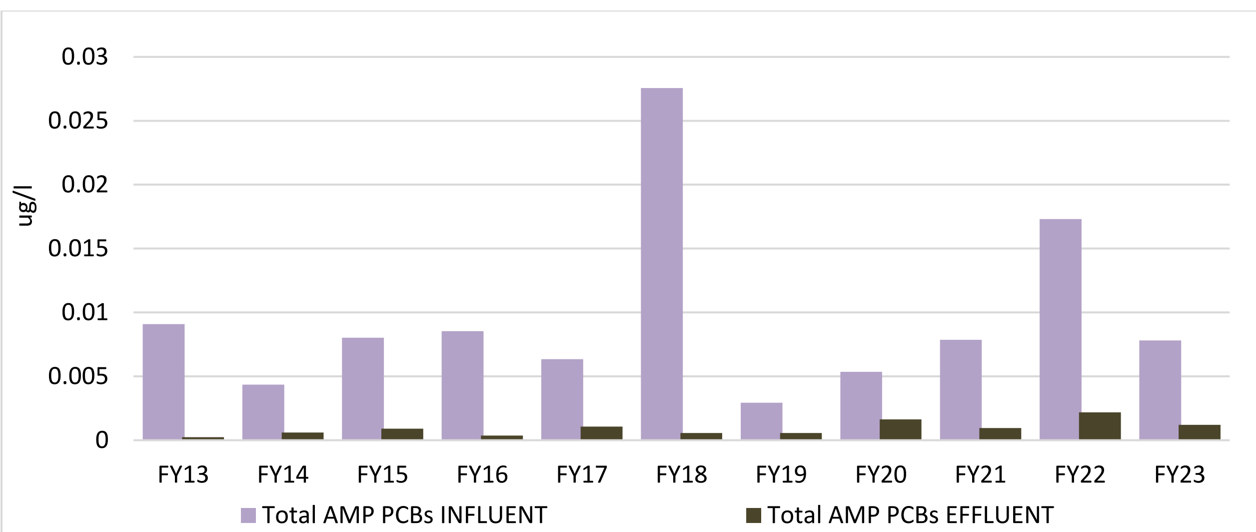

Figure II-19 Yearly Average of Total AMP PCB Concentration from Plant Influent & Effluent

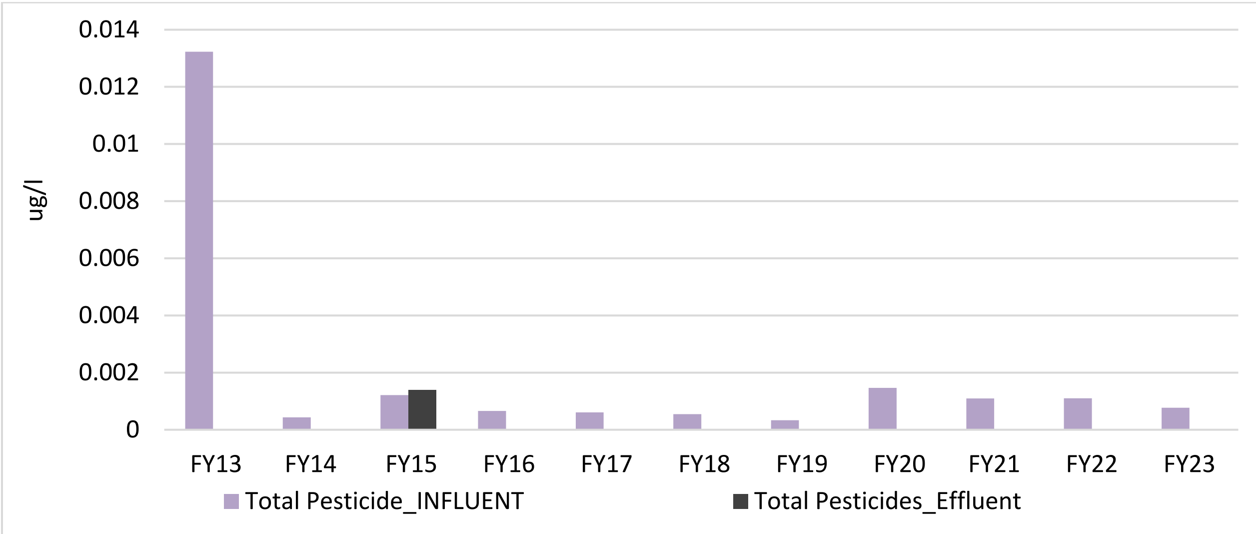

Figure II-20 Yearly Average of Total Pesticide Concentration from Plant Influent & Effluent

The activated sludge process also effectively removes metals. Removal rates for FY23 are presented in Table II-5. Figure II-21 summarizes the annual removal rates for FY13 through FY23.

Table II-5 Deer Island Metals Percent Reduction FY 2023

	Influent Concentration (ug/L)	Effluent Concentration (ug/L)	% Reduction
ARSENIC	0.93	0.478	49%
BERYLLIUM	0.25	0.25	0%
BORON	138	130	6%
CADMIUM	0.228	0.0434	81%
CHROMIUM	2.71	0.484	82%
COPPER	43.5	5.82	87%
IRON	1750	308	82%
LEAD	4.41	0.575	87%
MERCURY	0.0788	0.0058	93%
MOLYBDENUM	6.07	5.01	17%
NICKEL	2.4	1.48	38%
SELENIUM	0.462	0.45	3%
SILVER	0.261	0.0516	80%
THALLIUM	0.5	0.5	0%
ZINC	117	17.8	85%

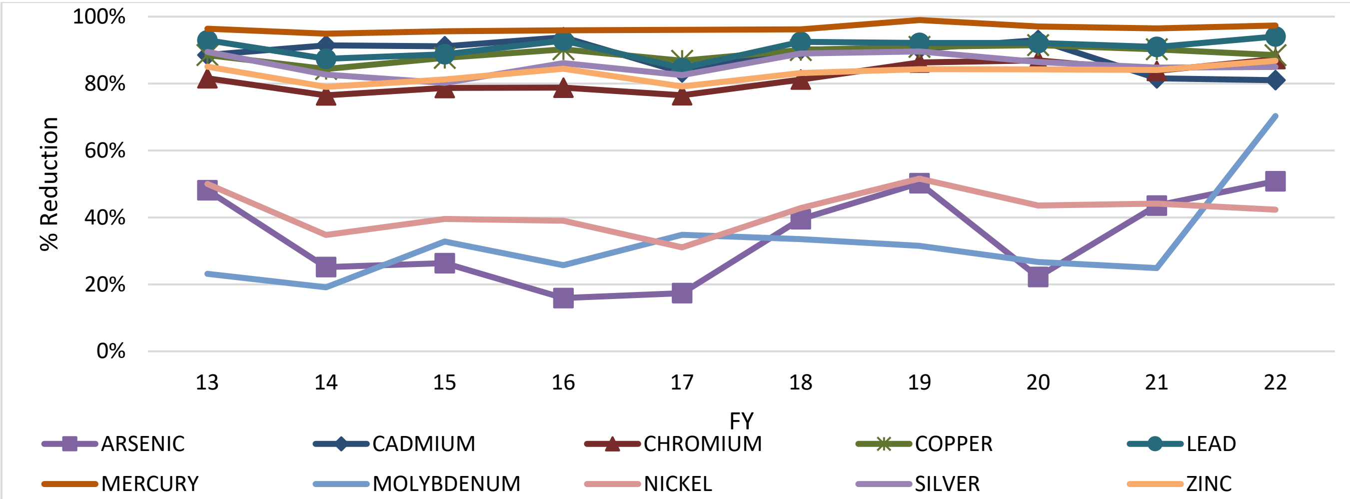

Figure II-21 Deer Island Metal % Reduction FY13-FY23

Table II-6 compares concentrations of metals in DITP effluent to water quality criteria, both acute and chronic. Copper is the only parameter that requires use of a dilution factor to meet water quality criteria. MWRA's NPDES permit allows for a 50:1 dilution for determining compliance with acute water quality standards and a 70:1 dilution for chronic water quality standards. Even before the dilution provided by the outfall, all the metals except for copper were below both the acute and chronic criteria. After dilution, all the metals, including copper, were below the acute and chronic criteria.

Table II-6 Comparison of DITP Effluent with Water Quality Criteria, FY23

Instream Concentration ug/L Effluent Max													
Parameter	**Acute Criterion (ug/L)**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Arsenic	**69**	0.0080	0.0180	0.0175	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0183	0.0080
Cadmium	**33**	0.0010	0.0003	0.0020	0.0009	0.0010	0.0008	0.0014	0.0012	0.0010	0.0032	0.0011	0.0003
Chromium	**A**	0.0181	0.0165	0.0070	0.0846	0.0144	0.0070	0.0070	0.0070	0.0070	0.0206	0.0177	0.0070
Copper	**4.8**	0.1568	0.1278	0.1354	0.1218	0.1102	0.1292	0.1230	0.1262	0.1610	0.2460	0.1646	0.0942
Cyanide	**1**	0.1000	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.2000	0.2000	0.2000	0.2000	0.2000
Lead	**210**	0.0120	0.0120	0.0120	0.0120	0.0120	0.0120	0.0120	0.0120	0.0169	0.0214	0.0120	0.0120
Mercury	**1.8**	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0007	0.0004	0.0001
Nickel	**74**	0.0468	0.0272	0.0330	0.0652	0.0428	0.0452	0.0314	0.0270	0.0330	0.0490	0.0328	0.0312
Silver	**0.95**	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0033	0.0009	0.0009
Zinc	**90**	0.3080	0.2680	0.2600	0.2480	0.2260	0.2840	0.3860	0.4160	0.5540	0.7020	0.4380	0.3960
Instream Concentration ug/L Effluent Average													
Parameter	**Chronic Criterion (ug/L)**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Arsenic	**36**	0.0057	0.0091	0.0121	0.0057	0.0057	0.0057	0.0057	0.0057	0.0057	0.0057	0.0095	0.0057
Cadmium	**7.9**	0.0005	0.0002	0.0007	0.0004	0.0005	0.0003	0.0009	0.0007	0.0006	0.0016	0.0004	0.0002
Chromium	**A**	0.0070	0.0084	0.0050	0.0200	0.0064	0.0050	0.0050	0.0050	0.0050	0.0074	0.0067	0.0050
Copper	**3.1**	0.0904	0.0764	0.0723	0.0689	0.0667	0.0821	0.0720	0.0789	0.0987	0.1221	0.0956	0.0570
Cyanide	**1**	0.0714	0.0357	0.0357	0.0357	0.0357	0.0357	0.0357	0.1429	0.1429	0.1429	0.1429	0.1429
Lead	**8.1**	0.0077	0.0077	0.0079	0.0074	0.0075	0.0077	0.0084	0.0079	0.0095	0.0102	0.0080	0.0076
Mercury	**0.94**	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0003	0.0001	0.0000
Nickel	**8.2**	0.0236	0.0151	0.0187	0.0311	0.0276	0.0294	0.0159	0.0173	0.0199	0.0264	0.0151	0.0174
Silver	**A**	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0017	0.0006	0.0006
Zinc	**81**	0.1971	0.1800	0.1657	0.1393	0.1571	0.1814	0.2571	0.2586	0.3600	0.4643	0.2814	0.2714

For below detection levels, half the method detection limit is used when estimating concentrations to compare with water quality standards.

A No applicable criteria

* EPA National Recommended Water Quality Criteria as incorporated into the Mass WQS [314 CMR 4.05(5)(e)

*Instream concentration calculated by dividing the maximum effluent concentration by 50, the dilution allowed in the permit for acute criterion compliance.

*** Instream concentration calculated by dividing the monthly average effluent concentration by 70, the dilution allowed in the permit for chronic criterion compliance.

C. AMBIENT MONITORING PLAN

The permit requires ambient monitoring of Massachusetts Bay. The ambient monitoring plan has three main components: the Harbor and Bay monitoring plan; the maintenance of the Bays Eutrophication Model; and plume tracking. Table II-7 summarizes the first component of the monitoring plan. Note that the plume-tracking component of the plan was completed and results are available[1]. MWRA also measures bacteria levels in Massachusetts Bay under a separate agreement with the Massachusetts Division of Marine Fisheries.

The ambient monitoring plan was revised in 2004, 2010 and 2021.

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

The Outfall Monitoring Science Advisory Panel (OMSAP), a panel of scientific experts convened by the EPA and MA DEP, oversees the monitoring plan and examines scientific data produced by the MWRA and MWRA consultants. OMSAP 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; documents directly associated with the permit, including the current version of the ambient monitoring plan, can be found at: www.mwra.com
Associated information and synthesis reports generated by ambient monitoring results can be found at www.mwra.com
The OMSAP web page, including announcements for public meetings, is at: https://www.epa.gov/npdes-permits/outfall-monitoring-science-advisory-panel.

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[1]

Hunt CD, Mansfield AD, Roberts PJW, Albro CS, Geyer WR, Steinhauer WS, Mickelson MJ. 2002. Massachusetts Water Resources Authority outfall effluent dilution: July 2001. Boston: Massachusetts Water Resources Authority. Report 2002-07. 77 p.
Hunt CD, Steinhauer WS, Mansfield AD, Albro CS, Roberts PJW, Geyer WR, Mickelson MJ. 2002. Massachusetts Water Resources Authority effluent outfall dilution: April 2001. Boston: Massachusetts Water Resources Authority. Report 2002-06. 69 p.

Table II-7 Post-Discharge Ambient Monitoring Plan Summary

Task	Objective	Sampling Protocol	Analyses
Effluent sampling	Characterize wastewater discharge from Deer Island Treatment Plant	continuous weekly 1/ day – 1/month Several times monthly 3x/daily 3x/daily	Flow Nutrients Solids and organic material Toxic contaminants Bacterial indicators Chlorine
Water Column			
Water column	Collect water quality data throughout Massachusetts and Cape Cod bays (Not all analyses are performed at every station)	9 surveys/year 5 nearfield stations 6 reference stations	**Hydro profile** Temperature Salinity Dissolved oxygen Chlorophyll fluorescence Transmissometry Irradiance Photosynthetically Active Radiation (PAR) Depth of sensors **Water chemistry** Ammonium Nitrate Nitrite Total dissolved nitrogen Particulate nitrogen Phosphate Total dissolved phosphorus Particulate phosphorus Silicate Particulate carbon **Alexandrium** Gene Probe **Phytoplankton** **Zooplankton** Identification, enumeration
		3 stations in Cape Cod Bay	**Hydro profile** Temperature Salinity Dissolved oxygen Depth of sensor Chlorophyll fluorescence PAR **Water Chemistry** Nitrate + nitrite Ammonium Phosphate Total nitrogen Total phosphorus Extracted chlorophyll **Phytoplankton** **Zooplankton** Identification and enumeration

Task	Objective	Sampling Protocol	Analyses
Mooring (NERACOOS)	Provides continuous oceanographic data for Massachusetts Bay	Continuous measurement of biological parameters One to four depths near Cape Ann	Temperature Salinity Dissolved oxygen Chlorophyll and turbidity
Remote sensing via satellite imagery (NASA PACE)	Provides oceanographic data on a regional scale through satellite imagery	Available daily (cloud-cover permitting) from NASA's Ocean Color web service	Surface temperature Chlorophyll
Marine Mammal Observation	Provide observational data and set a positive example by using observers to minimize the chances of collision with a right whale and other marine mammals	Observer continuously scanned the sea surface while sampling vessel is in transit or while on-station.	Count of marine mammals observed
Sea Floor			
Soft-bottom studies	Evaluate sediment quality and benthos in Boston Harbor and Massachusetts Bay	1 survey/year 10 nearfield stations 3 farfield stations	Benthic species composition and abundance from 0.04 m^2 grab samples as retained on 0.3 mm sieves. TOC, sediment grain size, *Clostridium perfringens* spore counts in the 0-2 cm depth fraction.
Hard-bottom studies	Characterize marine benthic communities in rock and cobble areas	1 survey/3 years 23 stations	Benthic hard-bottom species composition as determined by digital video analysis, supplemented by stills as appropriate; topography and sediment cover.
Fish and Shellfish			
Winter flounder	Determine contaminant body burden and population health	1 survey/year 2 stations	PCB, pesticides, mercury and lipids in flounder fillet and lobster meat. PCB, PAH, trace metals, pesticides, and lipids in flounder liver and lobster hepatopancreas. Histological analysis of flounder liver. Animal size, mass, and dry/lipid weight are recorded.
American lobster	Determine contaminant body burden	1 survey/3 years 3 stations	
Blue mussel	Evaluate biological condition and potential contaminant bioaccumulation	1 survey/3 years 3 stations	PAH, PCB, pesticides, mercury and lead.
Adapted from Werme, C, Rex, Ac, Hunt, CD. 2012. 2002 *Outfall Monitoring Overview Background: 2012 update*. EnQual report 2012-02. Updated from MWRA, 2021. *Ambient monitoring plan for the Massachusetts Water Resources Authority effluent outfall revision 2.1.* August 2021. Boston: Massachusetts Water Resources Authority. Report 2021-08.			

D. THE CONTINGENCY PLAN

The permit requires a contingency plan that defines a response plan when a parameter threshold is exceeded. Reponses may include further study and additional data collection, changes in laboratory procedures, or changes in treatment plant process. Table II-8, Table II-9 and Table II-10 show the thresholds for the parameters. The effluent thresholds are set to be equal to the NPDES permit limits, with additional thresholds for plant performance. However, the Contingency Plan includes a number of thresholds related to parameters monitored under the Ambient Monitoring Plan in Massachusetts Bay.

Table II-8 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 historical harbor prevalence	--

Table II-9 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	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	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 (1)	--	--
Nearfield water column *Alexandrium tamarense*	100 cells/L	--
Farfield water column PSP extent	New incidence	--
Redox potential discontinuity, nearfield sediments	0.5 x baseline	--

(1) 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 makes every effort to participate in workshops to investigate food web pathways in Massachusetts and Cape Cod Bays sponsored by NOAA Fisheries.

Table II-10 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 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 MGD for an annual average dry day

Under the Contingency Plan, two types of thresholds exist: a caution level and a warning level. . Table II-11 details the Contingency Plan exceedances in FY23. For more information on exceedances, please refer to the website listed below.

Table II-11 Contingency Plan Exceedances, FY23

Date*	Threshold Level Exceeded	Threshold Exceeded
7/5/2022	caution	Alexandrium (Red tide), June 28 2022
9/26/2022	warning	Ambient dissolved oxygen (August 23, 2022)
10/7/2022	caution, warning	Ambient dissolved oxygen (September 20, 2022)
12/7/2022	caution, warning	Ambient dissolved oxygen (October 18, 2022)
* Notification date; typically, within 5 days of knowing of the exceedance.		

More information on Contingency Plan topics is on the Internet at:
www.mwra.com
Exceedance reports are posted at:
www.mwra.com

III. Combined Sewer Overflows

Overview

This section summarizes data collected as part of the MWRA combined sewer overflow (CSO) discharge monitoring program.

MWRA monitors four CSO facilities. Three of the facilities – Cottage Farm, Prison Point, and Somerville Marginal – are included in the same NPDES permit as DITP. The fourth facility is the Union Park CSO facility, located in Boston and discharging to the Fort Point Channel. Union Park operates under a separate NPDES permit than the other CSO facilities. Details of the CSO facilities can be found in Appendix G. There are no CSO facilities in the South System. In November 2007, the Fox Point and Commercial Point facilities were decommissioned and will no longer discharge due to the completion of a separation project in the Dorchester area. The Constitution Beach facility was deactivated in September 2000.

Each CSO facility screens, chlorinates, and dechlorinates combined wastewater (sewage and storm water) prior to discharge. The Cottage Farm, Prison Point, and Union Park facilities also have pumping and tank storage capacity. Pumping and tank storage allow screened and 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 discharge through the CSO outfalls. All of this discharge is disinfected and dechlorinated.

The remaining CSO facility – Somerville Marginal – is a gravity CSO facility, meaning that combined wastewater both arrives and leaves the CSO facility by gravity instead of pumping. The disinfected wastewater overflows to the receiving water as quickly as it arrives at the facility, but is dechlorinated before discharge.

Since the early 1990s, major MWRA system improvements, such as the upgrade of the Deer Island Treatment Plant and related transport systems and the completed CSO projects, have reduced the frequency and volume of CSO discharges and have increased the percentage of discharges receiving treatment. MWRA's CSO Long Term Control Plan (LTCP) reduced region-wide CSO discharge volume in a Typical Year from 3.3 billion gallons in 1988 to 0.4 billion gallons, an 87% reduction, with 93% of the remaining discharge volume receiving treatment at MWRA's four CSO treatment facilities. Figure III-1 shows the estimated Typical Year CSO volume reduction system-wide since 1992. The "Typical Year" is a year with an average number of storms of various sizes, which is input into a computer model of the sewer system to estimate what CSOs would occur if rainfall stayed the same while the sewer system was improved. The apparent small increase in 2019 is due to a recalibration of the sewer system model. Real rainfall and corresponding CSOs vary from year to year as shown in Figure III-2, which shows CSO activation by facility compared to rainfall.

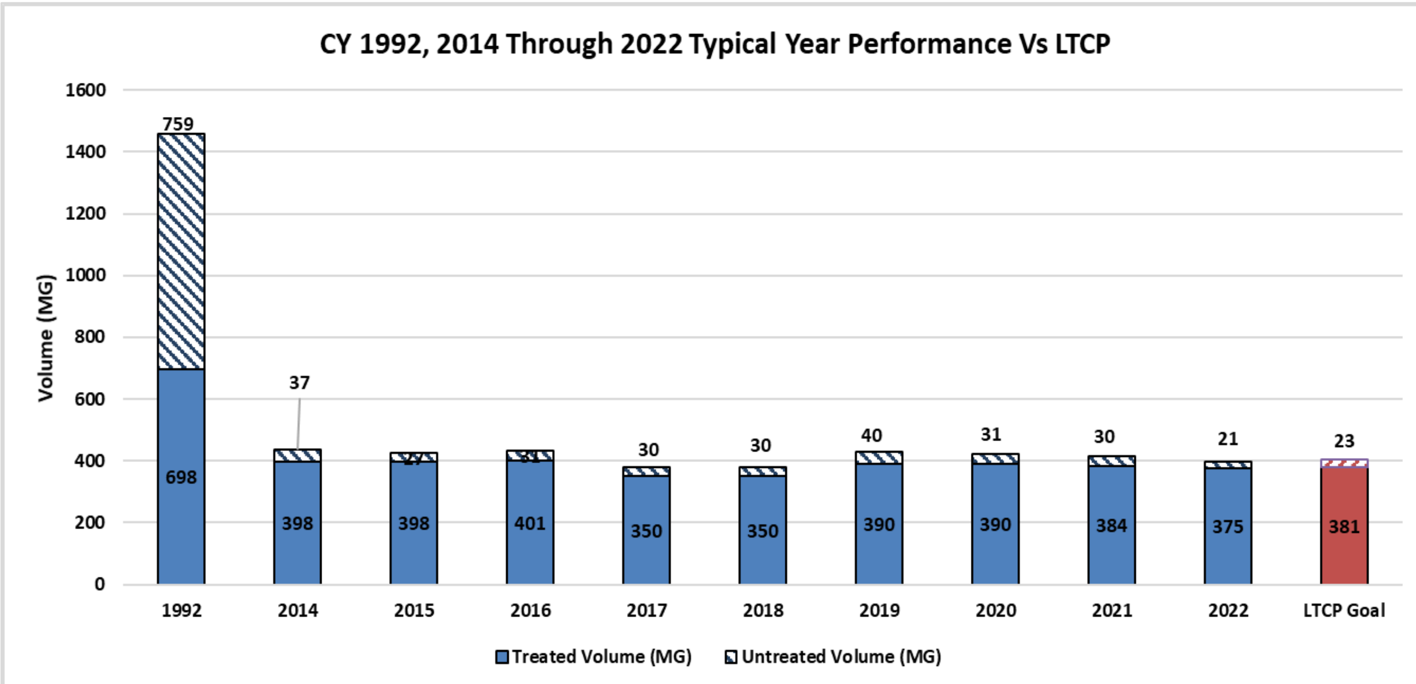
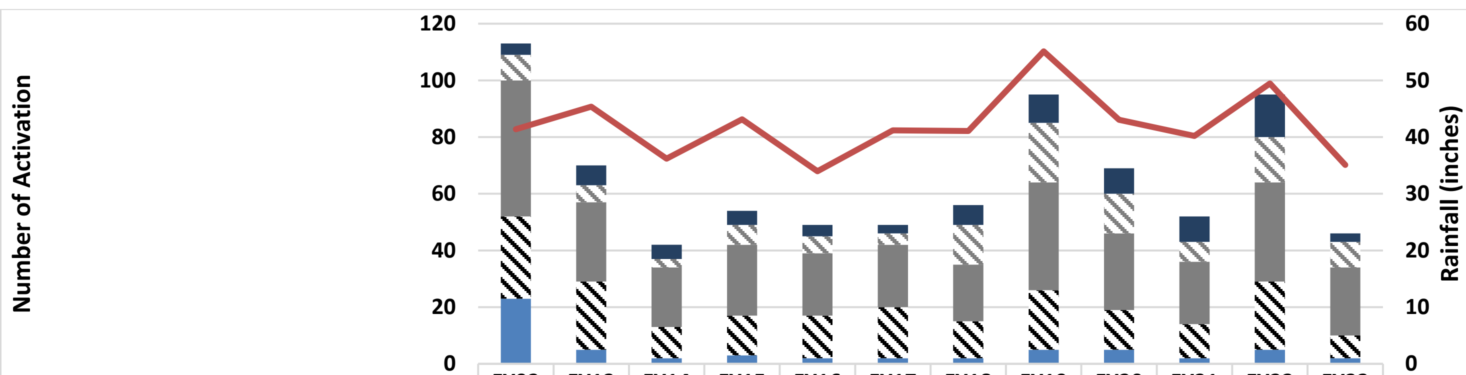


Figure III-1 CY 1992, and 2014 Through 2022 Typical Year Modeled CSO Performance vs LTCP



	FY92	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
Union Park Activations	4	7	5	5	4	3	7	10	9	9	15	3
Somerville Marginal 205A Activations	9	6	3	7	6	4	14	21	14	7	16	9
Somerville Marginal Activations	48	28	21	25	22	22	20	38	27	22	35	24
Prison Point Activations	29	24	11	14	15	18	13	21	14	12	24	8
Cottage Farm Activations	23	5	2	3	2	2	2	5	5	2	5	2
Rainfall	41.38	45.36	36.18	43.13	33.97	41.17	41.08	55.12	43.06	40.19	49.44	35.08

Figure III-2 CSO Activations FY92, FY13- FY23

Monitoring results

The MWRA's NPDES permit requires the Authority to monitor wastewater discharge from its CSO facilities for specific parameters. This chapter presents and discusses monitoring information for the four CSO facilities, conventional parameters, metals, bacteria and effluent toxicity. Appendix B, C, D, and E contains detailed data on parameters in the effluents of each CSO facility. Table III-1 summarizes CSO activation information for each treatment facility for FY23.

Table III-1 CSO Activation Summary FY23

	Cottage Farm			Prison Point			Somerville			Somerville 205A			Union Park		
Month	Duration (hr)	Volume (MG)	Activation	Duration (hr)	Volume (MG)	Activation	Duration (hr)	Volume (MG)	Activation	Duration (hr)	Volume (MG)	Activation	Duration (hr)	Volume (MG)	Activation
Jul															
Aug							0.4	0.0	1						
Sep							1.6	0.2	1						
Oct				4.5	14.8	1	2.9	2.8	2						
Nov				2.1	6.1	1	4.0	4.4	3	0.3	0.2	1			
Dec				5.46	17.6	2	11.6	7.7	3	3.3	2.5	1			
Jan				3.6	14.7	1	5.4	5.7	3	3.1	4.1	1	0.9	0.8	1
Feb															
Mar	3.27	12.11	1	9.6	48.0	1	18.3	18.0	3	5.5	5.2	2	7.3	7.4	1
Apr							0.7	0.9	1	0.6	0.4	1			
May	0.63	1.79	1	5.95	27.26	2	7.7	9.8	2	3.0	6.0	1	1.2	1.2	1
Jun							5.0	2.7	5	1.0	0.3	2			
Total	**3.9**	**13.9**	**2.0**	**31.3**	**128.4**	**8.0**	**57.7**	**52.1**	**24.0**	**16.8**	**18.6**	**9.0**	**9.4**	**9.4**	**3.0**

Table III-2, III-3 and appendices B, C, D and E summarize violations and presents effluent data for each facility for FY23. There were violations for total chlorine residual, fecal coliform and pH. All four facilities covered in this chapter provide floatables control (screening), chlorination, and dechlorination. However, these facilities cannot provide the same level of effluent treatment as a secondary treatment plant such as Deer Island. MWRA also tests CSO effluent for metals whenever the CSO facility is sampled. The results of these tests are presented in Appendices B, C, D and E. Metals are commonly detected in almost every sample. There is no permit limit for toxicity, but any observed LC50 less than 100% requires repeat sampling as soon as possible, to ensure the toxicity does not persist.

Table III-2 CSO NPDES Violation Summary FY23

Effluent Characteristics	Cottage Farm	Prison Point	Somerville	Somerville 205A	Union Park
TCR: # of Violations	2	0	0	NA	0
Fecal Coliform: # of violations	4	6	2	NA	8
pH: # of violations	1	3	0	NA	4
Enterococcus: # of violations	NA	NA	NA		0

Table III-3 CSO Toxicity Summary FY23

	Cottage Farm		Prison Point		Somerville Marginal		SOM205A Outfall		Union Park
	Mysid*	Menidia***	Mysid*	Menidia***	Mysid*	Menidia***	Mysid*	Menidia***	Mysid*
	Acute	Acute	Acute	Acute	Acute	Acute	Acute	Acute	Acute
July									
August									
September									
October			>100	>100					
November			>100	>100					
December									
January									
February									
March	>100	>100					70.7	>100	
April									
May					>100	>100	>100	>100	
June									

*Mysid is *Americamysis bahia*, a marine animal similar to a shrimp.
**Arbacia is *Arbacia punctulata*, a sea urchin. Chronic test measures fertilization.
***Menidia is *Menidia beryllina*, a small fish. Chronic test measures growth.

IV. Sludge Processing

Overview

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

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 stored, and used later to generate electrical power or heat for Deer Island. The digested sludge is pumped via a pipe in the Inter-Island Tunnel across Boston Harbor to the Fore River Pelletizing facility. This tunnel connection became operational in April 2005.

At the Fore River Pelletizing facility, centrifuges dewater the sludge into "cake," and dryers further process the sludge into the fertilizer pellets. The centrate from the centrifuges is transferred back to Deer Island for treatment via a second pipe in the Inter-Island Tunnel by way of the Braintree-Weymouth Intermediate Pump Station 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 truck and if needed 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.

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 standards are more strict than the federal standards. Meeting these regulations has generally not been a problem for the MWRA, with the occasional exception of the state standard for molybdenum. Table IV-1 (next page) summarizes the applicable standards.

Table IV-1 Federal and State Limits for Sludge Pellet Metals vs. Monthly Averages

Parameter	Federal Limit (ppm)	Massachusetts Type 1* Limit (ppm)	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Violation
Arsenic	41	NR	4	4	4	4	4	4	4	5	4	4	4	4	0
Boron	NR	300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0
Cadmium	39	14	3	3	2	2	3	3	3	4	4	4	4	4	0
Chromium	NR	1000	57	49	52	49	50	50	53	57	55	56	54	52	0
Copper	1500	1000	542	553	550	533	516	537	506	487	495	484	490	512	0
Lead	300	300	76	77	81	82	86	82	84	81	76	70	73	75	0
Mercury	17	10	1	1	1	1	2	1	1	1	2	1	1	1	0
Molybdenum	75	40	36	**41**	**42**	36	34	34	26	25	17	17	22	24	2
Nickel	420	200	23	23	23	24	27	25	28	25	28	28	25	25	0
Selenium	100	NR	5	4	4	4	4	4	5	5	4	5	5	5	0
Zinc	2800	2500	1228	1290	1238	1195	1106	1155	1113	1133	1038	1012	1058	1095	0

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

Copper, lead, and molybdenum (Mo) are metals of concern for MWRA as their concentrations in its biosolids have, at times, exceeded regulatory standards for unrestricted use as fertilizer. Molybdenum-based cooling tower water is a significant source of Mo in the sludge fertilizer pellets. Exceedance of regulatory standard makes the pellets an impractical source of fertilizer for local Massachusetts farms since NEFCO does not distribute product that does not meet the suitability standards. Overall, the levels for copper and lead have been below the DEP Type 1 limit. For Mo, the level in the MWRA sludge fertilizer pellets during FY23 exceeded state standards twice. During FY13 to FY23 there were no violations of the EPA type I limit for any metal. However, There were violations of molybdenum throughout this time period, in 2015, 2017, 2020 and 2023.

Figure IV-1 and Figure IV-2 compares the federal and state standards for some metals over several years.

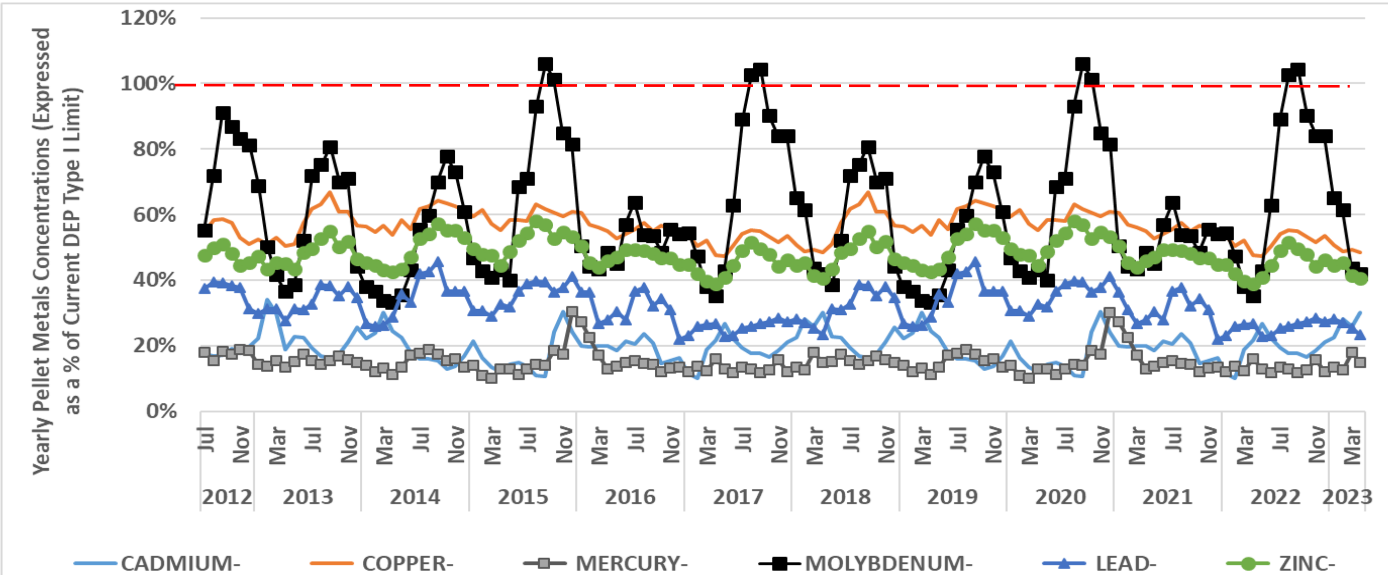


Figure IV-1 Yearly Pellet Metals Concentrations (Expressed as a % of DEP Type I Limit**)**

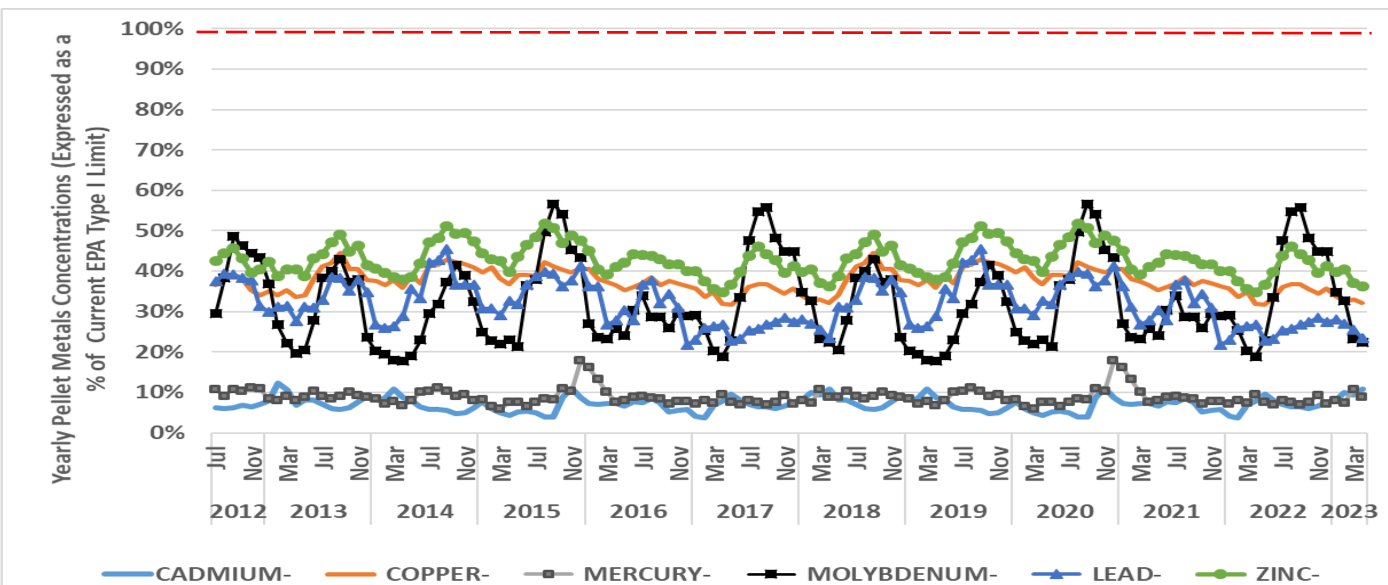


Figure IV-2 Yearly Pellet Metals Concentrations (Expressed as a % of EPA Type I Limit)

V. Transport Systems

North System Headworks Flow Restrictions

Figure V-1 below shows the number of hours of flow restriction at the remote headworks in FY23. 72.9 flow-restricted hours occurred FY23. 55.3 flow- restricted hours were due to rain. 17.6 flow-restricted events were due to maintenance. Columbus Park, Ward Street and Chelsea creek headwork had 37, 20 and 16 hours of flow restriction respectively in FY23.

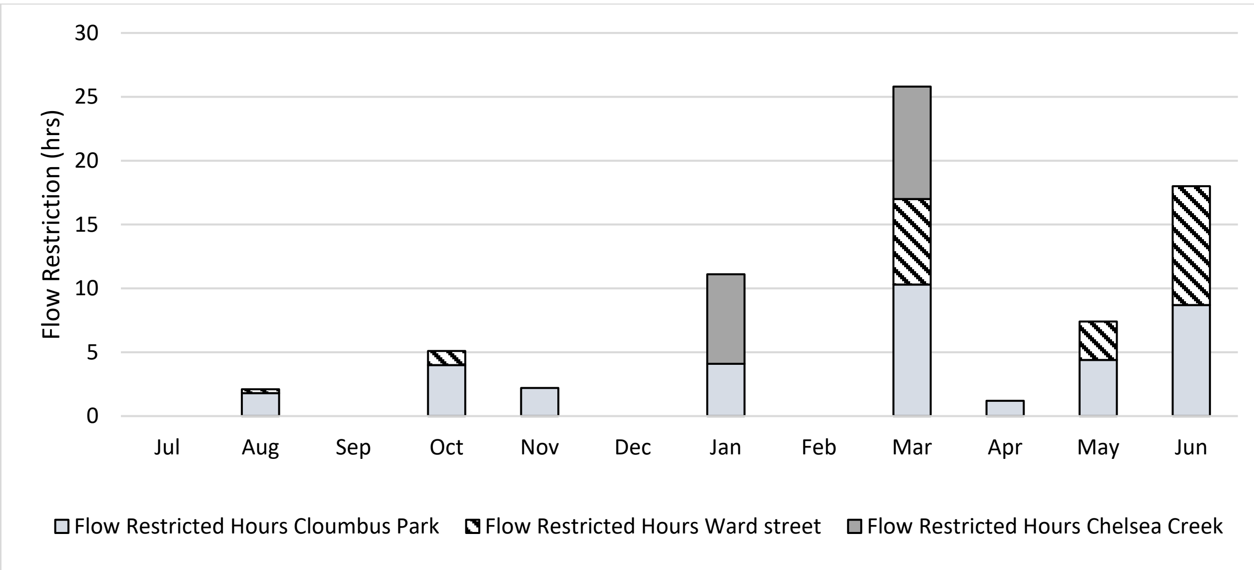


Figure V-1 Flow Restrictions Summary FY23

Figure V-2 shows the total number hours of flow restriction per year from FY13 to FY23. Flow restrictions, also referred to as "choking" are due to rainfall or maintenance related disturbances.

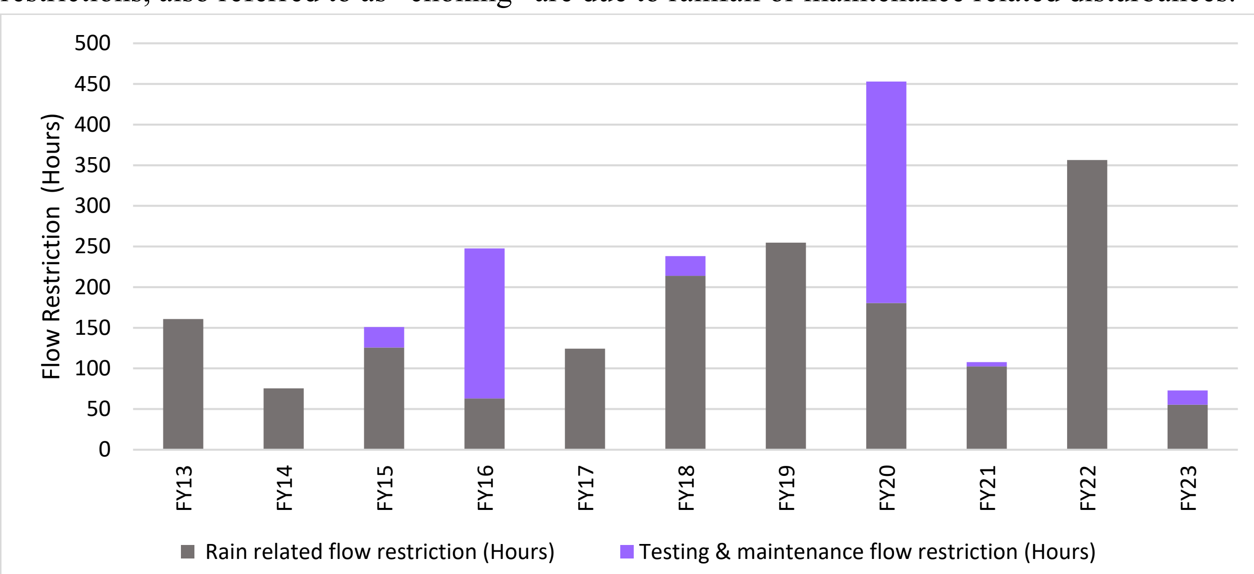


Figure V-2 Flow Restrictions Summary FY13-FY23

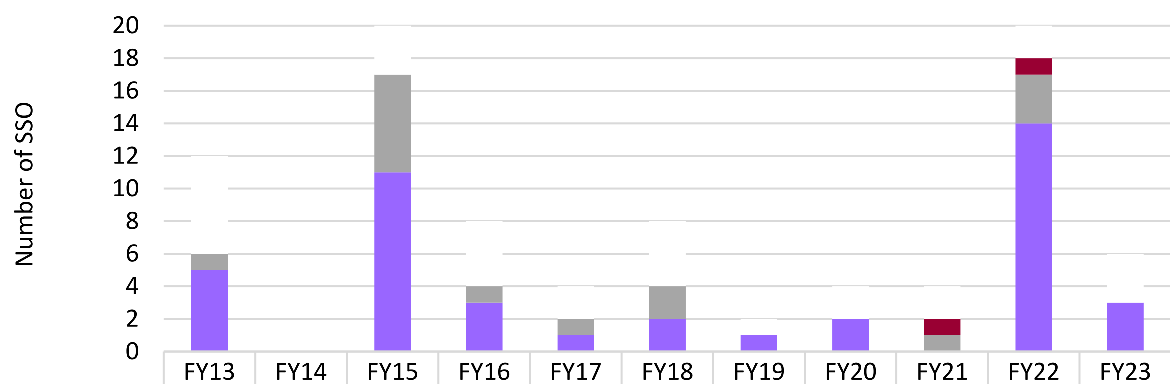
VI. Sanitary Sewer Overflows

MWRA monitors sanitary sewer overflows (SSOs) visually and by measuring water elevations in both the North and South Systems.   SSOs occur when extreme rainfall overwhelms the transport system. Note that SSOs 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 or shortly after heavy rain events.

A list of all the known overflow locations in the MWRA system is provided in Appendix G, Table G-6. Table VI-1 below shows a list of SSOs that occurred during FY23. There were three SSOs in FY23. Figure VI-1 summarizes SSO occurrence from FY13 to FY23.

Table VI-1 Sanitary Sewer Overflows, FY23

North/South	Start Date	Location	SSO Cause
N	4/14/2023	Alewife Brook Pump Station - Bypass	Rain/High Groundwater
N	4/14/2023	176 , 00+35 Alewife Brook Pump Station Discharge Side	Rain/High Groundwater
N	3/7/2023	South Boston CSO Pump Station	Leaking coupling in 24-inch force main



	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
TOTAL	6		17	4	2	4	1	2	2	18	3
Deer Island									1	1	
South System	1	0	6	1	1	2	0	0	1	3	0
North System	5	0	11	3	1	2	1	2	0	14	3

Figure VI-1 Sanitary Sewer Overflow summary FY13- FY23

VII. Inflow and Infiltration

Inflow and infiltration (I/I) is a potentially serious problem that affects all sewerage systems. The 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.

MWRA participated in a Regional I/I Task Force that developed goals and implementation strategies to reduce I/I to optimize local and regional sewer service. The I/I Task Force included MWRA staff, state regulators, and representatives from local communities.
On May 23, 2001 MWRA Board of Directors approved the Regional Infiltration/Inflow (I/I) Reduction Plan which was approved by MassDEP on November 19, 2002. A full copy of the Regional I/I Reduction Plan (dated September 2002) was included as Attachment 2 to the August 29, 2003 MWRA Annual I/I Reduction Report for FY03. The Regional I/I Reduction Plan is available at www.mwra.com

The Regional I/I Reduction Plan combines recommendations from the I/I Task Force Report (March 2001) with ongoing MWRA I/I reduction initiatives. Implementation of the Regional I/I Reduction Plan focuses on the cooperative efforts of member communities, MassDEP, EPA and MWRA to develop and implement I/I reduction and sewer system rehabilitation projects. Under the plan, MWRA has full legal and fiscal responsibility for implementation of operation, maintenance, and I/I reduction programs for the MWRA-owned interceptor system. Each member community retains full legal and fiscal responsibility for implementation of operation, maintenance and I/I reduction programs for community-owned sewers. MWRA provides technical and financial assistance to member communities and work cooperatively with MassDEP, EPA and other stakeholders to help solve local and regional sewer problems.

Find permit-related I/I materials at: www.mwra.com

VIII. Miscellaneous NPDES Permit Requirements

A. OVERVIEW

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

B. FACILITY BEST MANAGEMENT PRACTICES PLANS

Section I.9 of the Deer Island NPDES Permit (MA0103284) requires the development and implementation of a Best Management Practices plan to: "(1) minimize the potential for violations of the terms 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." The Permit requires the plan to reflect activities at Deer Island, all headworks facilities, all CSO treatment facilities, and the sludge pelletizing area at Fore River. BMP plans have also been written for MWRA's wastewater pumping stations.

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
Fore River Pelletizing facility
Alewife Brook Pump Station
Allison Hayes Pump Station
Braintree-Weymouth Pump Station
Caruso Pump Station
Delauri Pump Station
Framingham Pump Station
Hingham Pump Station
Houghs Neck Lift Station
Intermediate Pump Station
Neponset Pump Station
Quincy Pump Station
Squantum Pump Station

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 systems, accidental spillage, etc." (Permit section 9.a)

BMPs are available at the above facilities or at the MWRA ENQUAL department.

C. WATER CONSERVATION AND DRY DAY FLOW LIMITS

As described earlier in the dry day flow section of this report, MWRA has maintained the 365-calendar day running average dry day wastewater flow well below the 436 MGD permit limit and well below the 415 MGD trigger. If dry day flow reaches 415 MGD, MWRA cannot accept new connections larger than 1.4 MGD.

An annual report documents 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:
www.mwra.com

D. POLLUTION PREVENTION PROGRAM

The pollution prevention requirement of the 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 a pollution prevention outreach program and fact sheet that enables individual homeowners to take steps to prevent pollution from entering the MWRA wastewater collection system.

For more information on the MWRA's pollution prevention program, visit:
www.mwra.com

E. 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 FY23, no change has been made to the prohibition.

F. LOCAL LIMITS AND INDUSTRIAL PRETREATMENT PROGRAM

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

The industrial pretreatment program requires MWRA to inspect and sample industrial users as specified by 40 CFR Part 403, which details the requirements of 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, improving the efficiency of the treatment process, and reducing "pass-through" of contaminants to the effluent. 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: www.mwra.com

G. REPORTING

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

MWRA maintains a NPDES permit website at www.mwra.com

EPA maintains an electronic mailing list for Massachusetts Bay outfall-related announcements. Contact Alexa Sterling (sterling.alexa@epa.gov) to be added to the list. EPA's MWRA permit website is at https://www.epa.gov/npdes-permits/epas-permit-massachusetts-water-resources-authority-mwra-deer-island-treatment-plant.

Appendix A. Deer Island Treatment Plant

Table A-1
Average Influent Concentrations
Deer Island Wastewater Treatment Plant - Fiscal Year 2023

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave Annual	Max Annual	No of Detects
Flow (MGD)															
PLANT INFLUENT TOTAL FLOW	205.6	201.7	223.3	252.1	241.0	339.2	423.5	310.4	430.1	299.2	309.6	277.7	293.0	1022.3	-
Metals (ug/L)															
SILVER	0.161	0.264	0.21	0.211	0.326	0.985	0.209	0.195	0.224	0.232	0.219	0.346	0.261	0.985	43 of 46
ALUMINUM	314	554	458	354	516	733	487	351	399	533	559	763	492	1150	46 of 46
ARSENIC	1.33	1.38	1.47	1.1	1.18	0.993	1.11	0.692	0.4	0.4	1	0.61	0.93	1.69	30 of 46
BORON	125	198	144	174	175	125	125	125	125	125	125	125	138	265	7 of 46
BERYLLIUM	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0 of 46
CADMIUM	0.151	0.179	0.192	0.159	0.216	0.265	0.234	0.235	0.31	0.255	0.211	0.28	0.228	0.434	46 of 46
CHROMIUM	1.62	3.15	2.85	2.07	3.5	3.21	2.41	2.35	2.69	2.57	2.66	3.79	2.71	6.09	46 of 46
COPPER	42.9	42.5	41.4	40.4	45.9	53.3	45.2	39.6	36.8	44.7	36.3	64.6	43.5	96.3	46 of 46
IRON	1430	1820	1450	1540	2010	2660	1800	1560	1600	1770	1740	2250	1750	3310	46 of 46
MERCURY	0.0297	0.0697	0.0872	0.1	0.0773	0.0616	0.0739	0.0841	0.0845	0.0882	0.0679	0.102	0.0788	0.158	40 of 46
MOLYBDENUM	9.12	8.12	3.6	5.4	8.05	8.09	4.67	6.9	4.88	4.78	6.04	6.97	6.07	12	46 of 46
NICKEL	1.73	1.47	2.09	2.55	3.24	3.34	1.98	2.45	2.85	2.37	2.32	2.75	2.4	3.8	45 of 46
LEAD	3.31	8.6	4.47	2.51	3.65	4.25	4.78	4.85	3.76	2.46	4.23	6.75	4.41	12.1	44 of 46
ANTIMONY	25	25	25	25	25	25	25	25	25	25	25	25	25	25	0 of 46
SELENIUM	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.6	0.462	0.759	1 of 46
THALLIUM	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
ZINC	97	136	110	84.7	114	138	122	91.1	106	121	106	201	117	315	46 of 46
Cyanide (ug/L)															
CYANIDE	11.5	2.5	2.5	2.5	2.5	2.5	2.5	20.4	24.9	33.8	33.4	19.8	15	37.9	16 of 46
FOG and PHC (mg/L)															
PETROLEUM HYDROCARBONS	2.57	2.18	1.49	2.96	1.71	1.64	0.863	1.48	0.918	1.02	0.928	1.22	1.51	3.23	40 of 40
FATS OIL AND GREASE	21.6	30.7	40.9	27.5	22.5	22.2	19.6	26.6	26.9	16.9	19.6	29.5	24.5	40.9	44 of 44
Conventional Parameters (mg/L)															
BIOCHEMICAL OXYGEN DEMAND	198	220	215	214	204	156	120	168	124	161	152	157	165	332	646 of 646
CHEMICAL OXYGEN DEMAND	472	488	464	456	479	330	251	363	269	372	324	340	363	726	662 of 662
TOTAL SUSPENDED SOLIDS	209	232	240	232	213	171	129	187	130	183	151	188	177	397	604 of 604
Nutrients (mg/L)															
AMMONIA	41.1	45.4	42.9	37.1	33.9	25.8	21.7	27.5	21.8	31.3	29.8	32.6	30.7	49.3	98 of 98
NITRATE	0.394	0.254	0.161	0.335	0.129	0.637	0.418	0.55	1.07	0.442	0.213	0.4	0.469	2.16	80 of 98
NITRITE	0.224	0.187	0.264	0.112	0.151	0.192	0.346	0.254	0.391	0.0991	0.358	0.24	0.255	0.601	96 of 98
TOTAL KJELDAHL NITROGEN	52.3	50.6	45.2	42.3	41.4	32.2	25.7	38.1	31.8	42.4	36.9	43	38.2	60.1	96 of 96
ORTHOPHOSPHATE	3.25	3.51	3.49	2.86	2.66	1.92	1.43	1.96	1.32	1.88	1.98	2.25	2.21	3.97	98 of 98
TOTAL PHOSPHORUS	5.46	5.79	5.11	4.72	4.78	4.32	3.24	4.06	3.09	5.14	4	4.17	4.28	7.23	98 of 98
Pesticides and PCBs (ug/L)															
4,4'-DDD	0.000505	0.00053	0.000514	0.000512	0.000534	0.00059	0.000495	0.000496	0.000494	0.00052	0.000519	~	0.000514	0.00059	0 of 42
4,4'-DDE	0.000404	0.000424	0.000411	0.00041	0.000427	0.000472	0.000396	0.000397	0.000395	0.000416	0.000415	~	0.000411	0.00047	0 of 42
4,4'-DDT	0.000505	0.00053	0.000514	0.000512	0.000534	0.00059	0.000495	0.000496	0.000494	0.00052	0.000519	~	0.000514	0.00059	0 of 42
ALDRIN	0.000505	0.00053	0.000514	0.000512	0.000534	0.00059	0.000495	0.000496	0.000494	0.00052	0.000519	~	0.000514	0.00059	0 of 42
ALPHA-BHC	0.000404	0.000424	0.000411	0.00041	0.000427	0.000472	0.000396	0.000397	0.000395	0.000416	0.000415	~	0.000411	0.00047	0 of 42
ALPHA-CHLORDANE	0.000404	0.00108	0.000411	0.00041	0.00199	0.00268	0.00313	0.00201	0.00524	0.00431	0.00367	~	0.00257	0.00674	15 of 42
AROCLOR-1016	0.0253	0.0265	0.0257	0.0256	0.0267	0.0295	0.0248	0.0248	0.0247	0.026	0.0259	~	0.0257	0.0295	0 of 42
AROCLOR-1221	0.0505	0.053	0.0514	0.0512	0.0534	0.059	0.0495	0.0496	0.0494	0.052	0.0519	~	0.0514	0.059	0 of 42
AROCLOR-1232	0.0253	0.0265	0.0257	0.0256	0.0267	0.0295	0.0248	0.0248	0.0247	0.026	0.0259	~	0.0257	0.0295	0 of 42

Table A-1
Average Influent Concentrations
Deer Island Wastewater Treatment Plant - Fiscal Year 2023

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave Annual	Max Annual	No of Detects
AROCLOR-1242	0.0253	0.0265	0.0257	0.0256	0.0267	0.0295	0.0248	0.0248	0.0247	0.026	0.0259	~	0.0257	0.0295	0 of 42
AROCLOR-1248	0.0253	0.0265	0.0257	0.0256	0.0267	0.0295	0.0248	0.0248	0.0247	0.026	0.0259	~	0.0257	0.0295	0 of 42
Pesticides and PCBs (ug/L) (cont.)															
AROCLOR-1254	0.0253	0.0265	0.0257	0.0256	0.0267	0.0295	0.0248	0.0248	0.0247	0.026	0.0259	~	0.0257	0.0295	0 of 42
AROCLOR-1260	0.0253	0.0265	0.0257	0.0256	0.0267	0.0295	0.0248	0.0248	0.0247	0.026	0.0259	~	0.0257	0.0295	0 of 42
BETA-BHC	0.000404	0.000424	0.000411	0.00041	0.000427	0.000472	0.000396	0.000397	0.000395	0.000416	0.000415	~	0.000411	0.00047	0 of 42
CHLORDANE (TECHNICAL)	0.0505	0.053	0.0514	0.0512	0.0534	0.059	0.0495	0.0496	0.0494	0.052	0.0519	~	0.0514	0.059	0 of 42
DELTA-BHC	0.000404	0.000424	0.000411	0.00041	0.000427	0.000472	0.000396	0.000397	0.000395	0.000416	0.000415	~	0.000411	0.00047	0 of 42
DIELDRIN	0.000404	0.000424	0.000411	0.00041	0.000427	0.000472	0.000396	0.000397	0.000395	0.000416	0.000415	~	0.000411	0.00047	0 of 42
ENDOSULFAN I	0.000404	0.000424	0.000411	0.00041	0.000427	0.000472	0.000396	0.000397	0.000395	0.000416	0.000415	~	0.000411	0.00047	0 of 42
ENDOSULFAN II	0.000505	0.00053	0.000514	0.000512	0.000534	0.00059	0.000495	0.000496	0.000494	0.00052	0.000519	~	0.000514	0.00059	0 of 42
ENDOSULFAN SULFATE	0.000505	0.00053	0.000514	0.000512	0.000534	0.00059	0.000495	0.000496	0.000494	0.00052	0.000519	~	0.000514	0.00059	0 of 42
ENDRIN	0.000404	0.000424	0.000411	0.00041	0.000427	0.000472	0.000396	0.000397	0.000395	0.000416	0.000415	~	0.000411	0.00047	0 of 42
ENDRIN ALDEHYDE	0.000505	0.00053	0.000514	0.000512	0.000534	0.00059	0.000495	0.000496	0.000494	0.00052	0.000519	~	0.000514	0.00059	0 of 42
ENDRIN KETONE	0.000505	0.00053	0.000514	0.000512	0.000534	0.00059	0.000495	0.000496	0.000494	0.00052	0.000519	~	0.000514	0.00059	0 of 42
GAMMA-BHC	0.000404	0.000424	0.000411	0.00041	0.000427	0.000472	0.000396	0.000397	0.000395	0.000416	0.000415	~	0.000411	0.00047	0 of 42
GAMMA-CHLORDANE	0.000404	0.00115	0.00226	0.00352	0.00188	0.000472	0.0037	0.00214	0.00308	0.00247	0.0027	~	0.00239	0.0049	17 of 42
HEPTACHLOR	0.000404	0.000424	0.000411	0.00041	0.000427	0.000472	0.000396	0.000397	0.000395	0.000416	0.000415	~	0.000411	0.00047	0 of 42
HEPTACHLOR EPOXIDE	0.000404	0.000424	0.000411	0.00041	0.000427	0.000472	0.000396	0.000397	0.000395	0.000416	0.000415	~	0.000411	0.00047	0 of 42
METHOXYCHLOR	0.00505	0.0053	0.00514	0.00512	0.00534	0.0059	0.00495	0.00496	0.00494	0.0052	0.00519	~	0.00514	0.0059	0 of 42
TOTAL AMP PCBS	~	0.0156	~	0.00685	~	0.0106	~	0.00554	~	0.00328	~	0.00605	0.00721	0.0232	22 of 22
TOXAPHENE	0.0505	0.053	0.0514	0.0512	0.0534	0.059	0.0495	0.0496	0.0494	0.052	0.0519	~	0.0514	0.059	0 of 42
Pesticides and PCBs (ug/L) - low detection limit methods															
2,4'-DDD	~	0.000199	~	0.0002	~	0.00274	~	0.000199	~	0.000201	~	0.0011	0.000579	0.00274	5 of 22
2,4'-DDE	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000425	~	0.000199	0.000249	0.00064	1 of 22
2,4'-DDT	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
4,4'-DDD	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
4,4'-DDE	~	0.00158	~	0.0018	~	0.00199	~	0.00138	~	0.00259	~	0.000937	0.0017	0.00321	20 of 22
4,4'-DDT	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
ALDRIN	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
ALPHA-CHLORDANE	~	0.00268	~	0.0032	~	0.00363	~	0.00392	~	0.00439	~	0.00284	0.00351	0.00469	22 of 22
BZ 101 PENTACHLOROBIPHENYL	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
BZ 105 PENTACHLOROBIPHENYL	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
BZ 118 PENTACHLOROBIPHENYL	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
BZ 126 PENTACHLOROBIPHENYL	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000428	0.000244	0.00067	1 of 22
BZ 128 HEXACHLOROBIPHENYL	~	0.0015	~	0.000469	~	0.00186	~	0.000479	~	0.000348	~	0.000427	0.0007	0.00244	17 of 22
BZ 138 HEXACHLOROBIPHENYL	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
BZ 153 HEXACHLOROBIPHENYL	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
BZ 170 HEPTACHLOROBIPHENYL	~	0.00239	~	0.00153	~	0.00219	~	0.00074	~	0.000786	~	0.00125	0.00132	0.00334	21 of 22
BZ 18 TRICHLOROBIPHENYL	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
BZ 180 HEPTACHLOROBIPHENYL	~	0.0011	~	0.000555	~	0.00115	~	0.000199	~	0.000373	~	0.000708	0.000592	0.00143	13 of 22
BZ 187 HEPTACHLOROBIPHENYL	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
BZ 195 OCTACHLOROBIPHENYL	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000333	0.000227	0.00047	1 of 22
BZ 206 NONACHLOROBIPHENYL	~	0.0028	~	0.00132	~	0.00176	~	0.000654	~	0.0007	~	0.00109	0.00124	0.004	22 of 22
BZ 209 DECACHLOROBIPHENYL	~	0.00304	~	0.00119	~	0.00178	~	0.000748	~	0.000837	~	0.000905	0.00128	0.00448	22 of 22
BZ 28 TRICHLOROBIPHENYL	~	0.000609	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.00026	0.00099	1 of 22
BZ 44 TETRACHLOROBIPHENYL	~	0.00237	~	0.000709	~	0.00102	~	0.000337	~	0.000394	~	0.00065	0.000809	0.00375	21 of 22
BZ 52 TETRACHLOROBIPHENYL	~	0.00159	~	0.000581	~	0.000421	~	0.000199	~	0.000263	~	0.000301	0.000507	0.00251	15 of 22
BZ 66 TETRACHLOROBIPHENYL	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
BZ 77 TETRACHLOROBIPHENYL	~	0.000199	~	0.0002	~	0.000229	~	0.00255	~	0.000201	~	0.000307	0.000741	0.00356	4 of 22

Table A-1
Average Influent Concentrations
Deer Island Wastewater Treatment Plant - Fiscal Year 2023

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave Annual	Max Annual	No of Detects
BZ 8 DICHLOROBIPHENYL	~	0.000359	~	0.00058	~	0.00042	~	0.00023	~	0.000201	~	0.00028	0.000324	0.00075	16 of 22
Pesticides and PCBs (ug/L) - low detection limit methods (cont.)															
CIS-NONACHLOR	~	0.000517	~	0.000581	~	0.000667	~	0.00158	~	0.000765	~	0.000387	0.000802	0.00253	19 of 22
DDMU	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
DIELDRIN	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
ENDRIN	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
GAMMA-BHC	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
GAMMA-CHLORDANE	~	0.00204	~	0.00275	~	0.00413	~	0.00345	~	0.00311	~	0.00273	0.003	0.00413	22 of 22
HEPTACHLOR	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
HEPTACHLOR EPOXIDE	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
HEXACHLOROBENZENE	~	0.0019	~	0.00317	~	0.00452	~	0.000808	~	0.00347	~	0.00246	0.00252	0.00452	22 of 22
MIREX	~	0.00377	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000702	0.00434	2 of 22
OXYCHLORDANE	~	0.000199	~	0.0002	~	0.000229	~	0.000199	~	0.000201	~	0.000199	0.000202	0.00023	0 of 22
TOTAL CHLORDANE	~	0.00436	~	0.00524	~	0.0058	~	0.00652	~	0.00728	~	0.00505	0.00584	0.00815	22 of 22
TOTAL DDT	~	0.00158	~	0.0018	~	0.00473	~	0.00138	~	0.00285	~	0.0019	0.00216	0.00473	21 of 22
TRANS-NONACHLOR	~	0.00168	~	0.00204	~	0.00216	~	0.00259	~	0.00288	~	0.00221	0.00233	0.00345	22 of 22
Semivolatile Organics (ug/L)															
1,2,4-TRICHLOROBENZENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
1,2-DIPHENYLHYDRAZINE (AS AZOBENZENE)	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2,2'-OXYBIS(1-CHLOROPROPANE)	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2,4,5-TRICHLOROPHENOL	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2,4,6-TRICHLOROPHENOL	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2,4-DICHLOROPHENOL	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2,4-DIMETHYLPHENOL	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2,4-DINITROPHENOL	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2,4-DINITROTOLUENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2,6-DINITROTOLUENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2-CHLORONAPHTHALENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2-CHLOROPHENOL	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2-METHYL-4,6-DINITROPHENOL	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2-METHYLNAPHTHALENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2-METHYLPHENOL	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2-NITROANILINE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
2-NITROPHENOL	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
3,3'-DICHLOROBENZIDINE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
3-NITROANILINE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
4-BROMOPHENYL PHENYL ETHER	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
4-CHLORO-3-METHYLPHENOL	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
4-CHLOROANILINE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
4-CHLOROPHENYL PHENYL ETHER	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
4-METHYLPHENOL (INCLUDES 3-METHYLPHENOL)	33.1	30.7	13.1	34.9	25.9	21.3	8.13	22.7	8.35	1.99	2.04	33.8	16.5	41.6	25 of 44
4-NITROANILINE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
4-NITROPHENOL	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
ACENAPHTHENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
ACENAPHTHYLENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
ANILINE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
Semivolatile Organics (ug/L)															
ANTHRACENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
BENZIDINE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
BENZO(A)ANTHRACENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
BENZO(A)PYRENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44

Table A-1
Average Influent Concentrations
Deer Island Wastewater Treatment Plant - Fiscal Year 2023

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave Annual	Max Annual	No of Detects
BENZO(B)FLUORANTHENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
BENZO(G,H,I)PERYLENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
BENZO(K)FLUORANTHENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
BENZOIC ACID	123	104	53.7	128	125	116	48.4	86.4	66	50	21.2	116	76.4	159	42 of 44
BENZYL ALCOHOL	27.9	37.1	1.92	7.12	44.9	2.27	1.95	8.97	9.32	10.8	2.04	25.8	12.6	60.7	15 of 44
BIS(2-CHLOROETHOXY)METHANE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
BIS(2-CHLOROETHYL)ETHER	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
BIS(2-ETHYLHEXYL)PHTHALATE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
BUTYLBENZYLPHTHALATE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
CARBAZOLE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
CHRYSENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
DIBENZO(A,H)ANTHRACENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
DIBENZOFURAN	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
DIETHYLPHTHALATE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
DIMETHYLPHTHALATE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
DI-N-BUTYLPHTHALATE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
DI-N-OCTYLPHTHALATE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
FLUORANTHENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
FLUORENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
HEXACHLOROBENZENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
HEXACHLOROBUTADIENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
HEXACHLOROCYCLOPENTADIENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
HEXACHLOROETHANE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
INDENO(1,2,3-CD)PYRENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
ISOPHORONE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
NAPHTHALENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
N-DECANE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
NITROBENZENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
N-NITROSODIMETHYLAMINE (NDMA)	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
N-NITROSODI-N-PROPYLAMINE (NDPA)	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
N-NITROSODIPHENYLAMINE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
N-OCTADECANE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
PENTACHLOROPHENOL	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
PHENANTHRENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
PHENOL	5.7	14.2	4.97	11.7	26.7	2.27	1.95	7.86	1.92	1.99	2.04	1.94	6.29	44.1	10 of 44
PYRENE	1.9	2.14	1.92	1.96	2.02	2.27	1.95	1.9	1.92	1.99	2.04	1.94	1.98	2.32	0 of 44
Polyaromatic Hydrocarbons - low detection limit methods															
1-METHYLNAPHTHALENE	~	0.0509	~	0.203	~	0.0524	~	0.0332	~	0.0956	~	0.023	0.0759	0.247	22 of 22
1-METHYLPHENANTHRENE	~	0.0241	~	0.0289	~	0.0151	~	0.00857	~	0.0119	~	0.00838	0.0152	0.0361	21 of 22
2,3,5-TRIMETHYLNAPHTHYLENE	~	0.0153	~	0.0726	~	0.0373	~	0.016	~	0.0408	~	0.0102	0.031	0.0947	21 of 22
2,6-DIMETHYLNAPHTHALENE	~	0.0209	~	0.0779	~	0.0415	~	0.0189	~	0.0802	~	0.0119	0.0423	0.0912	22 of 22
2-METHYLNAPHTHALENE	~	0.0425	~	0.167	~	0.0446	~	0.0312	~	0.0795	~	0.0263	0.0651	0.2	22 of 22
ACENAPHTHENE	~	0.0545	~	0.0712	~	0.0318	~	0.0334	~	0.0345	~	0.03	0.0419	0.0784	22 of 22
ACENAPHTHYLENE	~	0.0125	~	0.0101	~	0.00828	~	0.00781	~	0.0253	~	0.0207	0.0149	0.026	22 of 22
Polyaromatic Hydrocarbons - low detection limit methods (cont.)															
ANTHRACENE	~	0.0525	~	0.0236	~	0.0126	~	0.00781	~	0.00957	~	0.0105	0.0179	0.0568	21 of 22
BENZO(A)ANTHRACENE	~	0.108	~	0.0389	~	0.032	~	0.0261	~	0.0198	~	0.019	0.0375	0.149	22 of 22
BENZO(A)PYRENE	~	0.0821	~	0.0221	~	0.0282	~	0.0217	~	0.021	~	0.0176	0.0299	0.085	22 of 22
BENZO(B)FLUORANTHENE	~	0.131	~	0.038	~	0.0399	~	0.0359	~	0.0294	~	0.0313	0.0477	0.144	22 of 22
BENZO(E)PYRENE	~	0.0671	~	0.0185	~	0.0245	~	0.0171	~	0.0161	~	0.0155	0.0244	0.0756	22 of 22

Table A-1
Average Influent Concentrations
Deer Island Wastewater Treatment Plant - Fiscal Year 2023

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave Annual	Max Annual	No of Detects
BENZO(G,H,I)PERYLENE	~	0.0171	~	0.0227	~	0.00747	~	0.0428	~	0.0474	~	0.0343	0.0324	0.0557	22 of 22
BENZO(K)FLUORANTHENE	~	0.0376	~	0.00685	~	0.0116	~	0.00844	~	0.0186	~	0.00801	0.0146	0.0403	22 of 22
BENZOTHIAZOLE	~	0.475	~	0.462	~	0.305	~	0.307	~	1.42	~	0.575	0.64	1.48	22 of 22
BIPHENYL	~	0.014	~	0.0307	~	0.0111	~	0.00751	~	0.0115	~	0.00724	0.0133	0.0398	22 of 22
C1-CHRYSENES	~	0.0626	~	0.0354	~	0.0353	~	0.025	~	0.0224	~	0.0194	0.0313	0.0649	22 of 22
C1-DIBENZOTHIOPHENES	~	0.0309	~	0.0432	~	0.0381	~	0.0301	~	0.0365	~	0.0325	0.0348	0.0553	21 of 22
C1-FLUORANTHENES/PYRENES	~	0.0752	~	0.000499	~	0.0388	~	0.0278	~	0.0247	~	0.0208	0.029	0.0832	17 of 22
C1-FLUORENES	~	0.0572	~	0.0828	~	0.0535	~	0.0358	~	0.0508	~	0.0409	0.0519	0.103	21 of 22
C1-NAPHTHALENES	~	0.0618	~	0.239	~	0.0653	~	0.0424	~	0.104	~	0.029	0.0892	0.289	22 of 22
C1-PHENANTHRENES/ANTHRACENES	~	0.0979	~	0.116	~	0.0782	~	0.0401	~	0.0692	~	0.0386	0.0695	0.147	21 of 22
C2-CHRYSENES	~	0.000501	~	0.000499	~	0.000574	~	0.000498	~	0.000503	~	0.000497	0.000506	0.00057	0 of 22
C2-DIBENZOTHIOPHENES	~	0.000501	~	0.000499	~	0.000574	~	0.000498	~	0.000503	~	0.000497	0.000506	0.00057	0 of 22
C2-FLUORANTHENES/PYRENES	~	0.0107	~	0.000499	~	0.0204	~	0.0114	~	0.0106	~	0.0102	0.00992	0.0218	16 of 22
C2-FLUORENES	~	0.13	~	0.14	~	0.0966	~	0.0504	~	0.0732	~	0.0602	0.0865	0.151	21 of 22
C2-NAPHTHALENES	~	0.0666	~	0.241	~	0.0989	~	0.047	~	0.149	~	0.0415	0.106	0.302	22 of 22
C2-PHENANTHRENES/ANTHRACENES	~	0.0597	~	0.0311	~	0.0451	~	0.025	~	0.0332	~	0.0257	0.0344	0.0708	18 of 22
C3-CHRYSENES	~	0.000501	~	0.000499	~	0.000574	~	0.000498	~	0.000503	~	0.000497	0.000506	0.00057	0 of 22
C3-DIBENZOTHIOPHENES	~	0.000501	~	0.000499	~	0.000574	~	0.000498	~	0.000503	~	0.000497	0.000506	0.00057	0 of 22
C3-FLUORANTHENES/PYRENES	~	0.000501	~	0.000499	~	0.000574	~	0.000498	~	0.000503	~	0.000497	0.000506	0.00057	0 of 22
C3-FLUORENES	~	0.000501	~	0.000499	~	0.000574	~	0.000498	~	0.000503	~	0.000497	0.000506	0.00057	0 of 22
C3-NAPHTHALENES	~	0.0544	~	0.174	~	0.0968	~	0.053	~	0.104	~	0.0245	0.082	0.231	21 of 22
C3-PHENANTHRENES/ANTHRACENES	~	0.000501	~	0.000499	~	0.0525	~	0.0345	~	0.0845	~	0.0202	0.0337	0.0911	13 of 22
C4-CHRYSENES	~	0.000501	~	0.000499	~	0.000574	~	0.000498	~	0.000503	~	0.000497	0.000506	0.00057	0 of 22
C4-NAPHTHALENES	~	0.000501	~	0.000499	~	0.000574	~	0.000498	~	0.000503	~	0.000497	0.000506	0.00057	0 of 22
C4-PHENANTHRENES/ANTHRACENES	~	0.000501	~	0.000499	~	0.000574	~	0.000498	~	0.000503	~	0.000497	0.000506	0.00057	0 of 22
CHRYSENE	~	0.0968	~	0.0307	~	0.035	~	0.0277	~	0.0235	~	0.0225	0.0366	0.12	22 of 22
DIBENZO(A,H)ANTHRACENE	~	0.000501	~	0.000499	~	0.000574	~	0.00122	~	0.00273	~	0.00148	0.00131	0.00387	6 of 22
DIBENZOFURAN	~	0.0222	~	0.0282	~	0.0148	~	0.00997	~	0.0144	~	0.0109	0.0161	0.0317	21 of 22
DIBENZOTHIOPHENE	~	0.0242	~	0.0313	~	0.0125	~	0.00564	~	0.0102	~	0.00913	0.0145	0.036	21 of 22
FLUORANTHENE	~	0.219	~	0.0809	~	0.0806	~	0.0551	~	0.0553	~	0.0589	0.0851	0.251	22 of 22
FLUORENE	~	0.0446	~	0.057	~	0.03	~	0.0175	~	0.0282	~	0.0193	0.0313	0.0674	22 of 22
INDENO(1,2,3-CD)PYRENE	~	0.125	~	0.139	~	0.139	~	0.159	~	0.163	~	0.129	0.145	0.204	22 of 22
NAPHTHALENE	~	0.0949	~	0.208	~	0.0814	~	0.0532	~	0.12	~	0.057	0.101	0.236	22 of 22
PERYLENE	~	0.0308	~	0.0141	~	0.0214	~	0.0174	~	0.0185	~	0.0169	0.0192	0.0318	22 of 22
PHENANTHRENE	~	0.22	~	0.152	~	0.0894	~	0.0461	~	0.0636	~	0.0617	0.0976	0.278	22 of 22
PYRENE	~	0.186	~	0.0859	~	0.0812	~	0.0549	~	0.0618	~	0.0579	0.0825	0.212	22 of 22
Volatile Organics (ug/L)															
1,1,1-TRICHLOROETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
1,1,2,2-TETRACHLOROETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
1,1,2-TRICHLOROETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
1,1-DICHLOROETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
1,1-DICHLOROETHENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
1,2-DICHLOROBENZENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
Volatile Organics (ug/L) (cont.)															
1,2-DICHLOROETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
1,2-DICHLOROPROPANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
1,3-DICHLOROBENZENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
1,4-DICHLOROBENZENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
2-BUTANONE	5.57	4.91	2.82	2.77	8.28	3	5.86	0.5	0.5	0.5	0.5	4.31	2.97	11.2	19 of 46
2-CHLOROETHYL VINYL ETHER	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46

Table A-1
Average Influent Concentrations
Deer Island Wastewater Treatment Plant - Fiscal Year 2023

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave Annual	Max Annual	No of Detects
2-HEXANONE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
4-METHYL-2-PENTANONE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
ACETONE	94.9	88.8	149	95.5	371	184	78.5	67	79.9	159	94.6	138	124	623	46 of 46
ACROLEIN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0 of 46
ACRYLONITRILE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
BENZENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
BROMODICHLOROMETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
BROMOFORM	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
BROMOMETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
CARBON DISULFIDE	36.4	50.2	0.5	0.5	1.61	0.5	0.5	0.5	1.46	1.44	0.5	5.66	6.43	52.2	12 of 46
CARBON TETRACHLORIDE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
CHLOROBENZENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
CHLOROETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
CHLOROFORM	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
CHLOROMETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
CIS-1,2-DICHLOROETHENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
CIS-1,3-DICHLOROPROPENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
DIBROMOCHLOROMETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
ETHYLBENZENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
M,P-XYLENE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0 of 46
METHYLENE CHLORIDE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
O-XYLENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
STYRENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.51	0.5	0.5	0.685	4.53	1 of 46
TETRACHLOROETHENE	0.5	0.5	1.67	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.595	3.26	1 of 46
TOLUENE	0.5	3.75	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.08	6.85	6 of 46
TRANS-1,2-DICHLOROETHENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
TRANS-1,3-DICHLOROPROPENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
TRICHLOROETHENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
TRICHLOROFLUOROMETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
VINYL ACETATE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 46
VINYL CHLORIDE	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0 of 46

Notes: Where parameters were below detection levels, one half of the method detection limit for inorganic compounds or one tenth of the quantitation limit for organic compounds was substituted to calculate concentrations.
The annual average concentration is the flow-weighted average of all data points. The maximum concentration is the highest concentration observed in the monitoring year.
Pesticides and PCBs** and Polyaromatic Hydrocarbons** tested with more sensitive methods which are not EPA-approved for permit compliance.
~ No data

Table A-2
Average Effluent Concentrations
Deer Island Wastewater Treatment Plant - Fiscal Year 2023

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave Annual	Max Annual	No of Detects
Flow (MGD)															
PLANT EFFLUENT TOTAL FLOW	205.6	201.7	223.3	252.1	241.0	339.2	423.5	310.4	430.1	299.2	309.6	277.7	293.0	1022.2	-
Metals (ug/L)															
SILVER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.2	3 of 48
ALUMINUM	110.0	54.2	31.8	65.7	34.4	30.9	34.0	30.5	98.5	142.0	43.6	33.2	58.8	253.0	48 of 48
ARSENIC	0.4	0.6	0.8	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.7	0.4	0.5	0.9	4 of 24
BORON	125	125	125	193	125	125	125	125	125	125	125	125	130	266	1 of 24
BERYLLIUM	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0 of 24
CADMIUM	0.0329	0.015	0.0483	0.0253	0.0382	0.0224	0.0659	0.0469	0.0433	0.113	0.0302	0.015	0.0434	0.159	29 of 48
CHROMIUM	0.491	0.589	0.35	1.4	0.451	0.35	0.35	0.35	0.35	0.515	0.468	0.35	0.484	4.23	7 of 48
COPPER	6.33	5.35	5.06	4.82	4.67	5.75	5.04	5.52	6.91	8.55	6.69	3.99	5.82	12.3	48 of 48
IRON	355	358	307	362	288	253	192	246	304	680	213	217	308	769	24 of 24
MERCURY	0.00398	0.004	0.00345	0.00301	0.00289	0.00348	0.00326	0.00401	0.00792	0.0194	0.0076	0.0029	0.0058	0.037	48 of 48
MOLYBDENUM	6.26	5.08	3.95	4.71	4.4	5.39	3.86	8.45	3.54	5.08	4.63	5.12	5.01	17.8	48 of 48
NICKEL	1.65	1.06	1.31	2.18	1.93	2.06	1.11	1.21	1.39	1.85	1.06	1.22	1.48	3.26	46 of 48
LEAD	0.537	0.538	0.551	0.52	0.522	0.54	0.585	0.553	0.666	0.717	0.563	0.531	0.575	1.07	12 of 48
ANTIMONY	25	25	25	25	25	25	25	25	25	25	25	25	25	25	0 of 24
SELENIUM	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0 of 24
THALLIUM	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
ZINC	13.8	12.6	11.6	9.75	11	12.7	18	18.1	25.2	32.5	19.7	19	17.8	35.1	48 of 48
Cyanide (ug/L)															
CYANIDE	5	2.5	2.5	2.5	2.5	2.5	2.5	10	10	10	10	10	6.16	10	0 of 24
FOG and PHC (mg/L)															
PETROLEUM HYDROCARBON	0.02	0.146	0.0571	0.095	0.0577	0.298	0.0553	0.164	0.049	0.0556	0.0538	0.194	0.102	0.72	8 of 63
FATS OIL AND GREASE	0.493	0.352	0.35	0.367	0.365	0.485	0.473	0.352	0.4	0.349	0.36	0.369	0.398	0.686	0 of 62
Conventional Parameters (mg/L)															
BIOCHEMICAL OXYGEN DEMAND	13	12.2	12	14.1	14.6	17.2	18.9	19	21.9	20.8	17.7	15.7	17.1	41.5	361 of 361
CHEMICAL OXYGEN DEMAND	91.9	91.5	85.6	78.1	87.2	64.6	59.3	69.5	74	79.9	75.3	78.4	75.9	146	365 of 365
TOTAL SUSPENDED SOLIDS	10.3	9.11	8.56	8.59	11.3	10.9	13	10.7	18.1	18	12.5	10.3	12.3	37.6	365 of 365
Nutrients (mg/L)															
AMMONIA	34.8	39.2	30.2	33.3	35.1	24.7	19.5	22.2	19.4	27.1	24.4	25.7	26.7	46.2	87 of 87
NITRATE	0.0526	0.0166	0.165	0.0576	0.145	0.326	0.121	0.801	0.972	0.247	0.193	0.129	0.319	2.36	55 of 64
NITRITE	0.152	0.344	1.5	0.265	0.634	0.452	0.648	0.76	0.769	0.313	0.793	0.337	0.598	2.1	63 of 64
TOTAL KJELDAHL NITROGEN	41.3	38.6	36.4	33.4	32.5	23.1	20.7	26	21.7	29.8	29	30.8	28.8	49.8	63 of 63
ORTHOPHOSPHATE	2.81	2.89	2.79	2.38	2.56	1.67	1.27	1.52	0.935	1.7	1.68	1.87	1.86	3.41	52 of 52
TOTAL PHOSPHORUS	3.22	3.5	3.06	2.77	3.04	2.11	1.74	1.93	1.44	2.13	2.25	2.38	2.33	3.98	52 of 52
Pesticides and PCBs (ug/L)															
4,4'-DDD	0.0005	0.000505	0.000535	0.00053	0.000575	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00049	0.000509	0.000575	0 of 12
4,4'-DDE	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
4,4'-DDT	0.0005	0.000505	0.000535	0.00053	0.000575	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00049	0.000509	0.000575	0 of 12
ALDRIN	0.0005	0.000505	0.000535	0.00053	0.000575	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00049	0.000509	0.000575	0 of 12
ALPHA-BHC	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
ALPHA-CHLORDANE	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
AROCLOR-1016	0.025	0.0252	0.0268	0.0263	0.0288	0.025	0.025	0.025	0.025	0.025	0.025	0.0245	0.0255	0.0288	0 of 12

Average Effluent Concentrations
Deer Island Wastewater Treatment Plant - Fiscal Year 2023

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave Annual	Max Annual	No of Detects
AROCLOR-1221	0.05	0.0505	0.0535	0.0526	0.0575	0.05	0.05	0.05	0.05	0.05	0.05	0.049	0.0509	0.0575	0 of 12
AROCLOR-1232	0.025	0.0252	0.0268	0.0263	0.0288	0.025	0.025	0.025	0.025	0.025	0.025	0.0245	0.0255	0.0288	0 of 12
AROCLOR-1242	0.025	0.0252	0.0268	0.0263	0.0288	0.025	0.025	0.025	0.025	0.025	0.025	0.0245	0.0255	0.0288	0 of 12
AROCLOR-1248	0.025	0.0252	0.0268	0.0263	0.0288	0.025	0.025	0.025	0.025	0.025	0.025	0.0245	0.0255	0.0288	0 of 12
Pesticides and PCBs (ug/L) (cont.)															
AROCLOR-1254	0.025	0.0252	0.0268	0.0263	0.0288	0.025	0.025	0.025	0.025	0.025	0.025	0.0245	0.0255	0.0288	0 of 12
AROCLOR-1260	0.025	0.0252	0.0268	0.0263	0.0288	0.025	0.025	0.025	0.025	0.025	0.025	0.0245	0.0255	0.0288	0 of 12
BETA-BHC	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
CHLORDANE (TECHNICAL)	0.05	0.0505	0.0535	0.0526	0.0575	0.05	0.05	0.05	0.05	0.05	0.05	0.049	0.0509	0.0575	0 of 12
DELTA-BHC	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
DIELDRIN	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
ENDOSULFAN I	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
ENDOSULFAN II	0.0005	0.000505	0.000535	0.00053	0.000575	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00049	0.000509	0.000575	0 of 12
ENDOSULFAN SULFATE	0.0005	0.000505	0.000535	0.00053	0.000575	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00049	0.000509	0.000575	0 of 12
ENDRIN	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
ENDRIN ALDEHYDE	0.0005	0.000505	0.000535	0.00053	0.000575	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00049	0.000509	0.000575	0 of 12
ENDRIN KETONE	0.0005	0.000505	0.000535	0.00053	0.000575	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00049	0.000509	0.000575	0 of 12
GAMMA-BHC	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
GAMMA-CHLORDANE	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
HEPTACHLOR	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
HEPTACHLOR EPOXIDE	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
HEXACHLOROBENZENE	0.0004	0.000404	0.000428	0.00042	0.00046	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00039	0.000407	0.00046	0 of 12
METHOXYCHLOR	0.005	0.00505	0.00535	0.00526	0.00575	0.005	0.005	0.005	0.005	0.005	0.005	0.0049	0.00509	0.00575	0 of 12
TOTAL AMP PCBS	0.00148	0.0015	0.00132	0.00084	0.00574	0.00164	0.000475	0.000571	0.00101	0.000622	0.000414	0.00052	0.0012	0.00854	48 of 48
TOXAPHENE	0.05	0.0505	0.0535	0.0526	0.0575	0.05	0.05	0.05	0.05	0.05	0.05	0.049	0.0509	0.0575	0 of 12
Pesticides and PCBs (ug/L) - low detection limit methods															
2,4'-DDD	0.000102	0.00068	0.0000997	0.00011	0.000106	0.00045	0.0000991	0.000107	0.0000977	0.000141	0.0000978	0.0001	0.00017	0.0015	8 of 48
2,4'-DDE	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.00026	0.000195	0.0000978	0.0001	0.000127	0.000498	3 of 48
2,4'-DDT	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.000389	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000133	0.000664	2 of 48
4,4'-DDD	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
4,4'-DDE	0.000176	0.000175	0.000171	0.00014	0.000113	0.00018	0.000105	0.000212	0.000169	0.000129	0.000147	0.00017	0.000156	0.000339	40 of 48
4,4'-DDT	0.000102	0.000102	0.0000897	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	1 of 48
ALDRIN	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
ALPHA-CHLORDANE	0.000697	0.000582	0.000563	0.00084	0.000641	0.00058	0.00064	0.0012	0.00146	0.00129	0.000618	0.00115	0.000876	0.00236	48 of 48
BZ 101 PENTACHLOROBIPHENYL	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
BZ 105 PENTACHLOROBIPHENYL	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
BZ 118 PENTACHLOROBIPHENYL	0.000102	0.000102	0.0000997	0.00011	0.0011	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000166	0.00163	4 of 48
BZ 126 PENTACHLOROBIPHENYL	0.000102	0.000102	0.0000997	0.00011	0.000175	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000106	0.000265	2 of 48
BZ 128 HEXACHLOROBIPHENYL	0.000167	0.000158	0.000114	0.00014	0.00132	0.00035	0.000131	0.00011	0.0000977	0.000101	0.0000978	0.0001	0.000216	0.00236	32 of 48
BZ 138 HEXACHLOROBIPHENYL	0.000134	0.000102	0.0000997	0.00011	0.000569	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000133	0.000894	5 of 48
BZ 153 HEXACHLOROBIPHENYL	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
BZ 170 HEPTACHLOROBIPHENYL	0.000373	0.000272	0.000235	0.00018	0.00064	0.00028	0.0000824	0.000111	0.000346	0.00016	0.00015	0.00016	0.000233	0.000889	48 of 48
BZ 18 TRICHLOROBIPHENYL	0.000102	0.000102	0.0000997	0.00011	0.000106	0.00012	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000103	0.000175	1 of 48
BZ 180 HEPTACHLOROBIPHENYL	0.000192	0.000181	0.000164	0.00011	0.00041	0.00021	0.0000809	6.63E-05	0.000408	0.000148	0.000108	0.00019	0.000184	0.000721	45 of 48
BZ 187 HEPTACHLOROBIPHENYL	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
BZ 195 OCTACHLOROBIPHENYL	0.000102	0.000102	0.0000997	0.00011	8.54E-05	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.0001	0.000117	4 of 48
BZ 206 NONACHLOROBIPHENYL	0.000239	0.000218	0.000198	0.00013	0.000526	0.00026	0.0000737	9.37E-05	0.000109	0.000133	0.0000777	8.9E-05	0.000164	0.000707	48 of 48
BZ 209 DECACHLOROBIPHENYL	0.00024	0.000238	0.000241	0.00013	0.000391	0.00026	0.0000746	9.31E-05	0.000121	0.000132	0.0000875	7.2E-05	0.00016	0.000513	48 of 48
BZ 28 TRICHLOROBIPHENYL	0.000102	0.000102	0.0000997	0.00011	9.28E-05	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.0001	0.000155	4 of 48

Average Effluent Concentrations
Deer Island Wastewater Treatment Plant - Fiscal Year 2023

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave Annual	Max Annual	No of Detects
BZ 44 TETRACHLOROBIPHENYL	0.000127	0.000159	0.000162	0.00011	0.000205	0.00013	0.0000991	0.000107	0.0000964	9.35E-05	0.0000924	0.0001	0.000118	0.000264	21 of 48
BZ 52 TETRACHLOROBIPHENYL	9.44E-05	0.000145	0.000112	0.00015	0.00016	0.00017	0.0000991	0.000083	0.0000977	0.000101	0.0000978	0.0001	0.000115	0.000341	21 of 48
BZ 66 TETRACHLOROBIPHENYL	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
BZ 77 TETRACHLOROBIPHENYL	0.000102	0.000102	0.000159	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000106	0.000285	1 of 48
BZ 8 DICHLOROBIPHENYL	8.69E-05	0.000129	0.0000997	8.4E-05	0.000115	0.00011	0.000032	0.000139	0.0000977	8.15E-05	0.0000884	8.5E-05	9.37E-05	0.000263	23 of 48
Pesticides and PCBs (ug/L) - low detection limit methods (cont.)															
CIS-NONACHLOR	0.000102	0.000102	0.0000997	0.00011	0.000106	9.4E-05	0.000066	0.000107	0.000144	0.000144	0.000131	0.00013	0.000112	0.000246	18 of 48
DDMU	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
DIELDRIN	0.000102	0.000102	0.00317	0.00045	0.000106	0.0001	0.0000991	0.00389	0.0000977	0.000101	0.0000978	0.0001	0.000707	0.00614	9 of 48
ENDRIN	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
GAMMA-BHC	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
GAMMA-CHLORDANE	0.000479	0.000297	0.00027	0.00027	0.000222	0.00047	0.00041	0.000671	0.00345	0.000941	0.0005	0.00274	0.000952	0.00771	48 of 48
HEPTACHLOR	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.000731	0.000101	0.0000978	0.00064	0.000207	0.00245	3 of 48
HEPTACHLOR EPOXIDE	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
HEXACHLOROBENZENE	0.000597	0.000649	0.000495	0.00046	0.000366	0.00062	0.000288	0.000401	0.000654	0.000568	0.000361	0.00035	0.000476	0.000893	48 of 48
MIREX	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
OXYCHLORDANE	0.000102	0.000102	0.0000997	0.00011	0.000106	0.0001	0.0000991	0.000107	0.0000977	0.000101	0.0000978	0.0001	0.000101	0.000117	0 of 48
TOTAL CHLORDANE	0.000927	0.000781	0.000722	0.00101	0.000774	0.00086	0.000853	0.00153	0.00264	0.00177	0.000871	0.00207	0.00128	0.00562	48 of 48
TOTAL DDT	0.000176	0.000854	0.000183	0.00014	0.000113	0.0006	0.000421	0.000212	0.000357	0.000316	0.000147	0.00017	0.000305	0.00168	42 of 48
TRANS-NONACHLOR	0.000229	0.0002	0.000159	0.00017	0.000134	0.00028	0.000214	0.000325	0.000523	0.000481	0.000253	0.00033	0.000287	0.000808	48 of 48
Semivolatile Organics (ug/L)															
1,2,4-TRICHLOROBENZENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
1,2-DIPHENYLHYDRAZINE (AS AZOBENZENE)	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2,2'-OXYBIS(1-CHLOROPROPANE)	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2,4,5-TRICHLOROPHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2,4,6-TRICHLOROPHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2,4-DICHLOROPHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2,4-DIMETHYLPHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2,4-DINITROPHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2,4-DINITROTOLUENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2,6-DINITROTOLUENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2-CHLORONAPHTHALENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2-CHLOROPHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2-METHYL-4,6-DINITROPHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2-METHYLNAPHTHALENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2-METHYLPHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2-NITROANILINE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
2-NITROPHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
3,3'-DICHLOROBENZIDINE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
3-NITROANILINE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
4-BROMOPHENYL PHENYL ETHER	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
4-CHLORO-3-METHYLPHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
4-CHLOROANILINE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
4-CHLOROPHENYL PHENYL ETHER	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
4-METHYLPHENOL (INCLUDES 3-METHYLPHENOL)	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
4-NITROANILINE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
4-NITROPHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
ACENAPHTHENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
ACENAPHTHYLENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave Annual	Max Annual	No of Detects
ANILINE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
Semivolatile Organics (ug/L) (cont.)															
ANTHRACENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
BENZIDINE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
BENZO(A)ANTHRACENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
BENZO(A)PYRENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
BENZO(B)FLUORANTHENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
BENZO(G,H,I)PERYLENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
BENZO(K)FLUORANTHENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
BENZOIC ACID	1.92	1.96	2.03	14.7	2	2.06	1.97	1.92	1.91	14.9	1.98	1.98	4.19	27.9	2 of 23
BENZYL ALCOHOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
BIS(2-CHLOROETHOXY)METHANE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
BIS(2-CHLOROETHYL)ETHER	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
BIS(2-ETHYLHEXYL)PHTHALATE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
BUTYLBENZYLPHTHALATE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
CARBAZOLE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
CHRYSENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
DIBENZO(A,H)ANTHRACENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
DIBENZOFURAN	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
DIETHYLPHTHALATE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
DIMETHYLPHTHALATE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
DI-N-BUTYLPHTHALATE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
DI-N-OCTYLPHTHALATE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
FLUORANTHENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
FLUORENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
HEXACHLOROBENZENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
HEXACHLOROBUTADIENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
HEXACHLOROCYCLOPENTADIENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
HEXACHLOROETHANE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
INDENO(1,2,3-CD)PYRENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
ISOPHORONE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
NAPHTHALENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
N-DECANE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
NITROBENZENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
N-NITROSODIMETHYLAMINE (NDMA)	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
N-NITROSODI-N-PROPYLAMINE (NDPA)	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
N-NITROSODIPHENYLAMINE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
N-OCTADECANE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
PENTACHLOROPHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
PHENANTHRENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
PHENOL	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
PYRENE	1.92	1.96	2.03	2.31	2	2.06	1.97	1.92	1.91	1.94	1.98	1.98	2	2.5	0 of 23
Polyaromatic Hydrocarbons (ug/L) - low detection limit methods															
1-METHYLNAPHTHALENE	0.0052	0.00365	0.0057	0.00688	0.00347	0.00497	0.00406	0.00328	0.0037	0.00393	0.00305	~	0.00426	0.00968	44 of 44
1-METHYLPHENANTHRENE	0.00202	0.00272	0.00276	0.00512	0.00225	0.00286	0.00106	0.000951	0.00221	0.00222	0.001	~	0.00217	0.00692	43 of 44
2,3,5-TRIMETHYLNAPHTHYLENE	0.00579	0.00491	0.00526	0.0145	0.00507	0.00705	0.00249	0.00364	0.00479	0.00987	0.00291	~	0.0058	0.0193	44 of 44
2,6-DIMETHYLNAPHTHALENE	0.00394	0.00218	0.00384	0.00657	0.00439	0.00402	0.00107	0.00105	0.00296	0.00504	0.00194	~	0.0032	0.00866	44 of 44
2-METHYLNAPHTHALENE	0.00243	0.00459	0.00615	0.00815	0.00272	0.00558	0.00155	0.00146	0.00584	0.00558	0.00155	~	0.00402	0.00972	44 of 44
ACENAPHTHENE	0.00444	0.00843	0.0103	0.0075	0.00524	0.00924	0.00258	0.00814	0.00712	0.00461	0.00242	~	0.00615	0.0128	44 of 44

Average Effluent Concentrations
Deer Island Wastewater Treatment Plant - Fiscal Year 2023

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave Annual	Max Annual	No of Detects
ACENAPHTHYLENE	0.000551	0.000773	0.000756	0.00086	0.000802	0.00098	0.000387	0.000319	0.000791	0.000708	0.000244	~	0.000628	0.00122	32 of 44
Polyaromatic Hydrocarbons (ug/L) - low detection limit methods (cont.)															
ANTHRACENE	0.00208	0.00445	0.00456	0.00281	0.00178	0.00194	0.00102	0.000616	0.00177	0.00126	0.00105	~	0.00194	0.00555	43 of 44
BENZO(A)ANTHRACENE	0.00426	0.00431	0.00356	0.00398	0.00331	0.00428	0.00316	0.00202	0.00501	0.00355	0.00284	~	0.00361	0.00732	44 of 44
BENZO(A)PYRENE	0.00257	0.0025	0.00216	0.00238	0.00174	0.00276	0.00238	0.00267	0.005	0.00395	0.00291	~	0.00291	0.00784	44 of 44
BENZO(B)FLUORANTHENE	0.00582	0.00479	0.00497	0.00487	0.00419	0.00492	0.00404	0.00281	0.00957	0.009	0.00663	~	0.00572	0.0136	44 of 44
BENZO(E)PYRENE	0.00312	0.00253	0.00244	0.00279	0.00233	0.00286	0.00201	0.00171	0.00459	0.00407	0.00235	~	0.00281	0.00664	44 of 44
BENZO(G,H,I)PERYLENE	0.00177	0.00114	0.000249	0.00339	0.00522	0.00483	0.00241	0.00147	0.00341	0.0023	0.00164	~	0.00253	0.007	37 of 44
BENZO(K)FLUORANTHENE	0.00144	0.00131	0.00118	0.00102	0.00134	0.00133	0.000757	0.000932	0.00226	0.00139	0.000926	~	0.00125	0.0034	44 of 44
BENZOTHIAZOLE	0.16	0.179	0.152	0.112	0.134	0.122	0.106	0.079	0.118	0.092	0.075	~	0.115	0.245	44 of 44
BIPHENYL	0.00164	0.00204	0.00235	0.00284	0.00167	0.00164	0.00115	0.0011	0.00117	0.000983	0.000659	~	0.00147	0.00334	44 of 44
C1-CHRYSENES	0.00401	0.00333	0.00335	0.00413	0.00342	0.00418	0.00281	0.00252	0.00418	0.00348	0.00277	~	0.00343	0.00598	44 of 44
C1-DIBENZOTHIOPHENES	0.00716	0.00706	0.00672	0.00997	0.00611	0.00776	0.00334	0.00423	0.00651	0.00823	0.00469	~	0.00632	0.0137	44 of 44
C1-FLUORANTHENES/PYRENES	0.0059	0.00549	0.0049	0.0069	0.00507	0.0064	0.00455	0.00317	0.00621	0.0053	0.00431	~	0.00521	0.00845	44 of 44
C1-FLUORENES	0.0107	0.0108	0.0118	0.0159	0.00989	0.0106	0.00525	0.00679	0.00954	0.0109	0.00564	~	0.00939	0.0214	44 of 44
C1-NAPHTHALENES	0.00618	0.00603	0.00819	0.0104	0.00477	0.0079	0.00384	0.00356	0.00587	0.00601	0.00308	~	0.00577	0.0133	44 of 44
C1-PHENANTHRENES/ANTHRACENES	0.0187	0.0173	0.0192	0.0286	0.0156	0.0178	0.00949	0.00846	0.0153	0.0154	0.00995	~	0.0153	0.0378	44 of 44
C2-CHRYSENES	0.000255	0.000254	0.000249	0.00026	0.000265	0.00026	0.000248	0.000266	0.000244	0.000251	0.000244	~	0.000253	0.000292	0 of 44
C2-DIBENZOTHIOPHENES	0.000255	0.000254	0.000249	0.00026	0.000265	0.00026	0.000248	0.000266	0.000244	0.000251	0.000244	~	0.000253	0.000292	0 of 44
C2-FLUORANTHENES/PYRENES	0.00301	0.00279	0.00239	0.00326	0.00218	0.00301	0.00268	0.00156	0.00355	0.00298	0.00262	~	0.00273	0.00455	44 of 44
C2-FLUORENES	0.0118	0.0107	0.0102	0.0196	0.00863	0.0112	0.00618	0.00847	0.0101	0.0123	0.00624	~	0.0102	0.0247	44 of 44
C2-NAPHTHALENES	0.00814	0.00788	0.0102	0.0226	0.00834	0.0112	0.00422	0.00365	0.00723	0.0112	0.00374	~	0.0085	0.0296	44 of 44
C2-PHENANTHRENES/ANTHRACENES	0.00828	0.00738	0.0069	0.0148	0.00761	0.0103	0.00459	0.00462	0.00757	0.0107	0.00571	~	0.00783	0.0217	44 of 44
C3-CHRYSENES	0.000255	0.000254	0.000249	0.00026	0.000265	0.00026	0.000248	0.000266	0.000244	0.000251	0.000244	~	0.000253	0.000292	0 of 44
C3-DIBENZOTHIOPHENES	0.000255	0.000254	0.000249	0.00026	0.000265	0.00026	0.000248	0.000266	0.000244	0.000251	0.000244	~	0.000253	0.000292	0 of 44
C3-FLUORANTHENES/PYRENES	0.000255	0.000254	0.000249	0.00026	0.000265	0.00026	0.000248	0.000266	0.000244	0.000251	0.000244	~	0.000253	0.000292	0 of 44
C3-FLUORENES	0.000255	0.000254	0.000249	0.00026	0.000265	0.00026	0.000248	0.000266	0.000244	0.000251	0.000244	~	0.000253	0.000292	0 of 44
C3-NAPHTHALENES	0.0179	0.0146	0.0164	0.0333	0.0138	0.0208	0.00686	0.0145	0.0144	0.0273	0.00906	~	0.0167	0.0452	44 of 44
C3-PHENANTHRENES/ANTHRACENES	0.01	0.00575	0.00785	0.00923	0.0061	0.00826	0.00544	0.00421	0.0076	0.00965	0.00519	~	0.00707	0.0179	44 of 44
C4-CHRYSENES	0.000255	0.000254	0.000249	0.00026	0.000265	0.00026	0.000248	0.000266	0.000244	0.000251	0.000244	~	0.000253	0.000292	0 of 44
C4-NAPHTHALENES	0.000255	0.000254	0.000249	0.00026	0.000265	0.00026	0.000248	0.000266	0.000244	0.000251	0.000244	~	0.000253	0.000292	0 of 44
C4-PHENANTHRENES/ANTHRACENES	0.000255	0.000254	0.000249	0.00026	0.000265	0.00026	0.000248	0.000266	0.000244	0.000251	0.000244	~	0.000253	0.000292	0 of 44
CHRYSENE	0.00565	0.00543	0.00431	0.00485	0.00421	0.00523	0.00461	0.00277	0.0078	0.00525	0.00442	~	0.00496	0.0116	44 of 44
DIBENZO(A,H)ANTHRACENE	0.000255	0.000502	0.000249	0.00026	0.00105	0.00026	0.000248	0.000266	0.000968	0.000501	0.000324	~	0.000439	0.00162	14 of 44
DIBENZOFURAN	0.00788	0.0112	0.0105	0.00994	0.00633	0.00663	0.00291	0.00271	0.00415	0.00444	0.00222	~	0.00571	0.0128	44 of 44
DIBENZOTHIOPHENE	0.00804	0.00788	0.00746	0.00759	0.00454	0.00438	0.00166	0.00144	0.00154	0.00183	0.000999	~	0.00377	0.0101	44 of 44
FLUORANTHENE	0.0163	0.0179	0.0163	0.017	0.013	0.0163	0.011	0.00803	0.0197	0.0121	0.0111	~	0.0141	0.0271	44 of 44
FLUORENE	0.00688	0.0116	0.0136	0.0118	0.00671	0.00727	0.00328	0.0028	0.00551	0.00452	0.00224	~	0.00636	0.0161	44 of 44
INDENO(1,2,3-CD)PYRENE	0.0102	0.00889	0.0103	0.00543	0.0024	0.0024	0.00249	0.00646	0.0102	0.0172	0.00543	~	0.00729	0.0262	44 of 44
NAPHTHALENE	0.00484	0.00594	0.00631	0.00599	0.00336	0.00755	0.00266	0.00289	0.00758	0.00501	0.00155	~	0.00475	0.0108	44 of 44
PERYLENE	0.000767	0.00166	0.0022	0.00201	0.00282	0.00194	0.00173	0.0017	0.00233	0.0028	0.00198	~	0.00202	0.00482	43 of 44
PHENANTHRENE	0.016	0.0228	0.0273	0.0216	0.014	0.0145	0.00708	0.0047	0.0111	0.00807	0.00652	~	0.0128	0.0324	44 of 44
PYRENE	0.0164	0.016	0.013	0.0159	0.0116	0.0148	0.0104	0.00648	0.0164	0.0108	0.00987	~	0.0125	0.022	44 of 44
Volatile Organics (ug/L)															
1,1,1-TRICHLOROETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
1,1,2,2-TETRACHLOROETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
1,1,2-TRICHLOROETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
1,1-DICHLOROETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
1,1-DICHLOROETHENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24

Average Effluent Concentrations
Deer Island Wastewater Treatment Plant - Fiscal Year 2023

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave Annual	Max Annual	No of Detects
1,2-DICHLOROBENZENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
Volatile Organics (ug/L) (cont.)															
1,2-DICHLOROETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
1,2-DICHLOROPROPANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
1,3-DICHLOROBENZENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
1,4-DICHLOROBENZENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
2-BUTANONE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
2-CHLOROETHYL VINYL ETHER	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
2-HEXANONE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
4-METHYL-2-PENTANONE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
ACETONE	5.51	1	1	1	1	6.2	1	1	1	1	1	1	1.77	10.5	2 of 24
ACROLEIN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0 of 24
ACRYLONITRILE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
BENZENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
BROMODICHLOROMETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
BROMOFORM	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
BROMOMETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
CARBON DISULFIDE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
CARBON TETRACHLORIDE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
CHLOROBENZENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
CHLOROETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
CHLOROFORM	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
CHLOROMETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
CIS-1,2-DICHLOROETHENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
CIS-1,3-DICHLOROPROPENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
DIBROMOCHLOROMETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
ETHYLBENZENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
M,P-XYLENE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0 of 24
METHYLENE CHLORIDE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
O-XYLENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
STYRENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
TETRACHLOROETHENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
TOLUENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
TRANS-1,2-DICHLOROETHENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
TRANS-1,3-DICHLOROPROPENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
TRICHLOROETHENE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
TRICHLOROFLUOROMETHANE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
VINYL ACETATE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0 of 24
VINYL CHLORIDE	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0 of 24

Notes: Where parameters were below detection levels, one half of the method detection limit for inorganic compounds or one tenth of the quantitation limit for organic compounds was substituted to calculate concentrations.
The annual average concentration is the flow-weighted average of all data points. The maximum concentration is the highest concentration observed in the monitoring year.

Appendix B. Cottage Farm CSO Facility

Table B-1 Cottage Farm CSO Facility Operations Summary

Table B-2 Cottage Farm CSO Facility Effluent Characterization

Table B-1 Cottage Farm CSO Facility Operations Summary

FISCAL YEAR_2023

DATE	RAINFALL (inches)	DISCHARGE DURATION (hours)	TOTAL VOLUME (MG)	PEAK FLOW (MGD)	BOD EFFLUENT (mg/L)		CHLORINE RESIDUAL (mg/L)		FECAL COLIFORM (col/100 ml)	TSS EFFLUENT (mg/L)		pH (SU)
14-MAR-2023	2.2	3.27	12	137.0	56.9		0.61		11400.0	90.0		5.8
						<	0.02		304000	93.0		
						<	0.02		39200	105.0		
21-MAY-2023	0.11	0.63	2	147								
TOTAL		3.90	14.00									
AVERAGE		2	7		57				51407	96		5.81
MINIMUM		1	2	137	57		0.21		11400	96		5.81
MAXIMUM		3	12	147	57		0.61		304000	96		5.81
COUNT		2	2	2	1		3		3	3		1
ACTIVATIONS	2					Sample > 0.25	1.0	Monthly > 200	1.0		pH <6.5	1.0
						Daily > 0.1	1.0	Single > 400	3.0		pH >8.5	0.0
						Violations	2	Violations	4		Violations	1

*= continued from previous day

NA= No Activation

Table B-2 Cottage Farm CSO Facility Effluent Characterization
FISCAL YEAR_2023

DATE	ALUMINUM ug/l	CADMIUM ug/l	CHROMIUM ug/l	COPPER ug/l	MERCURY ug/l	MAGNESIUM ug/l	NICKEL ug/l	LEAD ug/l	ZINC ug/l	TOTAL ORGANIC CARBON mg/l
14-MAR-2023	787	0.311	5.07	28.7	0.0823	2890	4.07	< 25	86.5	17.4
AVERAGE	787.0	0.3	5.1	28.7	0.1	2890.0	4.1	12.5	86.5	17.4
MINIMUM	787.0	0.3	5.1	28.7	0.1	2890.0	4.1	12.5	86.5	17.4
MAXIMUM	787.0	0.3	5.1	28.7	0.1	2890.0	4.1	12.5	86.5	17.4
COUNT	1	1	1	1	1	1	1	1	1	1

Appendix C. Prison Point CSO Facility

Table C-1 Prison Point Farm CSO Facility Operations Summary
FISCAL YEAR_2023

DATE	RAINFALL (inches)	DISCHARGE DURATION (hours)	TOTAL VOLUME (MG)	PEAK FLOW (MGD)	BOD EFFLUENT (mg/L)		CHLORINE RESIDUAL (mg/L)		FECAL COLIFORM (col/100 ml)	TSS EFFLUENT (mg/L)		pH (SU)
14-OCT-2022	1.19	4.53	15.00	123.00	32.9	<	0.02		171	202.0		5.9
							0.08		9.01	44.5		
						<	0.02		126	106.0		
						<	0.02		210	56		
						<	0.02		580	83		
						<	0.02		200	71		
30-NOV-2022	0.66	2.1	6.00	190.00	42.4	<	0.02		380	122		6.42
						<	0.02		27	99		6.21
16-DEC-2022	1.28	2.53	7.00	116.00	82.4	<	0.02		2400	189		6.62
						<	0.02		520	100		
						<	0.02		540	89.3		
						<	0.02		45	75		
23-DEC-2022	0.66	2.93	11.00	148.00	25.4	<	0.02		580	71		6.56
						<	0.02		162	58.7		
						<	0.02		270	38.7		
						<	0.02		54.1	29.3		
26-JAN-2023	0.72	3.63	15.00	167.00								
14-MAR-2023	2.2	9.63	48.00	216.00								
01-MAY-2023	0.05	2.22	8.00	159.00								
21-MAY-2023	0.11	3.73	19.00	226.00								
TOTAL		31.30	129.00									
AVERAGE		3.91	16.13		45.8		0.0		185.8	89.7		6.3
MINIMUM		2.10	6.00	116.0	25.4		0.0		9.0	29.3		5.9
MAXIMUM		9.63	48.00	226.0	82.4		0.1		2400.0	202.0		6.6
COUNT		8	8	8	4		16		16	16		5
ACTIVATIONS	8					Sample > 0.25	0.0	Monthly > 200	1.0		pH <6.5	3.0
						Daily > 0.1	0.0	Single > 400	5.0		pH >8.5	0.0
						Violations	0	Violations	6		Violations	3

Table C-2 Prison Point Farm CSO Facility Effluent Characterization
FISCAL YEAR_2023
Metals

DATE	ALUMINUM ug/l	CADMIUM ug/l	CHROMIUM ug/l	COPPER ug/l	MERCURY ug/l	MAGNESIUM ug/l	NICKEL ug/l	LEAD ug/l	ZINC ug/l	TOTAL ORGANIC CARBON mg/l
14-OCT-2022	2140	0.52	11.3	66.8	0.154	3430	6.94	58.6	223	15
30-NOV-2022	1510	0.333	7.35	52	0.487	2510	< 4.045	53.6	167	18.7
AVERAGE	1825	0.427	9.33	59.40	0.321	2970	4.48	56.10	195	0
MINIMUM	1510	0.333	7.35	52.00	0.154	2510	2.02	53.60	167	15
MAXIMUM	2140	0.520	11.30	66.80	0.487	3430	6.94	58.60	223	19
COUNT	2	2	2	2	2	2	2	2	2	2

Appendix D. Somerville Marginal CSO Facility

Table D-1 Somerville CSO Facility Operations Summary
FISCAL YEAR_2023

DATE	RAINFALI (inches)	DISCHARGE DURATION (hours)	TOTAL VOLUME (MG)	PEAK FLOW (MGD)	BOD EFFLUENT (mg/L)	CHLORINE RESIDUAL (mg/L)		FECAL COLIFORM (col/100 ml)		TSS EFFLUENT (mg/L)	pH (SU)	
26-AUG-2022	0.41	0.4	0	23								
19-SEP-2022	0.42	1.6	0	78								
13-OCT-2022	1.03	1.68	0	31								
14-OCT-2022	1.19	1.25	3	104								
16-NOV-2022	0.79	2.16	1	50								
27-NOV-2022	0.64	0.31	0	18								
30-NOV-2022	0.66	1.55	3	93								
07-DEC-2022	0.85	0.3	0	31								
16-DEC-2022	1.28	6.61	3	48								
23-DEC-2022	0.66	4.7	5	64								
20-JAN-2023	0.49	0.5	1	53								
22-JAN-2023	0.24											
23-JAN-2023	0.87	0.26	0	31								
26-JAN-2023	0.72	4.63	5	80								
02-MAR-2023	0.58	3.08	1	54		<	0.02	<	10	98.5		7.64
						<	0.02	<	10	185		
						<	0.02		69000	92.5		
						<	0.02					
04-MAR-2023	0.32	2.87	0	14								
14-MAR-2023	2.2	12.32	17	78								
30-APR-2023	1.81	0.73	1	50	4.26	<	0.02		9.01	67.5		8.45
						<	0.02	<	10	32.5		
		2.88	3	59	4.26	<	0.02		9.01	67.5		8.45
						<	0.02	<	10	32.5		
20-MAY-2023	1.83	4.78	6	112	5.72	<	0.02	<	10	98		8.42
						<	0.02	<	10	65		
						<	0.02	<	10	32		
						<	0.02	<	10	32		
						<	0.02	<	10	27		
						<	0.02	<	10	29		
						<	0.02		27000	32		
02-JUN-2023	0.37	0.32	0	3								
10-JUN-2023	0.34	1.65	0	18								
12-JUN-2023	0.34	0.3	0	22								
14-JUN-2023	0.12	2.02	1	73	19.1	<	0.02	<	10	102		7.15
						<	0.02	<	10	67		
						<	0.02	<	10	66.7		
17-JUN-2023	0.77	0.75	2	245								
TOTAL		57.65	52.00									
AVERAGE		2.40	2.17		8.3		0.01		4.55	66.3		8.0
MINIMUM		0.26	0.00	3.0	4.3		0.01		1.00	66.3		7.2
MAXIMUM		12.32	17.00	245.0	19.1		0.01		69000.00	66.3		8.5
COUNT		24	24	24	4		18		17	17		5
ACTIVATIONS	24					Sample > 0.25	0.0	Monthly > 200	0.0		pH <6.5	0.0
						Daily > 0.1	0.0	Single > 400	2.0		pH >8.5	0.0
						Violations	0	Violations	2		Violations	0

*= continued from previous day
NA= No Activation

Table D-1A Somerville 205A CSO Facility Operations Summary
FISCAL YEAR_2023

DATE	RAINFALL (inches)	DISCHARGE DURATION (hours)	TOTAL VOLUME (MG)	PEAK FLOW (MGD)	BOD EFFLUENT (mg/L)	CHLORINE RESIDUAL (mg/L)	FECAL COLIFORM (col/100 ml)	TSS EFFLUENT (mg/L)	pH (su) Min
30-NOV-2022	0.66	0.33	ND	ND					
16-DEC-2022	1.28	3.33	ND	ND					
26-JAN-2023	0.72	3.08	ND	ND					
02-MAR-2023	0.58	1.25	ND	ND					
14-MAR-2023	2.2	4.25	ND	ND					
30-APR-2023	1.81	0.58	ND	ND					
20-MAY-2023	1.83	3	ND	ND					
10-JUN-2023	0.34	0.17	ND	ND					
14-JUN-2023	0.12	0.83	ND	ND					

TOTAL		16.82
AVERAGE		1.87
MINIMUM		0.17
MAXIMUM		4.25
COUNT		9
ACTIVATIONS	9	

*= continued from previous day
ND= No Flow measurment at this outfall

Table D-2 Somerville 205A CSO Facility Effluent Characterization
FISCAL YEAR_2023
Metals

DATE	ALUMINUM ug/l	CADMIUM ug/l	CHROMIUM ug/l	COPPER ug/l	MERCURY ug/l	MAGNESIUM ug/l	NICKEL ug/l	LEAD ug/l	ZINC ug/l	TOTAL ORGANIC CARBON mg/l
2-MAR-2023	2650	0.346	13.5	44.8	0.145	202000	3.98	31.8	246	20.6
1-MAY-2023	829	1.58	4.8	11.3	0.0879	1170	< 2.9415	< 25.7	56.8	5.84
20-MAY-2023	1900	0.224	7.97	21.8	0.0539	1350	< 3.965	63.5	113	7.34
AVERAGE	1793	1	9	26	0	68173	2	36	139	11
MINIMUM	829	0	5	11	0	1170	1	13	57	6
MAXIMUM	2650	2	14	45	0	202000	4	64	246	21
COUNT	3	3	3	3	3	3	3	3	3	3

Appendix E. Union Park CSO Facility

Table E-1 Union Park CSO Facility Operations Summary
FISCAL YEAR_2023

DATE	RAINFALL (inches)	DISCHARGE DURATION (hours)	TOTAL VOLUME (MG)	PEAK FLOW (MGD)	BOD EFFLUENT (mg/L)	CHLORINE RESIDUAL (mg/L)	Enterococci (col/100 ml) Effluent	FECAL COLIFORM (col/100 ml)	TSS EFFLUENT (mg/L)	pH (SU)
26-JAN-2023	0.72	0.91	1	36	87.0	< 0.02	20	40.0	19	6.70
						< 0.02	< 10	< 10.0		6.20
14-MAR-2023	2.2	7.28	7	89	9.0	< 0.02	15531	13100.0	64	6.60
						< 0.02	15531	29900		6.50
						< 0.02	9804	430		6.28
						< 0.02	15531	2000		6.77
						< 0.02	36540	24800		6.08
						< 0.02	9900	3600		6.64
						< 0.02	30760	30500		6.84
21-MAY-2023	0.11	1.22	1	45	21.0	< 0.02	< 10	< 10	62	6.09
TOTAL		9.41	9.00							
AVERAGE		3.14	3.00		39.0	.	0.0	718.5	48.3	6.5
MINIMUM		0.91	1.00	36.0	9.0	0.01	0.0	1.0	19.0	6.1
MAXIMUM		7.28	7.00	89.0	87.0	0.01	0.0	30500.0	64.0	6.8
COUNT		3	3	3	3	10	10	10	3	10
ACTIVATIONS	3									
					Sample > 0.25	0.0	Monthly > 200	1.0	pH <6.5	4.0
					Daily > 0.1	0.0	Single > 400	7.0	pH >8.5	0.0
					Violations	0	Violations	8	Violations	4

*= continued from previous day
NA= No Activation

Table E-2 Union Park CSO Facility Effluent Characterization
FISCAL YEAR_2023
Metals

DATE	ALUMINUM ug/l	CADMIUM ug/l	CHROMIUM ug/l	COPPER ug/l	MERCURY ug/l	MAGNESIUM ug/l	NICKEL ug/l	LEAD ug/l	ZINC ug/l	TOTAL ORGANIC CARBON mg/l
14-MAR-2023	0.565	0.0001	0.004	29.9	No Data	No Data	0.003	0.0136	0.091	10.3
TOTAL	0.565	0.0001	0.004	29.9			0.003	0.0136	0.091	10.3
AVERAGE	0.565	0.0001	0.004	29.9			0.003	0.0136	0.091	10.3
MINIMUM	0.565	0.0001	0.004	29.9			0.003	0.0136	0.091	10.3
MAXIMUM	0.565	0.0001	0.004	29.9			0.003	0.0136	0.091	10.3
COUNT	1	1	1	1			1	1	1	1

Appendix F. NPDES Monitoring Requirements

Overview

The Environmental Protection Agency (EPA) mandates that any discharge to a body of water must be permitted through the National Pollutant Discharge Elimination System (NPDES). The EPA and the Massachusetts Department of Environmental Protection (DEP) jointly issued a NPDES permit to MWRA for the Deer Island treatment plant and six CSO treatment facilities: Cottage Farm, Prison Point, Somerville Marginal, Constitution Beach, Fox Point, and Commercial Point. The Union Park CSO facility operates under a separate NPDES permit jointly issued to the MWRA and the Boston Water and Sewer Commission (BWSC).

The limits set in the MWRA NPDES permit are limitations for secondary treatment plants. In March 2001, secondary Battery C underwent start-up at Deer Island, substantially finishing the construction process at the plant. Before the completion of Battery C, though, plant effluent was already largely in compliance with the new permit. Additionally, in September of 2000, Constitution Beach, one of the CSO facilities, shut down, leaving five permitted and operational CSO facilities. Union Park came on-line at the beginning of FY08. In November 2007, the Fox Point and Commercial Point facilities were decommissioned following the completion of a sewer separation project in the Dorchester area.

In addition, MWRA monitors the influent quality of wastewater. Those monitoring results provide the basis for determining the adequacy of existing local limits to protect the treatment plant and Massachusetts Bay. Local Limits, enforced by MWRA's Toxic Reduction and Control (TRAC) department, allow the discharge of toxic chemicals from industrial sources to be regulated. The MWRA submitted proposed local limits in FY00 reflecting the new secondary treatment requirements. Regulators approved the new local limits and they became effective in June 2003, at the end of FY03. Under the pretreatment program requirements, local limits must be re-evaluated every time a new NPDES permit is issued. MWRA not only monitors to comply with the NPDES effluent requirements, but also has its own monitoring programs, including monitoring at DITP, Boston Harbor, and Massachusetts Bay. These monitoring programs serve to assure appropriate control of discharges to the system, to assure the most cost-effective wastewater treatment while meeting water quality standards, and to assure the quality of life of the organisms and health of the animal communities living in the receiving waters.

MWRA's current NPDES permit for DITP and the non-Union Park CSO facilities expired in August 2005. MWRA has applied for a new permit. However, as of the end of FY23, EPA has not issued a new NPDES permit. A draft permit was issued on May 31, 2023. In lieu of a new permit, the limits of the old permit remain in force.

Receiving Waters

Under the NPDES permit, "in compliance with the provisions of the Clean Water Act, as amended, 33 U.S.C. §§ 1251 et seq., and the Massachusetts Clean Water Act, as amended, Mass. Gen. Laws, ch. 21, §§ 26-53, Massachusetts Water Resources Authority is authorized to discharge from MWRA Publicly Owned Treatment Works, Deer Island Treatment Plant, Deer Island, Boston, MA 02152 (Discharge serial number T01), which discharges to receiving waters located in Massachusetts Bay, which is adjacent to Cape Cod Bay, and a part of the Gulf of Maine; and from Combined Sewer Overflow Outfalls, which discharge to the Charles River, Inner Harbor, Mystic River, Boston Harbor, Dorchester Bay, Alewife Brook; in accordance with effluent limitations, monitoring requirements and other conditions set in the permit…"

Monitoring Requirements and Effluent Limitations

The NPDES permit establishes monitoring requirements for the Deer Island outfall tunnel (T01). The permit also regulates CSO treatment facility outfalls at Cottage Farm (MWR201), Prison Point (MWR203), Somerville Marginal (which has two outfalls from a single facility, the primary outfall, MWR205, and the relief outfall, MWR205A), Constitution Beach (MWR207, now closed), Fox Point (MWR209, now closed), and Commercial Point (MWR211, now closed). The permit also establishes a comprehensive receiving water monitoring plan, the Ambient Monitoring Plan, in Massachusetts Bay. MWRA's joint permit with BWSC for Union Park regulates the outfall for the Union Park CSO facility (MWR215).

Reporting Requirements

In addition to Deer Island and CSO monitoring requirements, the NPDES permit requires numerous reports on the state of MWRA sewerage and operational systems. These include reports on infiltration/inflow, CSO facilities and collection systems maintenance and inspection, operational upsets, dry weather and sanitary sewer overflows, operational bypasses, monthly Discharge Monitoring Reports (DMRs), and reporting on the effects of discharges as measured by the Ambient Monitoring Plan. In addition, the Contingency Plan mandates a number of additional thresholds and stipulates actions needed if they are exceeded. Table F-1 presents a summary of the permit limits and monitoring requirements for Deer Island and Table F-2 does the same for the CSOs.

Table F-1. Effluent Limitations and Monitoring Requirements for DITP Outfall T01

Effluent Characteristic	Discharge Limitation Average Monthly	Average Weekly	Maximum Daily
Flow	Report*	N/A	Report
Dry Day Flow	436 MGD	N/A	Report
cBOD	25 mg/L	40 mg/L	Report
TSS	30 mg/L	45 mg/L	Report
pH	Not less than 6.0 nor greater than 9.0 at any time.		
Fecal Coliform[a]	N/A	14,000 colonies/100mL	14,000 colonies/100mL
Chlorine, Total Residual	456 μg/L	N/A	631 μg/L
PCBs, Arochlors: 1016, 1221, 1232, 122, 1248, 1254, 1260	0.000045 μg/L	N/A	Report
Settleable Solids	N/A	Report	Report
Chlorides, Influent	N/A	N/A	Report
Mercury	Report	N/A	Report
Chlordane	Report	N/A	Report
4,4-DDT	Report	N/A	Report
Dieldrin	Report	N/A	Report
Heptachlor	Report	N/A	Report
Ammonia-Nitrogen	Report	N/A	N/A
Total Kjeldahl Nitrogen	Report	N/A	N/A
Total Nitrate	Report	N/A	N/A
Total Nitrite	Report	N/A	N/A
Cyanide, Total	Report	N/A	Report
Copper, Total	Report	N/A	Report
Arsenic, Total	Report	N/A	Report
Hexachlorobenzene	Report	N/A	Report
Aldrin	Report	N/A	Report
Heptachlor Epoxide	Report	N/A	Report
PCBs, Total	Report	N/A	Report

Table F-1. Effluent Limitations and Monitoring Requirements for DITP Outfall

Effluent Characteristic	Discharge Limitation Average Monthly	Average Weekly	Maximum Daily
Volatile Organic Compounds	Report		
LC50[b]	Tests involve using mysid shrimp (*Mysidopsis bahia*) and inland silverside (*Menidia beryllina*) in 48 hour acute toxicity tests. LC50 must be achieved in a solution that is 50% effluent.		
C-NOEC[c]	C-NOEC tests involve larval inland silverside (*Menidia beryllina*) and sea urchin (*Arbacia punctulata*). *Menidia* tests involve a week's worth of exposure to various effluent concentrations. The *Arbacia* toxicity test measures fertilization in the test organism. In both cases, no chronic effects must be observed in a solution composed of 1.5% effluent.		
* No limit, but values reported to EPA and DEP.			
[a] There are two other fecal coliform limits. The first is that not more than 10% of the individual samples collected in a month can have a count higher than 14,000 colonies/100mL. Typically, given 3 samples a day, this means no more than 9 samples can have a count higher than 14,000 in a given month. The second limit is that no more than 3 consecutive samples can exceed 14,000 colonies/100mL.			
[b] LC50: the concentration of effluent in a sample that causes mortality in 50% of the test population at a specific time of observation.			
[c] C-NOEC: Chronic No Observed Effect Concentration is the highest concentration of effluent to which organisms are exposed in a life cycle or partial life cycle test which has no adverse effects (on growth, survival and reproduction).			

Table F-2. Effluent Limitations and Monitoring Requirements for CSO Outfalls

Effluent Characteristic	Discharge Limitation Average Monthly	Event Average
Rainfall	Report*	Report
Flow	Report	Report
TSS	Report	Report
BOD	Report	Report
Chlorine, Total Residual	0.1 mg/L	0.25 mg/L max hourly
pH	Not less than 6.5 nor greater than 8.3 or 8.5[†]	
Fecal Coliform	Must meet Massachusetts Water Quality Standards	
Enterococcus	(Union Park Only) Report	
LC50[b]	Since Cottage Farm and Somerville Marginal's relief outfall both discharge in freshwater, acute toxicity tests are required with daphnids (*Ceriodaphnia dubia*) and fathead minnows (*Pimpephales promelas*). There is no limit to effluent LC50, but results are reportable.	
	All other CSO facilities discharge to marine waters, so the acute test organisms are mysid shrimp (*Mysidopsis bahia*) and inland silverside (*Menidia beryllina*). LC50 results are reportable.	

* No limit, but values reported to EPA and DEP.

[†] 8.3 S.U. is the limit for facilities discharging to freshwater (Cottage Farm and the Somerville Marginal relief outfall). 8.5 S.U. is the limit for saltwater discharge (Prison Point, Somerville Marginal, and Union Park).

[b] LC50: the concentration of effluent in a sample that causes mortality in 50% of the test population at a specific time of observation.

[c] C-NOEC: Chronic No Observed Effect Concentration is the highest concentration of effluent to which organisms are exposed in a life cycle or partial life cycle test which has no adverse effects (on growth, survival and reproduction).

Monitoring Programs

MWRA conducted several monitoring programs. However, this report presents only the influent and effluent monitoring programs. The receiving water monitoring programs are too complex to cover in a single document. More information on monitoring in Massachusetts Bay and Boston Harbor can be found at:
http://www.mwra.com/harbor/html/bhrecov.htm

Treatment Plant Monitoring

Monitoring at DITP has two main components: influent monitoring and effluent monitoring.

Influent monitoring characterizes the influent to the Deer Island Treatment Plant. Monitoring for conventional parameters is necessary for some parameters to meet NPDES reporting requirements, but monitoring many other parameters is critical for process control to ensure optimal plant functioning. Influent monitoring data provides influent loading rates and the basis for determining treatment plant efficiency. Influent monitoring for non-conventional parameters is an important part of MWRA's source reduction and Local Limits program run by TRAC.

Effluent monitoring characterizes the quality of the effluent discharged to Massachusetts Bay. With the addition of whole effluent toxicity (WET) testing, the parameters measured in the effluent are similar to those measured in the influent. The NPDES permit requires effluent monitoring and imposes permit limits on both conventional and priority pollutants to ensure the health of the receiving water. Additionally, the permit also requires the reporting of non-priority pollutants such as nutrients, although no limits are set on them.

Table F-3 lists the treatment plant monitoring program parameters, including sample type, sampling frequency and analytical procedures used.

Combined Sewer Overflow Facilities Monitoring Program

The CSO Monitoring Program includes influent and effluent monitoring at the three operational MWRA CSO facilities (Constitution Beach was closed in early FY01 and Fox Point and Commercial Point were closed in early FY08) as well as MWRA/BWSC facility Union Park. Samples are collected and tested for conventional parameters at all CSO facilities. Selected priority pollutants and metals are also analyzed in the effluent. Table F-4 lists the CSO monitoring program parameters, including sample type, sampling frequency and analytical procedures used.

Sewer System Monitoring Program

The sewer system monitoring program, which attempts to identify Sanitary Sewer Overflows (SSOs), involves conducting visual inspections of areas in the separate sewer system that have a history of discharging during or shortly after a heavy rainfall event.

Treatment of Results

It can be difficult to interpret laboratory results to ensure that they are representative of the sample, especially when the results are at or below method detection levels. For the conventional parameters measured in these monitoring programs, calculating the average concentration of a particular parameter is straightforward: the arithmetic average is used. However, the concentrations of metals, pesticides and organics are frequently below method detection levels, and data are manipulated. Appendix H gives a brief description of method detection limits and how measurements below detection limits are treated in this report.

Daily loadings (in lbs/day) were calculated using the formula:

$$Loading = Q \times C \times 8.34$$

Q = flow (MGD)
C = concentration (mg/L)
8.34 = unit conversion factor

To calculate monthly average loading for priority pollutants (metals, cyanide, pesticides/PCBs and organic compounds), the average of detected measured concentrations of pollutant during each sampling event is determined, and flow weighted for influent samples or divided by the total flow during those events for effluent samples.

Average annual concentrations were calculated using the same method, taking each individual sampling event into account in the calculation.
It should be kept in mind that with the large flows going through the Deer Island Treatment Plant, taking one small sample might not always be truly representative. It is also important to keep in mind that certain parameters (conventional) were analyzed daily while other parameters (priority pollutants) were analyzed only two or three times per month.

Appendix G. An Overview of the MWRA Sewerage System and Facilities

Overview

MWRA is responsible for the collection, transport, pumping, treatment, and disposal of sewage in Boston and the greater Boston area. In addition to the Deer Island Treatment Plant, MWRA operates another treatment plant, serving the Town of Clinton and the Lancaster Sewer District, under special arrangements that originated when the Metropolitan District Commission (MDC) acquired land in Clinton for the Wachusett Reservoir. The Clinton Treatment Plant operates under a separate permit from the Boston NPDES permit and is not discussed in this report.

MWRA serves 43 communities with a total population of about three million people, 5,500 businesses, and 1,400 industries. More than 5,400 miles of town- and city-owned local sewers connect at over 1,800 points to over 230 miles of MWRA interceptor sewers. Also included in the vast sewerage system are thirteen pumping stations, five headworks, 48 combined sewer relief overflows and four operational CSO treatment facilities. Table G-1 lists the MWRA treatment facilities and relevant information pertaining to each facility.

The Deer Island Treatment Plant in Winthrop serves the 43 communities in the metropolitan Boston sewerage system and is allowed to discharge under the Boston NPDES Permit. The sewerage system is divided into two major regions: the North and the South Systems. Table G-2 lists the sewerage service area population by community.

Table G-1. List of CSO Treatment Facilities and Discharge Locations

Facility	Location	First Year of Operation	Treatment Process	Design Flow (MGD)	Interceptors / Sewer Lines In	Receiving Water	Outfall Number
Cottage Farm	Memorial Dr. near Boston University Bridge, Cambridge, MA	1971	Screening Settling Chlorination	233	N. Charles Relief S. Charles Relief Brookline Connection	Charles River	MWR201
		2001	Dechlorination				
Prison Point	Near Museum of Science, Cambridge, MA	1980	Screening Settling Chlorination	323	Cambridge Marginal	Boston Inner Harbor	MWR203
		2001	Dechlorination				
Somerville Marginal	McGrath Highway under I-93, Somerville, MA	1973	Screening Chlorination	245	Somerville-Medford Branch	Mystic River	MWR205
		2001	Dechlorination				
Union Park	Malden St., South End, Boston, MA	2007	Screening Settling Chlorination Dechlorination	288	BWSC New Albany St. BWSC Malden St.	Fort Point Channel, Boston Harbor	MWR215

Table G-2. Sewerage Service Area Population by Community

Population[1]			MWRA Sewerage System	
Community	Total Population	Sewered Population	North	South
Arlington	46,308	46,271	x	
Ashland	18,832	14,717		x
Bedford	14,383	13,947	x	
Belmont	27,295	26,932	x	
BWSC	675,647	673,957	x	x
Braintree	39,143	39,049		x
Brookline	63,191	63,084	x	x
Burlington	26,377	25,790	x	
Cambridge	118,403	118,379	x	
Canton	24,370	17,201		x
Chelsea	40,787	40,787	x	
Dedham	25,364	24,507		x
Everett	49,075	49,075	x	
Framingham	72,362	69,727		x
Hingham	8,565	8,128		x
Holbrook	11,405	10,359		x
Lexington	34,454	33,856	x	
Malden	66,263	65,969	x	
Medford	59,659	59,624	x	
Melrose	29,817	29,784	x	
Milton	28,630	27,963	x	x
Natick	37,006	32,803		x
Needham	32,091	30,757		x
Newton	88,923	88,190	x	x
Norwood	31,611	31,458		x
Quincy	101,636	101,636		x
Randolph	34,984	34,920		x
Reading	25,518	25,334	x	
Revere	62,186	61,944	x	
Somerville	81,045	81,045	x	
Stoneham	23,244	23,001	x	
Stoughton	29,281	21,493		x
Wakefield	27,090	27,001	x	
Walpole	26,383	19,449		x
Waltham	65,218	64,375	x	

Population[1]			MWRA Sewerage System	
Community	Total Population	Sewered Population	North	South
Watertown	35,329	35,329	x	
Wellesley	29,550	28,978		x
Westwood	16,266	15,318		x
Weymouth	57,437	56,061		x
Wilmington	23,349	4,819	x	
Winchester	22,970	22,924	x	
Winthrop	19,316	19,316	x	
Woburn	40,876	40,080	x	
TOTAL	2,391,639	2,325,337		
[1] Community population data are from MWRA's I/I program, August 2023 report.				

North System

The north system serves 26 communities, with a population of approximately 1.8 million. Most of the North System is a separate system – different conduits carry sanitary wastewater and storm water. However, portions of Boston, Cambridge, Somerville, and Chelsea still have combined sewers, where the same conduits carry sanitary and storm water. About 5% of the community sewer network is combined, all in the North System service area. Community sewer lines tie into the MWRA system through interceptor lines that feed into the four headworks facilities in the North System.

Two deep rock tunnels, the Boston Main Drainage Tunnel (BMDT) and the North Facilities Metropolitan Relief Tunnel (North Metro Relief), connect the three remote headworks to the North Main Pump Station (NMPS) on Deer Island. The seven-mile BMDT originates at the Ward Street Headworks, continues to the Columbus Park Headworks, and runs under Boston Harbor to the NMPS. The four-mile North Metro Relief Tunnel connects the Chelsea Creek Headworks to the NMPS. The two tunnels combined can handle approximately 800 MGD, matching the combined peak flow capacity of 788 MGD from the three remote headworks.

A fourth headworks facility, the Winthrop Terminal, is located on Deer Island and receives flows from the city of Winthrop and the East Boston (Caruso) Pump Station through the North Metro Trunk Sewer. Figure G-1 on the next page shows the North System schematics.

North System Pump Stations

The MWRA North System has four pump stations with peak flows as shown. The Alewife Brook (90 MGD), Caruso (125 MGD), DeLauri (93 MGD), and Allison Hayes (9.43 MGD) pump stations convey wastewater to the headworks facilities. The four pump stations receive flow from interceptor lines as follows in Table G-3.

Table G-3. Relationship between North System Pump Stations and Interceptors

Pump Station	Interceptor
Alewife Brook Pump Station	Lexington Branch Sewer Alewife Branch Sewer Alewife Branch Conduit
Caruso Pump Station	Revere Branch Sewer East Boston Branch Sewer North Metro Relief Sewer*
DeLauri Pump Station	Cambridge Branch Sewer Charlestown Branch Sewer Medford-Somerville Branch Sewer Prison Point Pump Station Somerville Marginal CSO Overflow**
Allison Hayes Pump Station	Wakefield Branch Sewer
*: When flow to the Chelsea Creek Headworks is held back, wastewater is diverted to the Caruso Pump Station. **: During low-intensity rainfall when line capacity is not exceeded, the combined wastewater is pumped back to the trunk sewers and ultimately to the DeLauri station.	

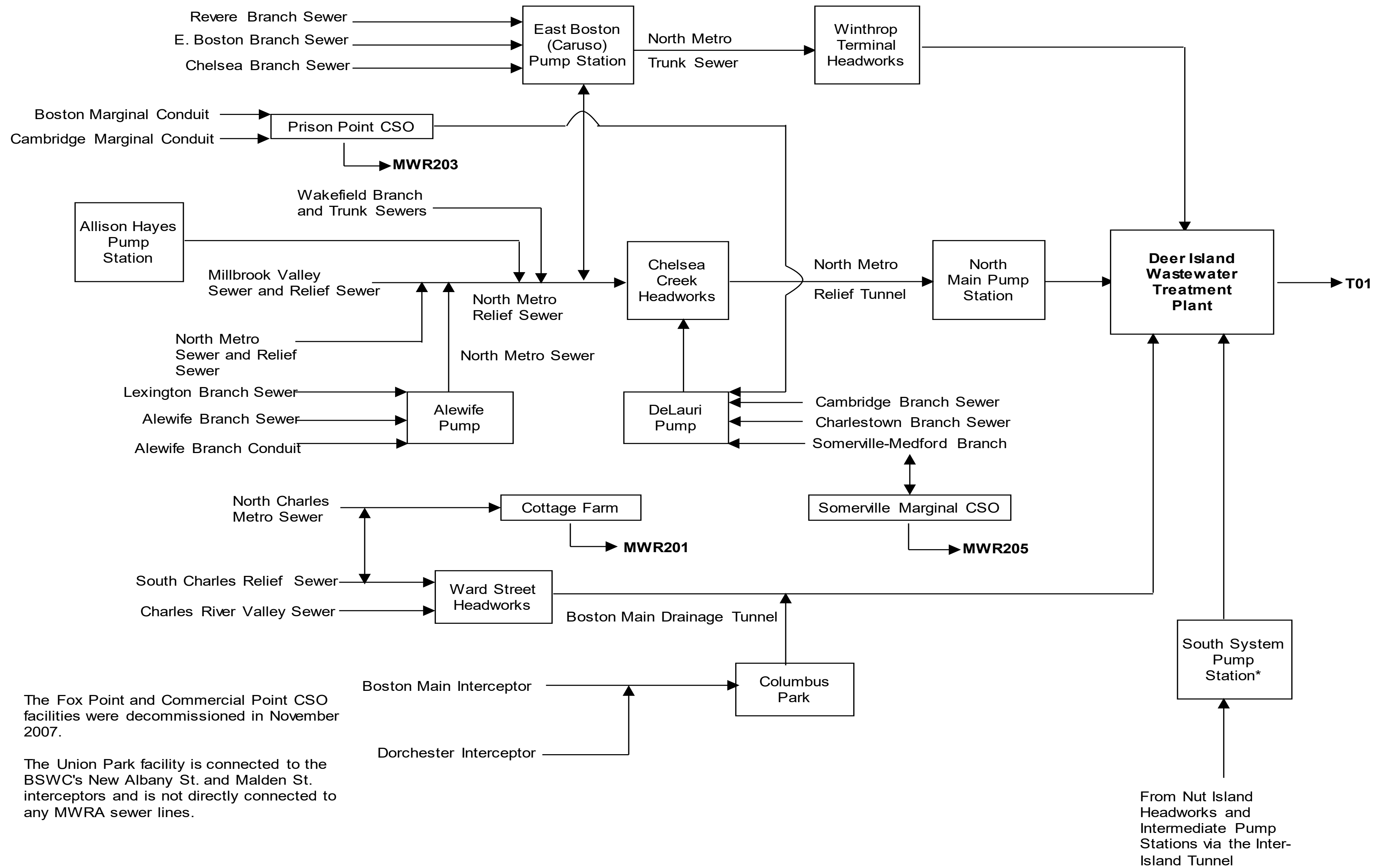
North System Headworks

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

Table G-4. Sources of Flow for North System Headworks

Headworks	Source
Ward Street Headworks	South Charles Relief Sewer Charles River Valley Sewer North Charles Metro Sewer* Cottage Farm CSO*
Columbus Park Headworks	Boston Main Interceptor Dorchester Interceptor
Chelsea Creek Headworks	Alewife Pump Station North Metro Relief Sewer DeLauri Pump Station Caruso Pump Station Overflow
Winthrop Terminal Headworks	Winthrop Sewer Caruso Pump Station**
*: During low intensity rainfall when line or holding capacity is not exceeded, the combined wastewater is pumped back to the trunk sewers and ultimately to the Ward Street Headworks. **: Overflow from the Caruso Pump Station.	

Figure G-1. North System Pump Stations, Headworks, CSOs and Tunnel Hydraulic Schematic



The Fox Point and Commercial Point CSO facilities were decommissioned in November 2007.

The Union Park facility is connected to the BSWC's New Albany St. and Malden St. interceptors and is not directly connected to any MWRA sewer lines.

* See Figure G-3 for South System hydraulics.

Combined Sewer Overflow Facilities

The conditions for discharge of effluent from six CSO chlorination facilities are also included in MWRA's Boston NPDES permit. Over time, some of these facilities have been closed due to improvement projects in the MWRA system. Constitution Beach in East Boston, was closed in September 2000, and Fox Point and Commercial Point in Boston, were closed in autumn 2007, leaving three active permitted CSO facilities. These three facilities, Cottage Farm and Prison Point in Cambridge, and Somerville Marginal in Somerville, discharge to the Charles River, the Inner Harbor, and the Mystic River, respectively.

Also included in this section is the Union Park CSO facility, which opened at the beginning of FY08. The Union Park facility is permitted jointly with the Boston Water and Sewer Commission and discharges to the Fort Point Channel in Boston.

Discharge of combined wastewater from a CSO treatment facility outfall to a receiving body of water is defined in this report as a CSO activation. Discharge of combined wastewater to a non-facility CSO outfall pipe is defined as a CSO overflow. CSO overflows will not be discussed in this report. In general, CSO activations occur as a result of heavy rain, snowmelt, or flow restriction at the headworks.

During wet weather, when the wastewater volume exceeds the hydraulic capacity of the treatment plant, the headworks restrict the flow and hold the wastewater in the lines. As a result, the combined wastewater backs up into the system, forcing the combined wastewater to overflow to CSO treatment facilities and non-facility CSO outfall pipes, resulting in potential CSO activations and overflow as well as potential SSOs. In addition to flow restriction in response to hydraulic demand on the system, the headworks may restrict flow so that emergency repairs, system testing, or maintenance work can be performed at the treatment plant. Flow restriction at Ward Street and Columbus Park Headworks influences Cottage Farm activations. Backups at the DeLauri Pumping Station brought about by flow restriction at the Chelsea Headworks can activate the Somerville Marginal CSO.

At the CSO facilities, the combined wastewater is screened and chlorinated prior to discharge. Of the CSO facilities, Cottage Farm, Prison Point, and Union Park have tank storage capacity. This allows the wastewater to be held at these facilities. The facility only discharges when the storage capacity is exceeded; when that happens, the treated wastewater overflows and is discharged to the river. Somerville Marginal is a gravity CSO facility, which means that combined wastewater arrives and leaves the CSO facility by gravity. This type of facility provides disinfection and allows the chlorinated combined wastewater to overflow to the receiving water as quickly as the wastewater arrives at the facility.

The CSO facilities provide treatment for approximately 87% of the CSO volume.

Cottage Farm CSO Facility

During dry weather conditions, wastewater arrives at the Ward Street Headworks where it is pumped to the Deer Island Plant. Under storm conditions, wastewater backs up into sewer lines and into the Cottage Farm CSO facility. Cottage Farm detains wastewater up to a volume of 1.3 MG. Any excess flow is screened, settled, chlorinated, and discharged to the Charles River through outfall MWR201. Combined wastewater that is held back is pumped back to the Ward Street Headworks. This facility, on-line since 1971, has a design pumping capacity of 233 MGD. An upgrade completed in FY01 added a dechlorination system for the effluent.

Prison Point CSO Facility
Prison Point is a dual function facility. During dry weather conditions, the facility acts as a pump station receiving wastewater from both the Boston Marginal and Cambridge Marginal Conduits. During wet weather events, the facility acts a combined sewer overflow (CSO) treatment facility, providing screening, sedimentation, detention, disinfection and dechlorination to a combined wastewater/storm water influent stream. If the facility's detention capacity is exceeded, excess treated flow is discharged through outfall MWR203 located in the inner area of Boston Harbor. The facility has a wet and dry weather peak pumping capacity of 323 MGD and 5 MGD, respectively.Combined wastewater volume that is held back, up to 1.2 MG, is pumped back to the DeLauri Station. This facility came on-line in 1980 and was upgraded with a dechlorination system in 2001.

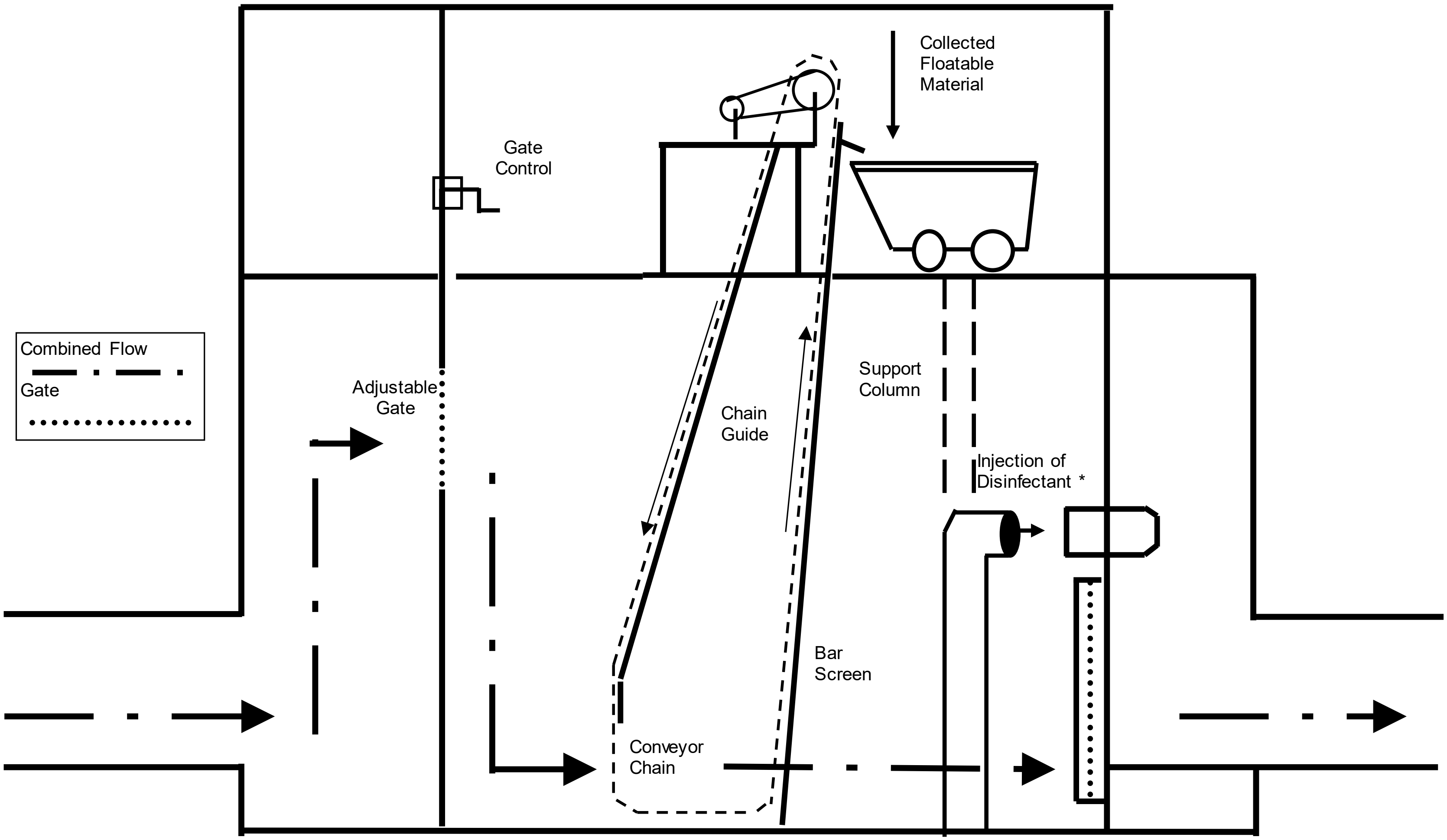
Somerville Marginal CSO Facility
Somerville Marginal CSO is an unmanned gravity facility with a design capacity of 145 MGD. Somerville Marginal receives wet weather flow from the Somerville-Medford trunk sewer when the DeLauri Pump Station is unable to meet the demand during wet weather conditions. As combined storm water and wastewater volumes increase within the sewer, the wastewater overflows the trunk sewer weir and is gravity-fed to the facility. The combined wastewater is screened, chlorinated and dechlorinated before it is discharged into the Mystic River through outfall MWR205. If the activation occurs during high tide, the effluent stream discharges to the Mystic River through Outfall SOM007A/MWR205A. During low-intensity rainfall when line capacity is not exceeded, the combined wastewater is pumped back from a wet well to the DeLauri Station. This facility came on-line in 1973 and was upgraded in 2001 with a dechlorination system.

Figure G-2 on the following page shows a representative gravity CSO schematic applicable to Somerville Marginal as well as the now decommissioned Fox Point and Commercial Point facilities.

Union Park CSO Facility
The Union Park Facility enables flow which was previously discharged untreated to outfall BOS070 (a CSO overflow) and the Fort Point Channel to be routed to a 2.2 million gallon detention/treatment facility. Flow is treated by high-rate sedimentation, screening, and disinfection followed by dechlorination. Any stored volume is pumped back to the interceptor system at the end of the storm. This project was completed in April 2007, and the first recorded discharge was in June 2007.

The operation and maintenance of the Union Park CSO facility at present is contracted to Woodard & Curran. MWRA is ultimately responsible for permit compliance and thus reviews operational data, and retains the authority to conduct facility inspections and environmental audits.

Figure G-2. Typical Gravity Combined Sewer Overflow Treatment Facility



* At Somerville Marginal, injection occurs at the influent gate.

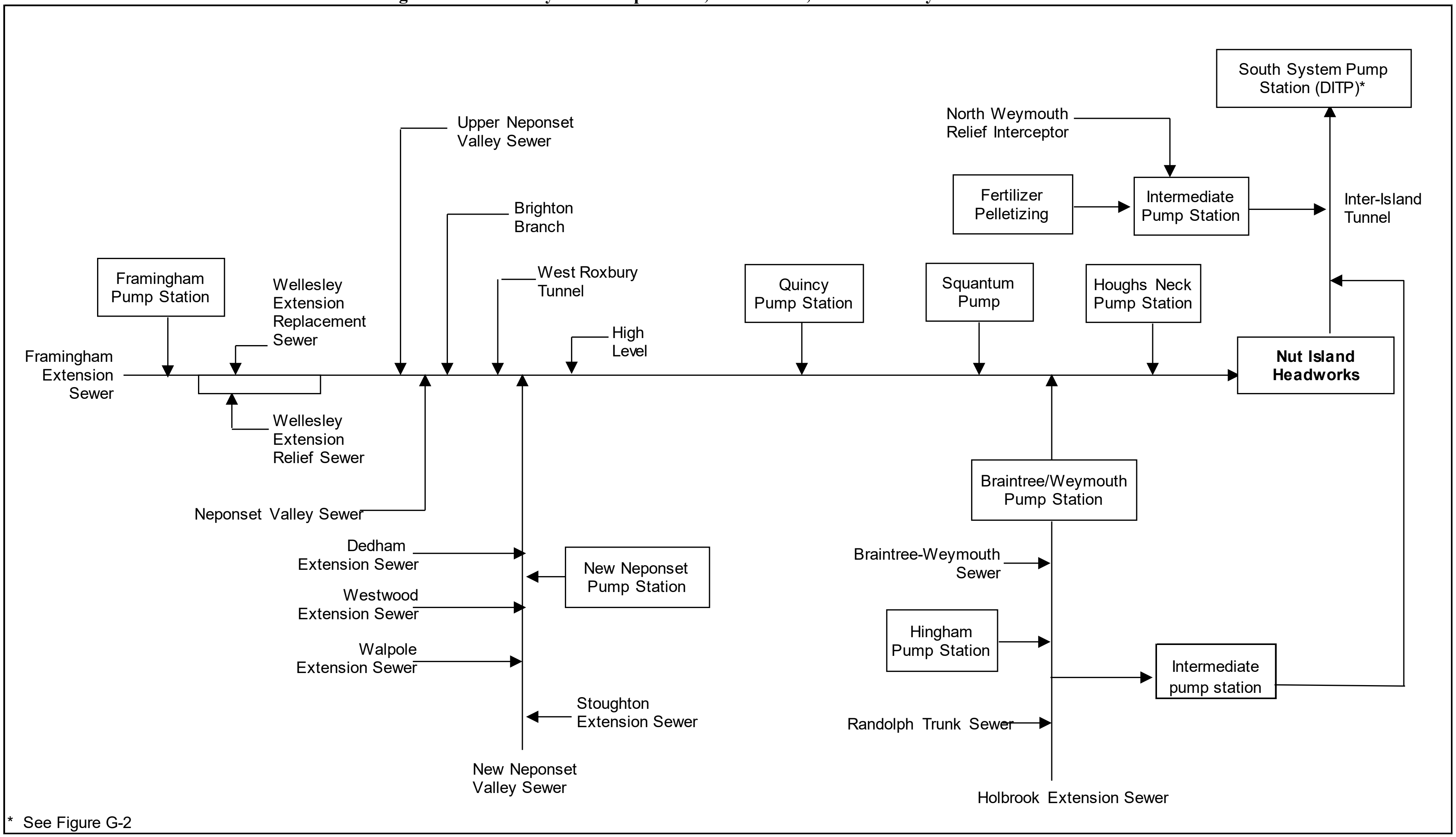
South System

The south system has separate sanitary and stormwater systems, and serves 21 communities with a population of approximately 1.5 million.
Figure G-3 on the following page illustrates the South System hydraulic schematic. Community sewer lines tie into the South System through MWRA interceptor lines. The Framingham Extension Sewer, Wellesley Extension Sewer, Upper Neponset Valley Sewer, Wellesley Extension Relief Sewer, Neponset Valley Sewer, Walpole Extension Sewer, Stoughton Extension Sewer, Braintree-Randolph Trunk Sewer, and several other branch sewers discharge to the South System High Level Sewer. The High Level Sewer has a capacity of 360 MGD. Pump stations move the wastewater through the High Level Sewer to the Nut Island Headworks for preliminary treatment and grit removal. The South System flows are then conveyed to the South System Pump Station at Deer Island through the 4.7-mile Inter-Island Tunnel for treatment at the Deer Island Treatment Plant.

In 2004 MWRA completed the Braintree-Weymouth Intermediate Pump Station (IPS) in North Weymouth. The IPS pumps sewage from the North Weymouth Relief Interceptor directly into the Inter-Island Tunnel, bypassing Nut Island. The IPS also acts as a headworks with bar screens and grit collectors. The IPS was designed to increase South System capacity, helping to alleviate some of the overflows in the South System. Additionally, the IPS pumps wastewater between the fertilizer pelletizing plant in Quincy and Deer Island. Sewage sludge flows from Deer Island to Quincy for conversion to fertilizer and centrate from the fertilizer production process will return to Deer Island via the IPS and Inter-Island Tunnel.

Once at Deer Island, the South System flow can be pumped to one of two locations. The South System flow is normally discharged to the effluent channel of the Grit Facility, where it is combined with the North System and recycle flows, then split between Primary Clarifier Batteries A through D. The alternate discharge location is directly to the Primary Clarifier Battery D influent channel, which allows the South System flow to be isolated.

Figure G-3. South System Pump Station, Headworks, and Tunnel Hydraulic Schematic



South System Pump Stations

Eight MWRA pump stations move wastewater from low-lying areas to the High Level Sewer and have peak capacity as shown Hingham Pump Station (6.62 MGD), Braintree-Weymouth Pump Station (73MGD), Braintree-Weymouth IPS (45 MGD), Squantum Pump Station (7.5 MGD), Houghs Neck Lift Station (1.3 MGD), Neponset Pump Station (46 MGD), Framingham Pump Station (28 MGD) and Quincy Pump Station (26 MGD).

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

Table G-5. Relationship between South System Pump Stations and Interceptors

Pump Station	Interceptor
Hingham Pump Station	Weymouth-Hingham Sewer Lines
Braintree-Weymouth Pump Station	Braintree-Randolph Trunk Sewer Braintree-Weymouth Extension Sewer Holbrook Extension Sewer Hingham Pump Station
Braintree-Weymouth IPS	North Weymouth Relief Interceptor Quincy Pelletizing Plant
Squantum Pump Station	Squantum Sewers
Houghs Neck Lift Station	Houghs Neck Sewer
Neponset Pump Station	Neponset Valley Sewer
Framingham Pump Station	Framingham Sewers
Quincy Pump Station	Quincy and Upstream Sewers

South System Headworks

The Deer Island Treatment Plant receives South System flow from the Nut Island Headworks. The Nut Island Headworks went on-line on July 7, 1998. It is located in Quincy and has a capacity of 400 MGD. Vortex grit separators similar to those used on Deer Island in the North System Grit Facility provide grit removal for South System flows.

Deer Island Treatment Plant

Until July 8, 1998, wastewater flows from the North System were treated at the Deer Island Treatment Plant and flows from the South System were treated at the Nut Island Treatment Plant. In July 1998, the Nut Island Treatment Plant was decommissioned and all flows were treated at Deer Island.

Four lines convey sewage to the Deer Island Treatment Plant. North System wastewater is delivered to the plant via the Boston Main Drainage Tunnel (from the Ward Street and Columbus Park Headworks), the North Metropolitan Relief Tunnel (from the Chelsea Creek Headworks), and the North Metropolitan Trunk Sewer. South System wastewater is transferred to the plant from the Nut Island Headworks and Braintree-Weymouth Intermediate Pump Station via the Inter-Island Tunnel.

The Deer Island Treatment Plant receives wastewater at the North Main Pump Station (NMPS), the Winthrop Terminal, and the South System Pump Station (SSPS). The North Metro Relief Tunnel and the Boston Main Drainage Tunnel connect to the NMPS, which consists of ten pumps, each rated at 110 MGD, for a total pumping capacity of 1,100 MGD. The North Metro Trunk Sewer connects to the Winthrop Terminal. The Inter-Island Tunnel connects to the SSPS, which consists of eight pumps, each rated at 66.7 MGD, for a total capacity of 534 MGD.

Grit removal and screening (preliminary treatment), which remove heavy particles and debris, is provided at the remote headworks and on-site at Deer Island. Flow from the South System receives preliminary treatment at the Nut Island Headworks. Grit and screenings are landfilled off-site.

The upgraded primary treatment plant came on-line on January 21, 1995. The first battery of secondary treatment was initiated at Deer Island on August 1, 1997. Battery B came on-line on March 1, 1998, and the third and final secondary treatment battery, Battery C, started up on March 8, 2001.

Wastewater from the North System flows through the grit chambers for additional grit removal. It, along with South System wastewater, then flows to the primary settling tanks where floatables, consisting mainly of oil, grease, and plastics rise to the surface while the sludge of heavy solid particles settles to the bottom. The majority of the primary effluent (the allowable capacity for secondary treatment) is sent to secondary treatment, while any remaining portion from high flow conditions due to rainfall bypasses secondary and is sent directly to the disinfection basins to be treated with sodium hypochlorite. Effluent from secondary treatment is then, if necessary, blended with primary effluent that bypassed secondary, and then sent to the disinfection basins, where it is chlorinated, detained, and then dechlorinated before discharge.

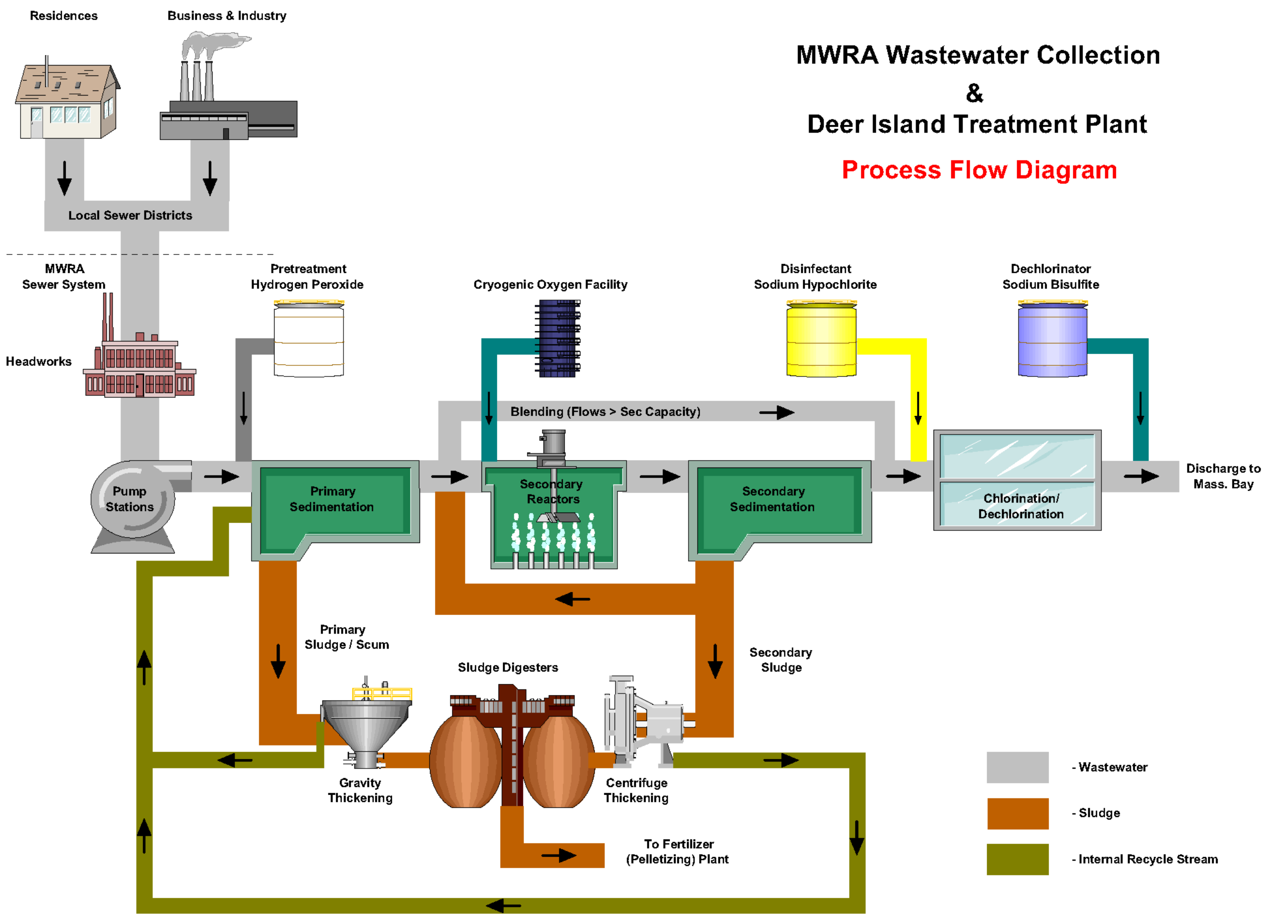
The scum (floatables) is skimmed off the top of the primary and secondary settling tanks while the sludge (settled solids) is scraped from the bottom of the tanks. Primary scum is pumped to the scum concentrator while the primary sludge is pumped to the gravity sludge thickeners. Scum and sludge from the secondary batteries are concentrated using centrifuges. After the scum and sludge are concentrated and thickened, they are conveyed to the anaerobic digesters for further treatment. The digested sludge/scum is sent via the Inter-Island Tunnel to the Fore River Pelletizing Plant, where it is converted into fertilizer. Methane from the digestion process is stored and used to generate power and heat for DITP.

Figure G-4 on the following page presents the Deer Island plant process flow diagram.

Deer Island Treatment Plant Outfalls

On September 6, 2000, effluent from Deer Island was diverted to a 9.5 mile outfall tunnel into Massachusetts Bay. Effluent is discharged through 53 operational risers over the last 1.25 miles of the tunnel. The tunnel has a capacity of 1,270 MGD, slightly greater than the old harbor outfall system. Before the effluent enters the outfall it is used to run a hydroelectric facility linked to the Deer Island power grid.

Figure G-4. Deer Island Treatment Plant Process Flow



Collection and Transport Systems

An issue of concern in both the North System and the South System is the occurrence of Sanitary Sewer Overflows (SSOs). These occur during extreme rainfall events, when inflow and infiltration from heavy rains exceeds the capacity of the pipes, causing certain areas to become inundated. Whenever there is a high amount of rainfall, a crew from the Transport Department investigates a number of critical areas to visually monitor potential overflow sites. While some of these critical areas are the MWRA's responsibility, most of them are the responsibility of the local communities. A list of these areas belonging to the MWRA is included in Table G-6. Not all of these areas are checked during every rainfall, and some are monitored by the MWRA only during extreme storm events

Table G-6. Known MWRA Sanitary Sewer Overflow Locations*

North/South	Community	Location Description	MDC/MWRA Section No	MWRA Station No.
N	Arlington	Manhole off Mystic Valley Pkwy at Mt. Pleasant Cemetary	91B/152	56+54
N	Arlington	Manhole at Mystic Valley Pkwy	91B/152	59+29
N	Boston/Back Bay-Beacon Hill	Manhole on Storrow Drive near Massachusetts Ave		92+74
N	Boston/Back Bay-Beacon Hill	Manhole on Storrow Drive near Massachusetts Ave	222/BMC	92+74
N	Boston/Back Bay-Beacon Hill	Manhole on Storrow Drive median west of Massachusetts Ave		96+68
N	Boston/Back Bay-Beacon Hill	Manhole on Storrow Drive median west of Massachusetts Ave	222/BMC	96+68
N	Boston/South Boston	Massport Wiggins Terminal	253/	
N	Cambridge	MBTA Red Line Parking Garage	43/43	79+84
N	Medford	Mystic Valley Pkwy (Rte 16) near James St	107/107	1+00
N	Medford	Auburn St Manhole	176/ABC	131+21
N	Medford	Auburn St Manhole	C/176A	131+21
N	Medford	Downstream Headhouse at Lakeview Ave		31+24
N	Medford	Downstream Headhouse at Lakeview Ave	152/91B	31+24
N	Medford	Downstream Headhouse at Lakeview Ave	91B/152	31+24
N	Melrose	Manhole on Tremont St	60/60	19+18
N	Melrose	Manhole on Melrose St		26+50
N	Melrose	Manhole on Melrose St	50/50	26+50

N	Somerville	Alewife Brook Pump Station - Bypass		
N	Somerville	Alewife Brook Pump Station Discharge Side		0+35
N	Somerville	Alewife Brook Pump Station Discharge Side	176/ABC	0+35
N	Somerville	Alewife Brook Pump Station Discharge Side	C/176C	0+35
N	Somerville	Manhole on Medford St Near Railroad Tracks	27/27	17+03
N	Somerville	Boston Ave/Upstream Headhouse	155/43.5	9+12
N	Somerville	Boston Ave/Upstream Headhouse	43.5/155	9+12
N	Wakefield	59 Brook St	N/A	N/A
N	Winchester	Wedgemere Siphon Upstream Headhouse		3+24
N	Winchester	Wedgemere Siphon Upstream Headhouse	113/113	3+24
N	Winchester	Wedgemere Siphon Upstream Headhouse	113/113B	3+24
N	Winchester	Upstream Headhouse at Aberjona River	69/69	48+53
S	Boston/Roslindale	Bradeen St North Gate		0+00
S	Boston/Roslindale	Bradeen St North Gate	570/70	0+00
S	Boston/Roslindale	Bradeen St North Gate	NA/570C	0+00
S	Boston/Roslindale	Bradeen St South Gate	570/70	10+89
S	Boston/Roslindale	Bradeen St South Gate	NA/570C	10+89
S	Braintree	Manhole Downstream of Pearl St. Siphon	128/628	16+30
S	Braintree	Upstream Headhouse (South of Pearl St)		17+64
S	Braintree	Upstream Headhouse	628/128	17+64
S	Braintree	Upstream Headhouse		54+06
S	Braintree	Smelt Brook - upstream headhouse	626/126	54+06
S	Braintree	Smelt Brook - upstream headhouse	126/626	54+06
S	Weymouth	Downstream Headhouse		53+23
S	Weymouth	Smelt Brook - downstream headhouse	626/126	53+23
S	Weymouth	Smelt Brook - downstream headhouse	126/626	53+23

*Wet weather SSO locations FY2010-FY2023

Appendix H. Instrument Detection Limits, Method Detection Limits, and Quantitation Limits

Overview

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

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

Instrument Detection Limits

Instrument detection limits (IDL) reflect the capability of the instrument. This limit will be the lowest of the three detection limits. The IDL will not take into account the losses of the pollutant associated with the matrix (soil or wastewater) and extraction procedure. This discrepancy is known as matrix interference.

Method Detection Limits

Method detection limits (MDL) are the smallest amount of a substance that can be detected above background noise using a particular method. The MDL is statistically determined by running a series of analyses using various low concentrations of a pollutant. Using Student's *t*-test, the smallest concentration that has a 99% probability of being detected above the background is designated the MDL for that pollutant. The EPA, using several private laboratories, has determined the MDLs for most priority pollutants using their approved methods. These are published in 40 CFR.

Quantitation Limits

In general, if a plot is made of pollutant concentration versus instrument response, it will show a linear relationship. As the pollutant concentration approaches zero, the linearity of the relationship is lost. The point where the linearity is lost is called the Quantitation Limit (QL) or sometimes the Reporting Limit (RL). In other words, the smallest concentration where the linear relationship holds is the smallest concentration that can be quantified. Generally, the QL is about five times the MDL. Quantitative limits are relevant to GC/MS analyses, that is, methods 608 (for pesticides), 624 (for volatile organics), and 625 (for semi-volatile organics). Specific limits are highly matrix-dependent.

Detection limits, Non-Detects, and Reporting

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

Reported concentrations that are between the MDL and the QL indicate that a pollutant is present, but at a concentration too low to be accurately quantified. For example, using EPA method 624, chloroform has an MDL of 1.6 μg/L and a QL of 10 μg/L. If the concentration from an analysis is reported as 5 μg/L then it can be inferred that although the actual chloroform concentration in the wastewater is uncertain, 5 μg/L is a best guess. The EPA originally required that these intermediate values be flagged with a "J" on any reports submitted to them. Therefore, these are sometimes simply called "J-values."

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

Often it becomes necessary to estimate a concentration for below detection limit values, specifically when calculating the average yearly concentration of a pollutant. A commonly used method is to assume the actual concentration of a non-detected pollutant is simply one half of the MDL. While no scientific theory supports this assumption, it is often considered reasonable than assuming that the concentration is zero, or the MDL itself[1]. The EPA and DEP accept it as a standard practice that can be applied to any series of tests.

For the organic compounds – methods 608, 624, and 625 – one tenth of the QL, or half the MDL, was assumed for all non-detects (i.e. values below QL). For all metals, cyanide, petroleum hydrocarbons, etc., half the MDL was assumed for all non-detects (i.e. values below MDL).

Table H-1 is a list of the parameters regularly tested for in MWRA effluent.

[1] For a detailed analysis of this assumption as it relates to Deer Island effluent data, see Charlestra et al. 2020. *Assessing contaminant concentrations and trends in Deer Island Treatment Plant effluent using survival analysis techniques*. Boston: Massachusetts Water Resources Authority. Report 2020-06. 47 p. https://www.mwra.com/harbor/enquad/pdf/2020-06.pdf

Table H-1. List of Parameters Tested

Parameter
Aluminum
Antimony
Arsenic
Beryllium
Boron
Cadmium
Chromium
Copper
Hexavalent Chromium
Iron
Lead
Mercury
Molybdenum
Nickel
Selenium
Silver
Thallium
Zinc
Cyanide
Fats, Oil, and Grease (mg/L)
Petroleum hydrocarbons (mg/L)
Phenol
Sulfate (mg/L)
Total Organic Carbon (mg/L)
Surfactants (mg/L)
4,4'-DDD
4-4'-DDE
4-4'-DDT
Aldrin
alpha-BHC
alpha-Chlordane
beta-BHC

Parameter
Chlordane (Technical)
delta-BHC
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
Endrin ketone
gamma-BHC (Lindane)
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Methoxychlor
Toxaphene
Arochlor-1016
Arochlor-1221
Arochlor-1232
Arochlor-1242
Arochlor-1248
Arochlor-1254
Arochlor-1260
1,1,1-trichloroethane
1,1,2,2-tetrachloroethane
1,1,2-trichloroethane
1,1-dichloroethane
1,1-dichloroethene
1,2-dichlorobenzene
1,2-dichloroethane
1,2-dichloropropane
1,3-dichlorobenzene
1,4-dichlorobenzene

Parameter

2-butanone
2-chloroethylvinylether
2-hexanone
4-methyl-2-pentanone
Acetone
Acrolein
Acrylonitrile
Benzene
Bromodichloromethane
Bromoform
Bromomethane
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
cis-1,2-dichloroethene
cis-1,3-dichloropropane
Dibromochloromethane
Ethylbenzene
m,p-xylene
Methylene chloride
o-xylene
Styrene
Tetrachloroethene
Toluene
Total Phenol
trans-1,2-dichloroethene
trans-1,3-dichloropropene
Trichloroethene
Trichlorofluoromethane
Vinyl acetate
Vinyl chloride
1,2,4-trichlorobenzene
1,2-dichlorobenzene
1,2-diphenylhydrazine
1,3-dichlorobenzene
1,4-dichlorobenzene
2,2'-oxybis(1-chloropropane)

Parameter

2,4,5-trichlorophenol
2,4,6-trichlorophenol
2,4-dichlorophenol
2,4-dimethylphenol
2,4-dinitrophenol
2,4-dinitrotoluene
2,6-dinitrotoluene
2-chloronaphthalene
2-chlorophenol
2-methyl-4,6-dinitrophenol
2-methylnaphthalene
2-methylphenol
2-nitroaniline
2-nitrophenol
3-3'-dichlorobenzidine
3-nitroaniline
4-bromophenyl phenyl ether
4-chloro-3-methylphenol
4-chloroaniline
4-chlorophenyl phenyl ether
4-methylphenol (includes 3-methylphenol)
4-nitroaniline
4-nitrophenol
Acenaphthene
Acenaphthylene
Aniline
Anthracene
Benzindine
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(ghi)perylene
Benzo(k)fluoranthene

Parameter

Benzoic acid
Benzyl alcohol
bis(2-chloroethoxy) methane
bis(2-chloroethyl) ether
bis(2-ethylhexyl) phthalate
Butyl benzyl phthalate

Chrysene

di-n-butylphthalate
di-n-octylphthalate

Dibenzo(a,h)anthracene

Dibenzofuran

Diethyl phthalate
Dimethyl phthalate

Fluoranthene

Fluorene

Parameter

Hexachlorobenzene

Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachoroethane

Indeno(1,2,3-cd) pyrene

Isophrone
n-nitroso-di-n-propylamine
n-nitrosodimethylamine
n-nitrosodiphenylamine

Naphthalene

Nitrobenzene
Pentachlorophenol

Phenanthrene

Phenol

Pyrene

Appendix I. Priority Pollutant List and Other Parameters

Table I-1. EPA List of 128 Priority Pollutants

Chlorinated Benzenes Chlorobenzene 1,2-dichlorobenzene 1,3-dichlorobenzene 1,4-dichlorobenzene 1,2,4-trichlorobenzene Hexachlorobenzene	**Chlorinated Ethanes** Chloroethane 1,1-dichloroethane 1,2-dichloroethane 1,1,1-trichloroethane 1,1,2,2-tetrachloroethane Hexachloroethane	**Chlorinated Phenols** 2-chlorophenol 2,4-dichlorophenol 2,4,6-trichlorophenol Parametachlorocresol (4-chloro-3-methyl phenol)
DDT and Metabolites 4,4-DDT 4,4-DDE (p,p-DDX) 4,4-DDD (p,p-DDE)	**Haloethers** 4-chlorophenyl phenyl ether 2-bromophenyl phenyl ether Bis(2-chloroisopropyl) ether	**Halomethanes** Methylene chloride (dichloromethane) Methyl chloride (chloromethane) Methyl bromide (bromomethane) Bromoform (tribromomethane) Dichlorobromomethane Chlorodibromomethane
Inorganics Antimony Arsenic Asbestos Beryllium Cadmium Chromium (III) Chromium (VI) Copper Cyanide, total Lead Mercury Nickel Selenium Silver Thallium Zinc	**Nitroamines** N-nitrosodimethylamine N-nitrosodiphenylamine N-nitrosodi-n-propylamine	**Pesticides and Metabolites** Aldrin Dieldrin Chlordane (technical mixture and metabolites) Alpha-endosulfan Beta-endosulfan Endosulfan sulfate Endrin Endrin aldehyde Heptachlor Heptachlor epoxide (BHC-hexachlorocyclohexane) Alpha-BHC Beta-BHC Gamma-BHC (Lindane) Delta-BHC Toxaphene

Table I-1. Cont… EPA List of 128 Priority Pollutants

<u>Phenols (other than chlorinated)</u> 2-nitrophenol 4-nitrophenol 2,4-dinitrophenol 4,6-dinitro-o-cresol (4,6-dinitro-2-methylphenol) Pentachlorophenol Phenol 2,4-dimethylphenol	**<u>Phthalate Esters</u>** Bis(2-ethylhexyl)phthalate Butyl benzyl phthalate Di-n-butyl phthalate Di-n-octyl phthalate Diethyl phthalate Dimethyl phthalate	**<u>Polychlorinated Biphenyls (PCBs)</u>** PCB-1242 (Aroclor 1242) PCB-1254 (Aroclor 1254) PCB-1221 (Aroclor 1221) PCB-1232 (Aroclor 1232) PCB-1248 (Aroclor 1248) PCB-1260 (Aroclor 1260) PCB-1016 (Aroclor 1016)
<u>Polynuclear Aromatic Hydrocarbons (PAHs)</u> Acenaphthene 1,2-benzanthracene (benzo(a)anthracene) Benzo(a)pyrene (3,4-benzo-pyrene) 3,4-benzofluoranthene (benzo(b)fluoranthene) 11,12-benzofluoranthene (benzo(k)fluoranthene) Chrysene Acenaphthylene Anthracene 1,12-benzoperylene (benzo(ghi)perylene) Fluorene Fluoranthene Phenanthrene 1,2,5,6-dibenzanthracene (dibenzo(a,h)anthracene) Indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene) Pyrene	**<u>Other Chlorinated Organics</u>** Chloroform (trichloromethane) Carbon tetrachloride (tetrachloromethane) Bis(2-chloroethoxy)methane Bis(2-chloroethyl)ether 2-chloroethyl vinyl ether (mixed) 2-chloronaphthalene 3,3'-dichlorobenzidine 1,1-dichlorethylene 1,2-trans-dichloroethylene 1,2-dichloropropane 1,2-dichloropropylene (1,3-dichloropropene) Tetrachloroethylene Trichloroethylene Vinyl chloride (chloroethylene) Hexachlorobutadiene Hexachlorocyclopentadiene 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD)	**<u>Other Organics</u>** Acrolein Acrylonitrile Benzene Benzidine 2,4-dinitrotolulene 2,6-dinitrotolulene Ethylbenzene Isophrone Naphthalene Nitrobenzene Tolulene

Table I-2. NPDES Permit Application Testing Requirements
(40 CFR 122, Appendix D, Tables II and III)

https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-122/appendix-Appendix%20D%20to%20Part%20122

Volatile Organics	**Organic Pesticides**	**Organic Base/Neutrals**
acrolein	aldrin	acenaphthene
acrylonitrile	alpha-BHC	acenaphthylene
benzene	beta-BHC	anthracene
bromoform	gamma-BHC	benzidine
carbon tetrachloride	delta-BHC	benzo(a)anthracene
chlorobenzene	chlordane	benzo(a)pyrene
chlorodibromomethane	4,4'-DDT	3,4-benzofluoranthracene
chloroethane	4,4'-DDE	benzo(ghi)perylene
2-chloroethylvinyl ether	4,4'-DDD	benzo(k)fluoranthene
chloroform	dieldrin	bis(2-chloroethoxy)methane
dichlorobromomethane	alpha-endosulfan	bis(2-chloroethyl)ether
1,1-dichloroethane	beta-endosulfan	bis(2-ethylhexyl)phthalate
1,2-dichloroethane	endosulfan sulfate	4-bromophenyl phenyl ether
1,1-dichloroethylene	endrin	butylbenzyl phthalate
1,2-dichloropropane	endrin aldehyde	2-chloronaphthalene
1,3-dichloropropylene	heptachlor	4-chlorophenyl phenyl ether
ethyl benzene	heptachlor epoxide	chrysene
methyl bromide	PCB-1242	dibenzo(a,h)anthracene
methyl chloride	PCB-1254	1,2-dichlorobenzene
methylene chloride	PCB-1221	1,3-dichlorobenzene
1,1,2,2-tetrachloroethane	PCB-1232	1,4-dichlorobenzene
tetrachloroethylene	PCB-1248	3-3'-dichlorobenzidine
toluene	PCB-1260	diethyl phthalate
1,2-trans-dichloroethylene	PCB-1016	dimethyl phthalate
1,1,1-trichloroethane	toxaphene	di-n-butyl phthalate
1,1,2-trichloroethane		2,4-dinitrotoluene
trichloroethylene		2,6-dinitrotoluene
vinyl chloride		di-n-octyl phthalate
		1,2-diphenylhydrazine
		fluoranthene
		fluorene
		hexachlorobenzene
		hexachlorobutadiene
		hexachlorocyclopentadiene
		hexachloroethane
		indeno(1,2,3-cd)pyrene
		isophorone
		napthalene
		nitrobenzene

Table I-2. cont.. NPDES Permit Application Testing Requirements
(40 CFR 122, Appendix D, Tables II and III)

Organic Base/Neutrals cont... N-nitrosodimethylamine N-nitrosodi-n-propylamine N-nitrosodiphenylamine phenanthrene pyrene 1,2,4-trichlorobenzene		
Organic Acids 2-chlorophenol 2,4-dichlorophenol 2,4-dimethylphenol 4,6-dinitro-o-cresol (2-methyl-4,6-dinitrophenol) 2,4-dinitrophenol 2-nitrophenol 4-nitrophenol p-chloro-m-cresol (4-chloro-m-cresol) pentachlorophenol phenol 2,4,6-trichlorophenol	**Metals** antimony, total arsenic, total beryllium, total cadmium, total chromium, total copper, total lead, total mercury, total nickel, total selenium, total silver, total thallium, total zinc, total cyanide, total phenols, total	**Cyanide and Phenols** cyanide, total phenol, total

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