

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Clean Water Act, as amended, (33 U.S.C. §§1251 et seq.; the "CWA"), and the Massachusetts Clean Waters Act, as amended, (M.G.L. Chap. 21, §§ 26-53),

City of Brockton

is authorized to discharge from the facility located at

Brockton Advanced Water Reclamation Facility
303 Oak Hill Way
Brockton, Massachusetts 02301

to receiving water named Salisbury Plain River

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein. The Towns of Abington and Whitman are co-permittees for Parts 1.B. Unauthorized Discharges and 1.C. Operation and Maintenance of the Sewer System, which include conditions regarding the operation and maintenance of the collection systems owned and operated by the Towns. The responsible Town authorities are:

Town of Abington
Sewer Department
350 Summer Street
Abington, MA 02351

Town of Whitman
Department of Public Works
100 Essex Street, P.O. Box 454
Whitman, MA 02382

This permit will become effective on the first day of the calendar month immediately following sixty days after signature.\* This permit expires at midnight, five (5) years from the last day of the month preceding the effective date. This permit supersedes the permit issued on May 11, 2005.

This permit consists of Part I (23 pages including effluent limitations and monitoring requirements); Attachment A (USEPA Region 1 Freshwater Chronic Toxicity Test Procedure and Protocol, March 2013); Attachment B (USEPA Region 1 Freshwater Acute Toxicity Test Procedure and Protocol, February 2011); Attachment C (USEPA Region 1 Reassessment of Technically Based Industrial Discharge Limits); Attachment D (USEPA Region 1 NPDES Permit Requirement for Industrial Pretreatment Annual Report) and Part II (25 pages including NPDES Part II Standard Conditions).

Signed this day of

Ken Moraff, Director
Office of Ecosystem Protection
Environmental Protection Agency
Boston, MA

David Ferris, Director
Massachusetts Wastewater Management Program
Department of Environmental Protection
Commonwealth of Massachusetts
Boston, MA

\* Pursuant to 40 CFR 124.15(b)(3), if no comments requesting a change to the draft permit are received, the permit will become effective upon the date of signature.

PART I

A.1. During the period beginning on the effective date and lasting through expiration, the permittee is authorized to discharge treated effluent from outfall serial number **001** to the Salisbury Plain River. Such discharges shall be limited and monitored as specified below.

<u>EFFLUENT CHARACTERISTIC</u>			<u>EFFLUENT LIMITS</u>				<u>MONITORING REQUIREMENTS</u> <sup>1</sup>	
<u>PARAMETER</u>	<u>AVERAGE MONTHLY</u>	<u>AVERAGE WEEKLY</u>	<u>MAXIMUM DAILY</u>	<u>AVERAGE MONTHLY</u>	<u>AVERAGE WEEKLY</u>	<u>MAXIMUM DAILY</u>	<u>MEASUREMENT FREQUENCY</u>	<u>SAMPLE TYPE</u>
FLOW <sup>2</sup>	*****	*****	*****	18.0 mgd	*****	Report mgd	CONTINUOUS	RECORDER
FLOW <sup>2</sup>	*****	*****	*****	Report mgd	*****	*****	CONTINUOUS	RECORDER
CBOD <sub>5</sub> <sup>3</sup> (May 1-October 31)	750 lb/day	1200 lb/day	2250 lb/day	5 mg/l	8 mg/l	15 mg/l	1/DAY	24-HR COMP <sup>4</sup>
CBOD <sub>5</sub> <sup>3</sup> (November 1–April 30)	2250 lb/day	3750 lb/day	4500 lb/day	15 mg/l	25 mg/l	30 mg/l	1/DAY	24-HR COMP <sup>4</sup>
TSS <sup>3</sup> (May 1-October 31)	750 lb/day	1200 lb/day	2250 lb/day	5 mg/l	8 mg/l	15 mg/l	1/DAY	24-HR COMP <sup>4</sup>
TSS <sup>3</sup> (November 1–April 30)	2250 lb/day	3750 lb/day	4500 lb/day	15 mg/l	25 mg/l	30 mg/l	1/DAY	24-HR COMP <sup>4</sup>
pH RANGE <sup>5</sup>	6.5 - 8.3 S.U. (SEE PERMIT PARAGRAPH I.A.1.b.)						1/DAY	GRAB
ESCHERICHIA COLI <sup>5,6</sup> (April 1 to October 1)	*****	*****	*****	126 cfu/100 ml	*****	409 cfu/100 ml	3/WEEK	GRAB
TOTAL RESIDUAL CHLORINE <sup>7</sup>	*****	*****	*****	11 ug/l	*****	19 ug/l	1/DAY	GRAB
TOTAL PHOSPHORUS <sup>9</sup> (April 1 to October 31)	15.2 lb/day	*****	*****	101 ug/l	*****	Report mg/l	2/WEEK	24-HR COMP <sup>4</sup>
TOTAL PHOSPHORUS (November 1 to March 31)	150 lb/day	*****	*****	1.0 mg/l	*****	Report mg/l	1/WEEK	24-HR COMP <sup>4</sup>
ORTHOPHOSPHORUS <sup>8</sup> (November 1 to March 31)	*****	*****	*****	Report mg/l	*****	*****	1/WEEK	24-HR COMP <sup>4</sup>
DISSOLVED OXYGEN <sup>5</sup> (April 1-October 31)	NOT LESS THAN 6.0 mg/l						1/DAY	GRAB

Sampling location: 24-hour composites after disinfection; grab samples at foot of aeration cascade.

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A.1. During the period beginning the effective date and lasting through expiration, the permittee is authorized to discharge treated effluent from outfall serial number 001 to the Salisbury Plain River. Such discharges shall be limited and monitored as specified below.

<u>EFFLUENT CHARACTERISTIC</u>			<u>EFFLUENT LIMITS</u>			<u>MONITORING REQUIREMENTS<sup>1</sup></u>		
<u>PARAMETER</u>	<u>AVERAGE MONTHLY</u>	<u>AVERAGE WEEKLY</u>	<u>MAXIMUM DAILY</u>	<u>AVERAGE MONTHLY</u>	<u>AVERAGE WEEKLY</u>	<u>MAXIMUM DAILY</u>	<u>MEASUREMENT FREQUENCY</u>	<u>SAMPLE TYPE</u>
AMMONIA-NITROGEN (June 1 – October 31)	150 lb/day	150 lb/day	225 lb/day	1 mg/l	1 mg/l	1.5 mg/l	2/WEEK	24-HR COMP <sup>4</sup>
AMMONIA-NITROGEN (November 1 – November 30)	946 lb/day	*****	*****	6.3 mg/l	*****	Report mg/l	2/WEEK	24-HR COMP <sup>4</sup>
AMMONIA-NITROGEN (December 1 - April 30)	1,426 lb/day	*****	*****	9.5 mg/l	*****	Report mg/l	2/WEEK	24-HR COMP <sup>4</sup>
AMMONIA-NITROGEN (May 1 – May 31)	450 lb/day	*****	*****	3.2 mg/l	*****	Report mg/l	2/WEEK	24-HR COMP <sup>4</sup>
TOTAL NITROGEN <sup>9,10</sup> (May 1 – October 31)	450 lb/day	*****	*****	Report mg/l	*****	Report mg/l	2/WEEK	24-HR COMP <sup>4</sup>
TOTAL NITRATE NITROGEN	Report lb/day			Report lb/day		Report lb/day		
TOTAL NITRITE NITROGEN	Report lb/day			Report lb/day		Report lb/day		
TOTAL KJELDAHL NITROGEN	Report lb/day			Report lb/day		Report lb/day		
TOTAL NITROGEN <sup>11</sup> (November 1 – April 30)	Report lb/day	*****	*****	Report mg/l	*****	Report mg/l	1/MONTH	24-HR COMP <sup>4</sup>
TOTAL NITRATE NITROGEN	Report lb/day			Report lb/day		Report lb/day		
TOTAL NITRITE NITROGEN	Report lb/day			Report lb/day		Report lb/day		
TOTAL KJELDAHL NITROGEN	Report lb/day			Report lb/day		Report lb/day		
TOTAL COPPER <sup>12</sup>	*****	*****	*****	8.5 ug/l	*****	10 ug/l	1/MONTH	24-HR COMP <sup>4</sup>

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<u>PARAMETER</u>	<u>AVERAGE MONTHLY</u>	<u>AVERAGE WEEKLY</u>	<u>MAXIMUM DAILY</u>	<u>AVERAGE MONTHLY</u>	<u>AVERAGE WEEKLY</u>	<u>MAXIMUM DAILY</u>	<u>MEASUREMENT FREQUENCY</u>	<u>SAMPLE TYPE</u>
WHOLE EFFLUENT TOXICITY <sup>13,14,15,16</sup>			Acute	LC <sub>50</sub> ≥ 100%			6/YEAR	24-HR COMP <sup>4</sup>
			Chronic	C-NOEC ≥ 98%				
Hardness <sup>17</sup>	*****	*****		*****	*****	Report mg/l	6/YEAR	24-HR COMP <sup>4</sup>
Ammonia Nitrogen as N <sup>17</sup>	*****	*****		*****	*****	Report mg/l	6/YEAR	24-HR COMP <sup>4</sup>
Total Recoverable Aluminum <sup>17</sup>	*****	*****		*****	*****	Report mg/l	6/YEAR	24-HR COMP <sup>4</sup>
Total Recoverable Cadmium <sup>17</sup>	*****	*****		*****	*****	Report mg/l	6/YEAR	24-HR COMP <sup>4</sup>
Total Recoverable Copper <sup>17</sup>	*****	*****		*****	*****	Report mg/l	6/YEAR	24-HR COMP <sup>4</sup>
Total Recoverable Nickel <sup>17</sup>	*****	*****		*****	*****	Report mg/l	6/YEAR	24-HR COMP <sup>4</sup>
Total Recoverable Lead <sup>17</sup>	*****	*****		*****	*****	Report mg/l	6/YEAR	24-HR COMP <sup>4</sup>
Total Recoverable Zinc <sup>17</sup>	*****	*****		*****	*****	Report mg/l	6/YEAR	24-HR COMP <sup>4</sup>

## Footnotes:

1. Effluent sampling shall be of the discharge and shall be collected at the point specified on page 2. Any change in sampling location must be reviewed and approved in writing by EPA and MassDEP.

A routine sampling program shall be developed in which samples are taken at the same location, same time and same days of the week each month. Occasional deviations from the routine sampling program are allowed, but the reason for the deviation shall be documented in correspondence appended to the applicable discharge monitoring report.

All samples shall be tested using the analytical methods found in 40 CFR § 136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR § 136.

2. Report annual average, monthly average, and the maximum daily flow. The 18.0 mgd limit is an annual average, which shall be reported as a 12-month rolling average. The value will be calculated as the arithmetic mean of the monthly average flow for the reporting month and the monthly average flows of the previous eleven months.
3. Sampling required for influent and effluent.
4. 24-hour composite samples ("24-hr Comp") will consist of at least twenty four (24) grab samples taken during one consecutive 24 hour period, either collected at equal intervals and combined proportional to flow or continuously collected proportionally to flow.
5. Required for State Certification.
6. The monthly average limit for E. coli is expressed as a geometric mean.
7. Total residual chlorine monitoring is required whenever chlorine is added to the treatment process and such sampling shall be representative of the effluent under conditions of chlorine addition. TRC sampling is not required if chlorine is not added for disinfection or other purpose. The limitations are in effect year-round.

The minimum level (ML) for total residual chlorine is defined as 20 ug/l. This value is the minimum level for chlorine using EPA approved methods found in the most currently approved version of Standard Methods for the Examination of Water and Wastewater, Method 4500 CL-E and G. One of these methods must be used to determine total residual chlorine. For effluent limitations less than 20 ug/l, compliance/non-compliance will be determined based on the ML.

8. The maximum daily concentration values for dissolved orthophosphorus shall be derived from sampling done concurrently with the sampling for total phosphorus.
9. The permittee shall comply with the new 101 ug/l and 15.2 lb/day total phosphorus limits and the 450 lb/day total nitrogen limit in accordance with the schedule contained in

Section F below. The prior permit total phosphorus limit of 0.2 mg/l (April 1 to October 31) shall remain in effect as an interim limit until the date specified in Section F for compliance with the new 101 ug/l total phosphorus limit. Upon the effective date of the permit, and until the date specified in Section F below for compliance with the total nitrogen final limit of 450 lb/day, the permittee shall optimize the operation of its existing treatment facility for nitrogen removal.

10. The total nitrogen values will be calculated by adding the results of the nitrite and nitrate nitrogen and the total Kjeldahl nitrogen sampling.
11. The permittee shall optimize the operation of the treatment facility for the removal of total nitrogen during the period November 1 through April 30. All available treatment equipment in place at the facility shall be operated unless equal or better performance can be achieved in a reduced operational mode. The addition of a carbon source that may be necessary in order to meet the total nitrogen limit from May 1 through October 31 is not required during the period November 1 through April 30.
12. The minimum level (ML) for copper is defined as 3 ug/l. This value is the minimum level for copper using the Furnace Atomic Absorption analytical method (EPA Method 220.2).

Sampling results in connection with Whole Effluent Toxicity (WET) testing may be used to satisfy this monitoring requirement in those months in which WET testing is performed.

13. The permittee shall conduct acute and chronic toxicity tests four times per year. The permittee shall test the daphnid, Ceriodaphnia dubia, only. Toxicity test samples shall be collected during the second week of the months of February, May, August and November. The test results shall be submitted by the last day of the month following the completion of the test. The results are due March 31, June 30, September 30 and December 31, respectively. The tests must be performed in accordance with test procedures and protocols specified in **Attachments A and B** of this permit.

An additional two samples shall be collected and tests completed during days when treatment plant total daily flow exceeds 30 mgd. These two test may be conducted during any month of the year. The results for these tests shall be submitted by the last day of the month following the test in which they are taken. See Permit Attachments A and B, Toxicity Test Procedure and Protocols.

Test Dates Second Week in	Submit Results By:	Test Species	Acute Limit LC <sub>50</sub>	Chronic Limit C-NOEC
February May August November	March 31 June 30 September 30 December 31	<u>Ceriodaphnia dubia</u> (daphnid)	≥ 100%	≥ 98%

After submitting **one year** and a **minimum** of four consecutive sets of WET test results, all of which demonstrate compliance with the WET permit limits, the permittee may request a reduction in the WET testing requirements. The permittee is required to continue testing at the frequency specified in the permit until notice is received by certified mail from the EPA that the WET testing requirement has been changed.

14. The LC<sub>50</sub> is the concentration of effluent which causes mortality to 50% of the test organisms. Therefore, a 100% limit means that a sample of 100% effluent (no dilution) shall cause no more than a 50% mortality rate.
15. C-NOEC (chronic-no observed effect concentration) is defined as the highest concentration of toxicant or effluent to which organisms are exposed in a life cycle or partial life cycle test which causes no adverse effect on growth, survival, or reproduction, based on a statistically significant difference from dilution control, at a specific time of observation as determined from hypothesis testing. As described in the EPA WET Method Manual EPA 821-R-02-013, Section 10.2.6.2, all test results are to be reviewed and reported in accordance with EPA guidance on the evaluation of the concentration-response relationship. The "98% or greater" limit is defined as a sample which is composed of 98% (or greater) effluent, the remainder being dilution water.
16. If toxicity test(s) using receiving water as diluent show the receiving water to be toxic or unreliable, the permittee shall either follow procedures outlined in **Attachment A (Toxicity Test Procedure and Protocol) Section IV., DILUTION WATER** in order to obtain an individual approval for use of an alternate dilution water, or the permittee shall follow the Self-Implementing Alternative Dilution Water Guidance, which may be used to obtain automatic approval of an alternate dilution water, including the appropriate species for use with that water. This guidance is found in Attachment G of *NPDES Program Instructions for the Discharge Monitoring Report Forms (DMRs)*, which may be found on the EPA Region I web site at <http://www.epa.gov/Region1/enforcementandassistance/dmr.html>. If this guidance is revoked, the permittee shall revert to obtaining individual approval as outlined in **Attachment A**. Any modification or revocation to this guidance will be transmitted to the permittees. However, at any time, the permittee may choose to contact EPA-New England directly using the approach outlined in **Attachment A**.

17. For each whole effluent toxicity test, the permittee shall report on the appropriate discharge monitoring report (DMR) the concentrations of the hardness, ammonia nitrogen as nitrogen, total recoverable aluminum, cadmium, copper, lead, nickel, and zinc found in the 100 percent effluent sample. All these aforementioned chemical parameters shall be determined to at least the minimum quantification level shown in **Attachment A**. Also the permittee should note that all chemical parameter results must still be reported in the appropriate toxicity report.

**Part I.A.1. (Continued)**

- a. The discharge shall not cause a violation of the water quality standards of the receiving waters.
  - b. The pH of the effluent shall not be less than 6.5 or greater than 8.3 at any time.
  - c. The discharge shall not cause objectionable discoloration of the receiving waters.
  - d. The effluent shall not contain a visible oil sheen, foam, or floating solids at any time.
  - e. The permittee's treatment facility shall maintain a minimum of 85 percent removal of both total suspended solids and biochemical oxygen demand. The percent removal shall be based on monthly average values.
  - f. The results of sampling for any parameter done in accordance with EPA approved methods above its required frequency must also be reported.
  - g. If the average annual flow in any calendar year exceeds 80 percent of the facility's design flow, the permittee shall submit a report to MassDEP by March 31 of the following calendar year describing its plans for further flow increases and describing how it will maintain compliance with the flow limit and all other effluent limitations and conditions.
2. All POTWs must provide adequate notice to the Director of the following:
- a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the Clean Water Act if it were directly discharging those pollutants; and
  - b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
  - c. For purposes of this paragraph, adequate notice shall include information on:
    - (1) The quantity and quality of effluent introduced into the POTW; and

- (2) Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

3. Prohibitions Concerning Interference and Pass Through:

- a. Pollutants introduced into POTW's by a non-domestic source (user) shall not pass through the POTW or interfere with the operation or performance of the works.

4. Toxics Control

- a. The permittee shall not discharge any pollutant or combination of pollutants in toxic amounts.
- b. Any toxic components of the effluent shall not result in any demonstrable harm to aquatic life or violate any state or federal water quality standard which has been or may be promulgated. Upon promulgation of any such standard, this permit may be revised or amended in accordance with such standards.

5. Numerical Effluent Limitations for Toxicants

EPA or MassDEP may use the results of the toxicity tests and chemical analyses conducted pursuant to this permit, as well as national water quality criteria developed pursuant to Section 304(a)(1) of the Clean Water Act (CWA), state water quality criteria, and any other appropriate information or data, to develop numerical effluent limitations for any pollutants, including but not limited to those pollutants listed in Appendix D of 40 CFR Part 122.

## **B. UNAUTHORIZED DISCHARGES**

This permit authorizes discharges only from the outfall(s) listed in Part I.A.1, in accordance with the terms and conditions of this permit. Discharges of wastewater from any other point sources, including sanitary sewer overflows (SSOs), are not authorized by this permit and shall be reported to EPA and MassDEP in accordance with Section D.1.e.(1) of the General Requirements of this permit (Twenty-four hour reporting).

Notification of SSOs to MassDEP shall be made on its SSO Reporting Form (which includes DEP Regional Office telephone numbers). The reporting form and instruction for its completion may be found on-line at <http://www.mass.gov/eea/agencies/massdep/service/approvals/sanitary-sewer-overflow-bypass-backup-notification.html>.

## **C. OPERATION AND MAINTENANCE OF THE SEWER SYSTEM**

Operation and maintenance of the sewer system shall be in compliance with the General Requirements of Part II and the following terms and conditions. The permittee is required to complete the following activities for the collection system which it owns:

1. Maintenance Staff

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The permittee shall provide an adequate staff to carry out the operation, maintenance, repair, and testing functions required to ensure compliance with the terms and conditions of this permit. Provisions to meet this requirement shall be described in the Collection System O & M Plan required pursuant to Section C.5. below.

2. Preventive Maintenance Program

The permittee shall maintain an ongoing preventive maintenance program to prevent overflows and bypasses caused by malfunctions or failures of the sewer system infrastructure. The program shall include an inspection program designed to identify all potential and actual unauthorized discharges. Plans and programs to meet this requirement shall be described in the Collection System O & M Plan required pursuant to Section C.5. below.

3. Infiltration/Inflow

The permittee shall control infiltration and inflow (I/I) into the sewer system as necessary to prevent high flow related unauthorized discharges from their collection systems and high flow related violations of the wastewater treatment plant's effluent limitations. Plans and programs to control I/I shall be described in the Collection System O & M Plan required pursuant to Section C.5. below.

4. Collection System Mapping

**Within 30 months of the effective date of this permit**, the permittee shall prepare a map of the sewer collection system it owns (see page 1 of this permit for the effective date). The map shall be on a street map of the community, with sufficient detail and at a scale to allow easy interpretation. The collection system information shown on the map shall be based on current conditions and shall be kept up to date and available for review by federal, state, or local agencies. Such map(s) shall include, but not be limited to the following:

- a. All sanitary sewer lines and related manholes;
- b. All combined sewer lines, related manholes, and catch basins;
- c. All combined sewer regulators and any known or suspected connections between the sanitary sewer and storm drain systems (e.g. combination manholes);
- d. All outfalls, including the treatment plant outfall(s), CSOs, and any known or suspected SSOs, including stormwater outfalls that are connected to combination manholes;
- e. All pump stations and force mains;
- f. The wastewater treatment facility(ies);
- g. All surface waters (labeled);
- h. Other major appurtenances such as inverted siphons and air release valves;
- i. A numbering system which uniquely identifies manholes, catch basins, overflow points, regulators and outfalls;
- j. The scale and a north arrow; and

- k. The pipe diameter, date of installation, type of material, distance between manholes, and the direction of flow.

5. Collection System Operation and Maintenance Plan

The permittee shall develop and implement a Collection System Operation and Maintenance Plan.

- a. Within six (6) months of the effective date of the permit, the permittee shall submit to EPA and MassDEP
  - (1) A description of the collection system management goals, staffing, information management, and legal authorities;
  - (2) A description of the collection system and the overall condition of the collection system including a list of all pump stations and a description of recent studies and construction activities; and
  - (3) A schedule for the development and implementation of the full Collection System O & M Plan including the elements in paragraphs b.1. through b.8. below.
- b. The full Collection System O & M Plan shall be completed, implemented and submitted to EPA and MassDEP within twenty four (24) months from the effective date of this permit. The Plan shall include:
  - (1) The required submittal from paragraph 5.a. above, updated to reflect current information;
  - (2) A preventive maintenance and monitoring program for the collection system;
  - (3) Description of sufficient staffing necessary to properly operate and maintain the sanitary sewer collection system and how the operation and maintenance program is staffed;
  - (4) Description of funding, the source(s) of funding and provisions for funding sufficient for implementing the plan;
  - (5) Identification of known and suspected overflows and back-ups, including manholes. A description of the cause of the identified overflows and back-ups, corrective actions taken, and a plan for addressing the overflows and back-ups consistent with the requirements of this permit;
  - (6) A description of the permittee's programs for preventing I/I related effluent violations and all unauthorized discharges of wastewater, including overflows and by-passes and the ongoing program to identify and remove sources of I/I. The program shall include an inflow identification and control program that focuses on the disconnection and redirection of illegal sump pumps and roof down spouts; and
  - (7) An educational public outreach program for all aspects of I/I control, particularly private inflow.

- (8) An Overflow Emergency Response Plan to protect public health from overflows and unanticipated bypasses or upsets that exceed any effluent limitation in the permit.

6. Annual Reporting Requirement

The permittee shall submit a summary report of activities related to the implementation of its Collection System O & M Plan during the previous calendar year. The report shall be submitted to EPA and MassDEP annually by March 31. The summary report shall, at a minimum, include:

- a. A description of the staffing levels maintained during the year;
- b. A map and a description of inspection and maintenance activities conducted and corrective actions taken during the previous year;
- c. Expenditures for any collection system maintenance activities and corrective actions taken during the previous year;
- d. A map with areas identified for investigation/action in the coming year;
- e. If treatment plant flow has reached 80% of its design flow (14.4 mgd) based on the annual average flow during the reporting year, or there have been capacity related overflows, submit a calculation of the maximum daily, weekly, and monthly infiltration and the maximum daily, weekly, and monthly inflow for the reporting year; and
- f. A summary of unauthorized discharges during the past year and their causes and a report of any corrective actions taken as a result of the unauthorized discharges reported pursuant to the Unauthorized Discharges section of this permit.

7. Alternate Power Source

In order to maintain compliance with the terms and conditions of this permit, the permittee shall provide an alternative power source(s) sufficient to operate the portion of the publicly owned treatment works<sup>1</sup> it owns and operates.

## D. SLUDGE CONDITIONS

### 1. Standard Conditions

- a. The permittee shall comply with all existing federal and state laws and regulations that apply to sewage sludge use and disposal practices and the Clean Water Act section 405(d) technical standards.
- b. The permittee shall comply with the more stringent of either the state or federal requirements.
- c. No person shall fire sewage sludge in a sewage sludge incinerator except in compliance with the requirements of 40 CFR part 503 subpart E.

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<sup>1</sup> As defined at 40 CFR §122.2, which references the definition at 40 CFR §403.3

2. Pollutant Limitations

- a. Firing of sewage sludge shall not violate the requirements of the National Emission Standard for beryllium in 40 CFR part 61, subpart C - 10 grams per 24-hour period.
- b. Firing of sewage sludge shall not violate the requirements in the National Emission Standard for mercury in 40 CFR part 61, subpart E - 3200 grams per 24-hour period.
- c. The daily concentration of the metals in the sewage sludge fed to the incinerator shall not exceed the limits specified below (dry weight basis):

	<u>Maximum Daily</u>
Arsenic	732 mg/kg
Cadmium	1,601 mg/kg
Chromium	310,396 mg/kg
Lead	71,630 mg/kg
Nickel	136,438 mg/kg

3. Operational Standards

- a. The exit gas from the sewage sludge incinerator stack shall be monitored continuously for Total Hydrocarbons (THC).
- b. The monthly average concentration for Total Hydrocarbons (THC), corrected to zero percent moisture and to seven percent oxygen, in the exit gas from the sewage sludge incinerator stack shall not exceed 100 PPM on a volumetric basis.
- c. The measured THC concentration shall be corrected to zero percent moisture using the correction factor below:

$$\text{Correction factor} = \frac{1}{(1-X)}$$

(percent moisture)

Where:

X = the decimal fraction of the percent moisture in the sewage sludge incinerator exit gas in hundredths.

- d. The measured THC concentration shall be corrected to seven percent oxygen using the correction factor below:

$$\text{Correction factor} = \frac{14}{(21-Y)}$$

(oxygen)

Where:

Y = the percent oxygen concentration in the sewage sludge incinerator stack exit dry gas (dry volume/dry volume)

- e. The measured THC value shall be multiplied by the correction factors in items b and c. The corrected THC value shall be used to determine compliance with Paragraph D.3.a.

#### 4. Management Practices

- a. An instrument that continuously measures and records the THC concentration in the sewage sludge incinerator stack exit gas shall be installed, calibrated, operated and maintained for each incinerator in accordance with the manufacturer's written instructions.
- b. The total hydrocarbons instrument shall employ a flame ionization detector; shall have a heated sampling line maintained at a temperature of 150 degrees Celsius or higher at all times; and shall be calibrated at least once every 24-hour operating period using propane.
- c. An instrument that continuously measures and records the oxygen concentration in the sewage sludge incinerator stack exit gas shall be installed, calibrated, operated and maintained for each incinerator in accordance with the manufacture's written instructions.
- d. An instrument that continuously measures and records information used to determine the moisture content in the sewage sludge incinerator stack exit gas shall be installed, calibrated, operated and maintained for each incinerator in accordance with the manufacture's written instructions.
- e. An instrument that continuously measures and records combustion temperatures shall be installed, calibrated, operated and maintained for each incinerator in accordance with the manufacture's written instructions.
- f. Upon completion of the testing to demonstrate compliance with the performance specifications, but not later than 90 days from the effective date of this permit, the operator of the incinerators shall submit to EPA Region 1 a certification stating that the continuous emissions monitoring system meets the performance specifications detailed in the above referenced guidance.
- g. Operation of the incinerator shall not cause the operating combustion temperature for the incinerator to exceed the performance test combustion temperature by more than 20 percent.
- h. Any air pollution control devices shall be appropriate for the type of incinerator and operating parameters for the air pollution control device shall be adequate to indicate proper performance of the air pollution control device. For incinerators subject to the requirements of 40 CFR subpart O, operation of the air pollution

control device shall not violate the air pollution control device requirements of that part.

- i. Sewage sludge shall not be fired in an incinerator if it is likely to adversely affect a threatened or endangered species listed under Section 4 of the Endangered Species Act or its designated critical habitat.
- j. The permittee shall notify the EPA and MassDEP if any continuous emission monitoring equipment is shut down or broken down for more than 72 hours while the incinerator continues to operate.
- k. Notification shall include the following:
  - (1) The reason for the shut down or break down;
  - (2) Steps taken to restore the system;
  - (3) Expected length of the down time; and
  - (4) The expected length of the incinerator operation during the down time of the monitoring system.
- l. Break downs or shut downs of less than 72 hours shall be recorded in the operations log along with an explanation of the event.
- m. Copies of all manufacturer's instructions shall be kept on file and be available during inspections.

#### 5. Monitoring Frequency

- a. The frequency of monitoring beryllium shall be as required in 40 CFR part 61, subpart C.
- b. The frequency of monitoring mercury shall be as required in 40 CFR part 61, subpart E.
- c. The pollutants in paragraph 2c shall be monitored at the following frequency - **bimonthly (6 times per year)**.
- d. After the sewage sludge has been monitored for the pollutants in paragraph 2c for two years at the frequency specified above, the permittee may request a reduction in the monitoring frequency.
- e. The operating parameters for the air pollution control devices shall be monitored at the following frequency - **1/day**.
- f. The THC concentration in the exit gas, the oxygen concentration in the exit gas, information from the instrument used to determine moisture content, and combustion temperatures shall be **continuously** monitored.

## 6. Sampling and Analysis

- a. The sewage shall be sampled at a location which is prior to entering the incinerator and provides a representative sample of the sewage sludge being incinerated.
- b. The sewage sludge shall be analyzed using “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods”, EPA publication SW-846, Second Edition (1982) with Updates I (April 1984) and II (April 1985) and Third Edition (November 1986) with Revision I (December 1987).
- c. If emission testing is done for demonstration of NESHAPS, testing shall be in accordance with Method 101A in 40 CFR part 60, Appendix B, “Determination of Particulate and Gaseous Mercury Emissions from Sewage Sludge Incinerators”.
- d. Sewage sludge samples for mercury shall be sampled and analyzed using Method 105 in 40 CFR part 61, Appendix B, “Determination of Mercury in Wastewater Treatment Plant Sewage Sludge”.

## 7. Record Keeping Requirements

The permittee is required to keep records for the following:

- a. Report the maximum concentration of each pollutant listed in paragraph D.2.c above;
- b. Report the average monthly THC concentration in the exit gas from the incinerator stack;
- c. Information that demonstrates compliance with the National Emission Standard for beryllium;
- d. Information that demonstrates compliance with the National Emission Standard for mercury. If sludge sampling is used, include calculation for compliance demonstration;
- e. The operating combustion temperature for the sewage sludge incinerator;
- f. Report the average monthly operating values for the air pollution control devices operating parameters;
- g. The oxygen concentration and the information used to measure moisture content in the exit gas from the sewage sludge incinerator. Report the oxygen concentration and percent moisture results which were used to determine the THC values reported in paragraph D.3.b;
- h. Record the average daily and average monthly sewage sludge feed rate to the

incinerator;

- i. The stack height of the incinerator;
- j. The dispersion factor for the site where the incinerator is located;
- k. The control efficiency for arsenic, lead, chromium, cadmium and nickel;
- l. A calibration and maintenance log for the instruments used to measure the THC concentration and the oxygen concentration in the exit gas; the information need to determine moisture content in the exit gas, and the combustion temperatures.

#### 8. Reporting

The permittee shall report the information in paragraphs 7 (a) through (l) annually by February 19 to EPA and MassDEP.

#### **E. INDUSTRIAL USERS AND PRETREATMENT PROGRAM**

1. The permittee shall develop and enforce specific effluent limits (local limits) for Industrial User(s), and all other users, as appropriate, which together with appropriate changes in the POTW Treatment Plant's Facilities or operation, are necessary to ensure continued compliance with the POTW's NPDES permit or sludge use or disposal practices. Specific local limits shall not be developed and enforced without individual notice to persons or groups who have requested such notice and an opportunity to respond. Within (120 days of the effective date of this permit), the permittee shall prepare and submit a written technical evaluation to the EPA analyzing the need to revise local limits. As part of this evaluation, the permittee shall assess how the POTW performs with respect to influent and effluent of pollutants, water quality concerns, sludge quality, sludge processing concerns/inhibition, biomonitoring results, activated sludge inhibition, worker health and safety and collection system concerns. In preparing this evaluation, the permittee shall complete and submit the attached form (see **Attachment C** – Reassessment of Technically Based Industrial Discharge Limits) with the technical evaluation to assist in determining whether existing local limits need to be revised. Justifications and conclusions should be based on actual plant data if available and should be included in the report. Should the evaluation reveal the need to revise local limits, the permittee shall complete the revisions within 120 days of notification by EPA and submit the revisions to EPA for approval. The permittee shall carry out the local limits revisions in accordance with EPA's Local Limit Development Guidance (July 2004).
2. The permittee shall implement the Industrial Pretreatment Program in accordance with the legal authorities, policies, procedures, and financial provisions described in the permittee's approved Pretreatment Program, and the General Pretreatment Regulations, 40 CFR 403. At a minimum, the permittee must perform the following duties to properly implement the Industrial Pretreatment Program (IPP):

- a. Carry out inspection, surveillance, and monitoring procedures which will determine independent of information supplied by the industrial user, whether the industrial user is in compliance with the Pretreatment Standards. At a minimum, all significant industrial users shall be sampled and inspected at the frequency established in the approved IPP but in no case less than once per year and maintain adequate records.
  - b. Issue or renew all necessary industrial user control mechanisms within 90 days of their expiration date or within 180 days after the industry has been determined to be a significant industrial user.
  - c. Obtain appropriate remedies for noncompliance by any industrial user with any pretreatment standard and/or requirement.
  - d. Maintain an adequate revenue structure for continued implementation of the Pretreatment Program.
3. The permittee shall provide the EPA and MassDEP with an annual report describing the permittee's pretreatment program activities for the twelve (12) month period ending 60 days prior to the due date in accordance with 403.12(i). The annual report shall be consistent with the format described in **Attachment D** (NPDES Permit Requirement for Industrial Pretreatment Annual Report) of this permit and shall be submitted no later than **March 1** of each year.
  4. The permittee must obtain approval from EPA prior to making any significant changes to the industrial pretreatment program in accordance with 40 CFR 403.18(c).
  5. The permittee must assure that applicable National Categorical Pretreatment Standards are met by all categorical industrial users of the POTW. These standards are published in the Federal Regulations at 40 CFR 405 et. seq.
  6. The permittee must modify its pretreatment program, if necessary, to conform to all changes in the Federal Regulations that pertain to the implementation and enforcement of the industrial pretreatment program. The permittee must provide EPA, in writing, within 180 days of this permit's effective date proposed changes, if applicable, to the permittee's pretreatment program deemed necessary to assure conformity with current Federal Regulations. At a minimum, the permittee must address in its written submission the following areas: (1) Enforcement response plan; (2) revised sewer use ordinances; and (3) slug control evaluations. The permittee will implement these proposed changes pending EPA Region I's approval under 40 CFR 403.18. This submission is separate and distinct from any local limits analysis submission described in Part I.E.1.

#### **F. COMPLIANCE SCHEDULE**

In order to comply with the new permit limits for total phosphorus (101 ug/l and 15.2 lb/day monthly average) and total nitrogen (450 lb/day monthly average), the permittee shall take the following actions:

**DRAFT**

1. Within one year of the effective date of the permit, the permittee shall complete an evaluation of the ability of the current facility to meet the permit limits and identify alternatives to upgrade the facility to meet the permit limits.
2. Within two years of the effective date of the permit, the permittee shall complete design of the facility improvements required to achieve the new total phosphorus and total nitrogen permit limits and shall submit the design to MassDEP for approval.
3. Within three years of the effective date of the permit, the permittee shall initiate construction of the facility improvements required to achieve the new total phosphorus and total nitrogen permit limits.
4. Within four years of the effective date of the permit, the permittee shall submit to EPA and MassDEP a status report relative to construction of the facility improvements required to achieve the new total phosphorus and total nitrogen permit limits.
5. Within fifty-four (54 months) of the effective date of the permit, the permittee shall substantially complete construction of the facility improvements required to achieve the new total phosphorus and total nitrogen permit limits.
6. The new permit limits for total phosphorus and total nitrogen shall go into effect five years from the effective date of the permit. Until such time the permittee shall meet an interim phosphorus limit of 0.2 mg/l (60 day rolling average, April to October). The permittee shall also, as an interim measure, investigate alternative operational approaches to reduce nitrogen discharges using its existing equipment and implement operational changes as appropriate to optimize nitrogen removal at the existing facility. A report describing the optimization investigation and including a schedule for implementing any recommended actions shall be submitted within one year of the effective date of the permit, and a report on the results of the implementation shall be submitted within three years of the effective date of the permit.
7. The permittee shall notify EPA and MassDEP of its compliance or noncompliance with the requirements of this part in writing and provide a summary report on its activities under this schedule no later than 14 days after each interim or final date of compliance..

#### **G. MONITORING AND REPORTING**

The monitoring program in the permit specifies sampling and analysis, which will provide continuous information on compliance and the reliability and effectiveness of the installed pollution abatement equipment. The approved analytical procedures found in 40 CFR Part 136 are required unless other procedures are explicitly required in the permit. The Permittee is obligated to monitor and report sampling results to EPA and the MassDEP within the time specified within the permit.

Unless otherwise specified in this permit, the permittee shall submit reports, requests, and information and provide notices in the manner described in this section.

1. Submittal of DMRs Using NetDMR

The permittee shall continue to submit its monthly monitoring data in discharge monitoring reports (DMRs) to EPA and MassDEP no later than the 15th day of the month electronically using NetDMR. When the permittee submits DMRs using NetDMR, it is not required to submit hard copies of DMRs to EPA or MassDEP.

2. Submittal of Reports as NetDMR Attachments

Unless otherwise specified in this permit, the permittee shall electronically submit all reports to EPA as NetDMR attachments rather than as hard copies. Permittees shall continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP. (See Part I.G.6. for more information on state reporting.) Because the due dates for reports described in this permit may not coincide with the due date for submitting DMRs (which is no later than the 15<sup>th</sup> day of the month), a report submitted electronically as a NetDMR attachment shall be considered timely if it is electronically submitted to EPA using NetDMR with the next DMR due following the particular report due date specified in this permit.

3. Submittal of Pre-treatment Related Reports

All reports and information required of the permittee in the Industrial Users and Pretreatment Program section of this permit shall be submitted to the Office of Ecosystem Protection's Pretreatment Coordinator in Region 1 EPA's Office of Ecosystem Protection (OEP). These requests, reports and notices include:

- A. Annual Pretreatment Reports,
- B. Pretreatment Reports Reassessment of Technically Based Industrial Discharge Limits Form,
- C. Revisions to Industrial Discharge Limits,
- D. Report describing Pretreatment Program activities, and
- E. Proposed changes to a Pretreatment Program

This information shall be submitted to EPA/OEP as a hard copy at the following address:

**U.S. Environmental Protection Agency  
Office of Ecosystem Protection  
Regional Pretreatment Coordinator  
5 Post Office Square - Suite 100 (OEP06-03)  
Boston, MA 02109-3912**

4. Submittal of Requests and Reports to EPA/OEP

The following requests, reports, and information described in this permit shall be submitted to the EPA/OEP NPDES Applications Coordinator in the EPA Office Ecosystem Protection (OEP).

- A. Transfer of Permit notice

- B. Request for changes in sampling location
- C. Request for reduction in testing frequency
- D. Request for Reduction in WET Testing Requirement
- E. Report on unacceptable dilution water / request for alternative dilution water for WET testing

These reports, information, and requests shall be submitted to EPA/OEP electronically at [R1NPDES.Notices.OEP@epa.gov](mailto:R1NPDES.Notices.OEP@epa.gov) or by hard copy mail to the following address:

**U.S. Environmental Protection Agency  
Office of Ecosystem Protection  
EPA/OEP NPDES Applications Coordinator  
5 Post Office Square - Suite 100 (OEP06-03)  
Boston, MA 02109-3912**

5. Submittal of Reports in Hard Copy Form

The following notifications and reports shall be submitted as hard copy with a cover letter describing the submission. These reports shall be signed and dated originals submitted to EPA.

- A. Written notifications required under Part II
- B. Notice of unauthorized discharges, including Sanitary Sewer Overflow (SSO) reporting
- C. Collection System Operation and Maintenance Plan (from co-permittees)
- D. Report on annual activities related to O&M Plan (from co-permittees)
- E. Sludge monitoring reports

This information shall be submitted to EPA/OES at the following address:

**U.S. Environmental Protection Agency  
Office of Environmental Stewardship (OES)  
Water Technical Unit  
5 Post Office Square, Suite 100 (OES04-4)  
Boston, MA 02109-3912**

All sludge monitoring reports required herein shall be submitted only to:

**U.S. Environmental Protection Agency, Region 7  
Biosolids Center  
Water Enforcement Branch  
11201 Renner Boulevard  
Lenexa, Kansas 66219**

6. State Reporting

Unless otherwise specified in this permit, duplicate signed copies of all reports,

information, requests or notifications described in this permit, including the reports, information, requests or notifications described in Parts I.G.3, I.G.4, and I.G.5 also shall be submitted to the State at the following addresses:

**MassDEP – Southeast Region  
Bureau of Resource Protection (Municipal)  
20 Riverside Drive  
Lakeville, MA 02347**

Copies of toxicity tests and nitrogen optimization reports only shall be submitted to:

**Massachusetts Department of Environmental Protection  
Watershed Planning Program  
8 New Bond Street  
Worcester, Massachusetts 01606**

7. Verbal Reports and Verbal Notifications

Any verbal reports or verbal notifications, if required in Parts I and/or II of this permit, shall be made to both EPA and to MassDEP. This includes verbal reports and notifications which require reporting within 24 hours. (As examples, see Part II.B.4.c. (2), Part II.B.5.c. (3), and Part II.D.1.e.) Verbal reports and verbal notifications shall be made to EPA's Office of Environmental Stewardship at:

**U.S. Environmental Protection Agency  
Office of Environmental Stewardship  
5 Post Office Square, Suite 100 (OES04-4)  
Boston, MA 02109-3912  
617-918-1510**

**H. STATE PERMIT CONDITIONS**

1. This authorization to discharge includes two separate and independent permit authorizations. The two permit authorizations are (i) a federal National Pollutant Discharge Elimination System permit issued by the U.S. Environmental Protection Agency (EPA) pursuant to the Federal Clean Water Act, 33 U.S.C. §§1251 et seq.; and (ii) an identical state surface water discharge permit issued by the Commissioner of the Massachusetts Department of Environmental Protection (MassDEP) pursuant to the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and 314 C.M.R. 3.00. All of the requirements contained in this authorization, as well as the standard conditions contained in 314 CMR 3.19, are hereby incorporated by reference into this state surface water discharge permit.
2. This authorization also incorporates the state water quality certification issued by MassDEP under § 401(a) of the Federal Clean Water Act, 40 C.F.R. 124.53, M.G.L. c. 21, § 27 and 314 CMR 3.07. All of the requirements (if any) contained in MassDEP's

water quality certification for the permit are hereby incorporated by reference into this state surface water discharge permit as special conditions pursuant to 314 CMR 3.11.

3. Each agency shall have the independent right to enforce the terms and conditions of this permit. Any modification, suspension or revocation of this permit shall be effective only with respect to the agency taking such action, and shall not affect the validity or status of this permit as issued by the other agency, unless and until each agency has concurred in writing with such modification, suspension or revocation. In the event any portion of this permit is declared invalid, illegal or otherwise issued in violation of state law such permit shall remain in full force and effect under federal law as a NPDES Permit issued by the U.S. Environmental Protection Agency. In the event this permit is declared invalid, illegal or otherwise issued in violation of federal law, this permit shall remain in full force and effect under state law as a permit issued by the Commonwealth of Massachusetts.

# FRESHWATER CHRONIC TOXICITY TEST PROCEDURE AND PROTOCOL USEPA Region 1

## I. GENERAL REQUIREMENTS

The permittee shall be responsible for the conduct of acceptable chronic toxicity tests using three fresh samples collected during each test period. The following tests shall be performed as prescribed in Part 1 of the NPDES discharge permit in accordance with the appropriate test protocols described below. (Note: the permittee and testing laboratory should review the applicable permit to determine whether testing of one or both species is required).

- **Daphnid (Ceriodaphnia dubia) Survival and Reproduction Test.**
- **Fathead Minnow (Pimephales promelas) Larval Growth and Survival Test.**

Chronic toxicity data shall be reported as outlined in Section VIII.

## II. METHODS

Methods to follow are those recommended by EPA in: Short Term Methods For Estimating The Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, Fourth Edition, October 2002. United States Environmental Protection Agency. Office of Water, Washington, D.C., EPA 821-R-02-013. The methods are available on-line at <http://www.epa.gov/waterscience/WET/> . Exceptions and clarification are stated herein.

## III. SAMPLE COLLECTION AND USE

A total of three fresh samples of effluent and receiving water are required for initiation and subsequent renewals of a freshwater, chronic, toxicity test. The receiving water control sample must be collected immediately upstream of the permitted discharge's zone of influence. Fresh samples are recommended for use on test days 1, 3, and 5. However, provided a total of three samples are used for testing over the test period, an alternate sampling schedule is acceptable. The acceptable holding times until initial use of a sample are 24 and 36 hours for on-site and off-site testing, respectively. A written waiver is required from the regulating authority for any hold time extension. All test samples collected may be used for 24, 48 and 72 hour renewals after initial use. All samples held for use beyond the day of sampling shall be refrigerated and maintained at a temperature range of 0-6° C.

All samples submitted for chemical and physical analyses will be analyzed according to Section VI of this protocol.

Sampling guidance dictates that, where appropriate, aliquots for the analysis required in this protocol shall be split from the samples, containerized and immediately preserved, or analyzed as per 40 CFR Part 136. EPA approved test methods require that samples collected for metals analyses be preserved immediately after collection. Testing for the presence of total residual chlorine (TRC) must be analyzed immediately or as soon as possible, for all effluent samples, prior to WET testing. TRC analysis may be performed on-site or by the toxicity testing laboratory and the samples must be dechlorinated, as necessary, using sodium thiosulfate prior to sample use for toxicity testing.

If any of the renewal samples are of sufficient potency to cause lethality to 50 percent or more of the test organisms in any of the test treatments for either species or, if the test fails to meet its permit limits, then chemical analysis for total metals (originally required for the initial sample only in Section VI) will be required on the renewal sample(s) as well.

#### IV. DILUTION WATER

Samples of receiving water must be collected from a location in the receiving water body immediately upstream of the permitted discharge's zone of influence at a reasonably accessible location. Avoid collection near areas of obvious road or agricultural runoff, storm sewers or other point source discharges and areas where stagnant conditions exist. EPA strongly urges that screening for toxicity be performed prior to the set up of a full, definitive toxicity test any time there is a question about the test dilution water's ability to achieve test acceptability criteria (TAC) as indicated in Section V of this protocol. The test dilution water control response will be used in the statistical analysis of the toxicity test data. All other control(s) required to be run in the test will be reported as specified in the Discharge Monitoring Report (DMR) Instructions, Attachment F, page 2, Test Results & Permit Limits.

The test dilution water must be used to determine whether the test met the applicable TAC. When receiving water is used for test dilution, an additional control made up of standard laboratory water (0% effluent) is required. This control will be used to verify the health of the test organisms and evaluate to what extent, if any, the receiving water itself is responsible for any toxic response observed.

If dechlorination of a sample by the toxicity testing laboratory is necessary a "sodium thiosulfate" control, representing the concentration of sodium thiosulfate used to adequately dechlorinate the sample prior to toxicity testing, must be included in the test.

If the use of an alternate dilution water (ADW) is authorized, in addition to the ADW test control, the testing laboratory must, for the purpose of monitoring the receiving water, also run a receiving water control.

If the receiving water diluent is found to be, or suspected to be toxic or unreliable an ADW of known quality with hardness similar to that of the receiving water may be substituted. Substitution is species specific meaning that the decision to use ADW is made for each species and is based on the toxic response of that particular species. Substitution to an ADW is authorized in two cases. The first is the case where repeating a test due to toxicity in the site dilution water requires an **immediate decision** for ADW use be made by the permittee and toxicity testing laboratory. The second is in the case where two of the most recent documented incidents of unacceptable site dilution water toxicity requires ADW use in future WET testing.

For the second case, written notification from the permittee requesting ADW use **and** written authorization from the permit issuing agency(s) is required **prior to** switching to a long-term use of ADW for the duration of the permit.

Written requests for use of ADW must be mailed with supporting documentation to the following addresses:

Director  
Office of Ecosystem Protection (CAA)  
U.S. Environmental Protection Agency, Region 1  
Five Post Office Square, Suite 100  
Mail Code OEP06-5  
Boston, MA 02109-3912

and

Manager  
Water Technical Unit (SEW)  
U.S. Environmental Protection Agency  
Five Post Office Square, Suite 100  
Mail Code OES04-4  
Boston, MA 02109-3912

Note: USEPA Region 1 retains the right to modify any part of the alternate dilution water policy stated in this protocol at any time. Any changes to this policy will be documented in the annual DMR posting.

*See the most current annual DMR instructions which can be found on the EPA Region 1 website at <http://www.epa.gov/region1/enforcementandassistance/dmr.html> for further important details on alternate dilution water substitution requests.*

## **V. TEST CONDITIONS AND TEST ACCEPTABILITY CRITERIA**

Method specific test conditions and TAC are to be followed and adhered to as specified in the method guidance document, EPA 821-R-02-013. If a test does not meet TAC the test must be repeated with fresh samples within 30 days of the initial test completion date.

### **V.1. Use of Reference Toxicity Testing**

Reference toxicity test results and applicable control charts must be included in the toxicity testing report.

If reference toxicity test results fall outside the control limits established by the laboratory for a specific test endpoint, a reason or reasons for this excursion must be evaluated, correction made and reference toxicity tests rerun as necessary.

If a test endpoint value exceeds the control limits at a frequency of more than one out of twenty then causes for the reference toxicity test failure must be examined and if problems are identified corrective action taken. The reference toxicity test must be repeated during the same month in which the exceedance occurred.

If two consecutive reference toxicity tests fall outside control limits, the possible cause(s) for the exceedance must be examined, corrective actions taken and a repeat of the reference toxicity test must take place immediately. Actions taken to resolve the problem must be reported.

#### V.1.a. Use of Concurrent Reference Toxicity Testing

In the case where concurrent reference toxicity testing is required due to a low frequency of testing with a particular method, if the reference toxicity test results fall slightly outside of laboratory established control limits, but the primary test met the TAC, the results of the primary test will be considered acceptable. However, if the results of the concurrent test fall well outside the established **upper** control limits i.e.  $\geq 3$  standard deviations for IC25 values and  $\geq$  two concentration intervals for NOECs, and even though the primary test meets TAC, the primary test will be considered unacceptable and must be repeated.

V.2. For the *C. dubia* test, the determination of TAC and formal statistical analyses must be performed using only the first three broods produced.

V.3. Test treatments must include 5 effluent concentrations and a dilution water control. An additional test treatment, at the permitted effluent concentration (% effluent), is required if it is not included in the dilution series.

## VI. CHEMICAL ANALYSIS

As part of each toxicity test's daily renewal procedure, pH, specific conductance, dissolved oxygen (DO) and temperature must be measured at the beginning and end of each 24-hour period in each test treatment and the control(s).

The additional analysis that must be performed under this protocol is as specified and noted in the table below.

<u>Parameter</u>	Effluent	Receiving Water	ML (mg/l)
Hardness <sup>1, 4</sup>	x	x	0.5
Total Residual Chlorine (TRC) <sup>2, 3, 4</sup>	x		0.02
Alkalinity <sup>4</sup>	x	x	2.0
pH <sup>4</sup>	x	x	--
Specific Conductance <sup>4</sup>	x	x	--
Total Solids <sup>6</sup>	x		--
Total Dissolved Solids <sup>6</sup>	x		--
Ammonia <sup>4</sup>	x	x	0.1
Total Organic Carbon <sup>6</sup>	x	x	0.5
Total Metals <sup>5</sup>			
Cd	x	x	0.0005
Pb	x	x	0.0005
Cu	x	x	0.003
Zn	x	x	0.005
Ni	x	x	0.005
Al	x	x	0.02

Other as permit requires

#### Notes:

1. Hardness may be determined by:

- APHA Standard Methods for the Examination of Water and Wastewater , 21st Edition
    - Method 2340B (hardness by calculation)
    - Method 2340C (titration)
2. Total Residual Chlorine may be performed using any of the following methods provided the required minimum limit (ML) is met.
    - APHA Standard Methods for the Examination of Water and Wastewater , 21st Edition
      - Method 4500-CL E Low Level Amperometric Titration
      - Method 4500-CL G DPD Colorimetric Method
    - USEPA 1983. Manual of Methods Analysis of Water and Wastes
      - Method 330.5
  3. Required to be performed on the sample used for WET testing prior to its use for toxicity testing
  4. Analysis is to be performed on samples and/or receiving water, as designated in the table above, from all three sampling events.
  5. Analysis is to be performed on the initial sample(s) only unless the situation arises as stated in Section III, paragraph 4
  6. Analysis to be performed on initial samples only

## **VII. TOXICITY TEST DATA ANALYSIS AND REVIEW**

### **A. Test Review**

#### **1. Concentration / Response Relationship**

A concentration/response relationship evaluation is required for test endpoint determinations from both Hypothesis Testing and Point Estimate techniques. The test report is to include documentation of this evaluation in support of the endpoint values reported. The dose-response review must be performed as required in Section 10.2.6 of EPA-821-R-02-013. Guidance for this review can be found at <http://water.epa.gov/scitech/methods/cwa/> . In most cases, the review will result in one of the following three conclusions: (1) Results are reliable and reportable; (2) Results are anomalous and require explanation; or (3) Results are inconclusive and a retest with fresh samples is required.

#### **2. Test Variability (Test Sensitivity)**

This review step is separate from the determination of whether a test meets or does not meet TAC. Within test variability is to be examined for the purpose of evaluating test sensitivity. This evaluation is to be performed for the sub-lethal hypothesis testing endpoints reproduction and growth as required by the permit. The test report is to include documentation of this evaluation to support that the endpoint values reported resulted from a toxicity test of adequate sensitivity. This evaluation must be performed as required in Section 10.2.8 of EPA-821-R-02-013.

To determine the adequacy of test sensitivity, USEPA requires the calculation of test percent minimum significant difference (PMSD) values. In cases where NOEC determinations are made based on a non-parametric technique, calculation of a test PMSD value, for the sole purpose of assessing test sensitivity, shall be calculated using a comparable parametric statistical analysis technique. The calculated test PMSD is then compared to the upper and lower PMSD bounds shown for freshwater tests in Section 10.2.8.3, p. 52, Table 6 of EPA-821-R-02-013. The comparison will yield one of the following determinations.

- The test PMSD exceeds the PMSD upper bound test variability criterion in Table 6, the test results are considered highly variable and the test may not be sensitive enough to determine the presence of toxicity at the permit limit concentration (PLC). If the test results indicate that the discharge is not toxic at the PLC, then the test is considered insufficiently sensitive and must be repeated within 30 days of the initial test completion using fresh samples. If the test results indicate that the discharge is toxic at the PLC, the test is considered acceptable and does not have to be repeated.
- The test PMSD falls below the PMSD lower bound test variability criterion in Table 6, the test is determined to be very sensitive. In order to determine which treatment(s) are statistically significant and which are not, for the purpose of reporting a NOEC, the relative percent difference (RPD) between the control and each treatment must be calculated and compared to the lower PMSD boundary. See *Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the NPDES Program*, EPA 833-R-00-003, June 2002, Section 6.4.2. The following link: [Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the NPDES Program](#) can be used to locate the USEPA website containing this document. If the RPD for a treatment falls below the PMSD lower bound, the difference is considered statistically insignificant. If the RPD for a treatment is greater than the PMSD lower bound, then the treatment is considered statistically significant.
- The test PMSD falls within the PMSD upper and lower bounds in Table 6, the sub-lethal test endpoint values shall be reported as is.

## B. Statistical Analysis

### 1. General - Recommended Statistical Analysis Method

Refer to general data analysis flowchart, EPA 821-R-02-013, page 43

For discussion on Hypothesis Testing, refer to EPA 821-R-02-013, Section 9.6

For discussion on Point Estimation Techniques, refer to EPA 821-R-02-013, Section 9.7

### 2. *Pimephales promelas*

Refer to survival hypothesis testing analysis flowchart, EPA 821-R-02-013, page 79

Refer to survival point estimate techniques flowchart, EPA 821-R-02-013, page 80

Refer to growth data statistical analysis flowchart, EPA 821-R-02-013, page 92

### 3. *Ceriodaphnia dubia*

Refer to survival data testing flowchart, EPA 821-R-02-013, page 168

Refer to reproduction data testing flowchart, EPA 821-R-02-013, page 173

## VIII. TOXICITY TEST REPORTING

A report of results must include the following:

- Test summary sheets (2007 DMR Attachment F) which includes:
  - Facility name
  - NPDES permit number
  - Outfall number
  - Sample type
  - Sampling method
  - Effluent TRC concentration
  - Dilution water used
  - Receiving water name and sampling location
  - Test type and species
  - Test start date
  - Effluent concentrations tested (%) and permit limit concentration
  - Applicable reference toxicity test date and whether acceptable or not
  - Age, age range and source of test organisms used for testing
  - Results of TAC review for all applicable controls
  - Test sensitivity evaluation results (test PMSD for growth and reproduction)
  - Permit limit and toxicity test results
  - Summary of test sensitivity and concentration response evaluation

In addition to the summary sheets the report must include:

- A brief description of sample collection procedures
- Chain of custody documentation including names of individuals collecting samples, times and dates of sample collection, sample locations, requested analysis and lab receipt with time and date received, lab receipt personnel and condition of samples upon receipt at the lab(s)
- Reference toxicity test control charts
- All sample chemical/physical data generated, including minimum limits (MLs) and analytical methods used
- All toxicity test raw data including daily ambient test conditions, toxicity test chemistry, sample dechlorination details as necessary, bench sheets and statistical analysis
- A discussion of any deviations from test conditions
- Any further discussion of reported test results, statistical analysis and concentration-response relationship and test sensitivity review per species per endpoint

# USEPA REGION 1 FRESHWATER ACUTE TOXICITY TEST PROCEDURE AND PROTOCOL

## I. GENERAL REQUIREMENTS

The permittee shall conduct acceptable acute toxicity tests in accordance with the appropriate test protocols described below:

- **Daphnid (Ceriodaphnia dubia) definitive 48 hour test.**
- **Fathead Minnow (Pimephales promelas) definitive 48 hour test.**

Acute toxicity test data shall be reported as outlined in Section VIII.

## II. METHODS

The permittee shall use 40 CFR Part 136 methods. Methods and guidance may be found at:

[http://water.epa.gov/scitech/methods/cwa/wet/disk2\\_index.cfm](http://water.epa.gov/scitech/methods/cwa/wet/disk2_index.cfm)

The permittee shall also meet the sampling, analysis and reporting requirements included in this protocol. This protocol defines more specific requirements while still being consistent with the Part 136 methods. If, due to modifications of Part 136, there are conflicting requirements between the Part 136 method and this protocol, the permittee shall comply with the requirements of the Part 136 method.

## III. SAMPLE COLLECTION

A discharge sample shall be collected. Aliquots shall be split from the sample, containerized and preserved (as per 40 CFR Part 136) for chemical and physical analyses required. The remaining sample shall be measured for total residual chlorine and dechlorinated (if detected) in the laboratory using sodium thiosulfate for subsequent toxicity testing. (Note that EPA approved test methods require that samples collected for metals analyses be preserved immediately after collection.) Grab samples must be used for pH, temperature, and total residual chlorine (as per 40 CFR Part 122.21).

Standard Methods for the Examination of Water and Wastewater describes dechlorination of samples (APHA, 1992). Dechlorination can be achieved using a ratio of 6.7 mg/L anhydrous sodium thiosulfate to reduce 1.0 mg/L chlorine. If dechlorination is necessary, a thiosulfate control (maximum amount of thiosulfate in lab control or receiving water) must also be run in the WET test.

All samples held overnight shall be refrigerated at 1- 6°C.

#### IV. DILUTION WATER

A grab sample of dilution water used for acute toxicity testing shall be collected from the receiving water at a point immediately upstream of the permitted discharge's zone of influence at a reasonably accessible location. Avoid collection near areas of obvious road or agricultural runoff, storm sewers or other point source discharges and areas where stagnant conditions exist. In the case where an alternate dilution water has been agreed upon an additional receiving water control (0% effluent) must also be tested.

If the receiving water diluent is found to be, or suspected to be toxic or unreliable, an alternate standard dilution water of known quality with a hardness, pH, conductivity, alkalinity, organic carbon, and total suspended solids similar to that of the receiving water may be substituted **AFTER RECEIVING WRITTEN APPROVAL FROM THE PERMIT ISSUING AGENCY(S)**. Written requests for use of an alternate dilution water should be mailed with supporting documentation to the following address:

Director  
Office of Ecosystem Protection (CAA)  
U.S. Environmental Protection Agency-New England  
5 Post Office Sq., Suite 100 (OEP06-5)  
Boston, MA 02109-3912

and

Manager  
Water Technical Unit (SEW)  
U.S. Environmental Protection Agency  
5 Post Office Sq., Suite 100 (OES04-4)  
Boston, MA 02109-3912

Note: USEPA Region 1 retains the right to modify any part of the alternate dilution water policy stated in this protocol at any time. Any changes to this policy will be documented in the annual DMR posting.

*See the most current annual DMR instructions which can be found on the EPA Region 1 website at <http://www.epa.gov/region1/enforcement/water/dmr.html> for further important details on alternate dilution water substitution requests.*

It may prove beneficial to have the proposed dilution water source screened for suitability prior to toxicity testing. EPA strongly urges that screening be done prior to set up of a full definitive toxicity test any time there is question about the dilution water's ability to support acceptable performance as outlined in the 'test acceptability' section of the protocol.

#### V. TEST CONDITIONS

The following tables summarize the accepted daphnid and fathead minnow toxicity test conditions and test acceptability criteria:

**EPA NEW ENGLAND EFFLUENT TOXICITY TEST CONDITIONS FOR THE DAPHNID, CERIODAPHNIA DUBIA 48 HOUR ACUTE TESTS<sup>1</sup>**

1.	Test type	Static, non-renewal
2.	Temperature (°C)	20 ± 1°C or 25 ± 1°C
3.	Light quality	Ambient laboratory illumination
4.	Photoperiod	16 hour light, 8 hour dark
5.	Test chamber size	Minimum 30 ml
6.	Test solution volume	Minimum 15 ml
7.	Age of test organisms	1-24 hours (neonates)
8.	No. of daphnids per test chamber	5
9.	No. of replicate test chambers per treatment	4
10.	Total no. daphnids per test concentration	20
11.	Feeding regime	As per manual, lightly feed YCT and <u>Selenastrum</u> to newly released organisms while holding prior to initiating test
12.	Aeration	None
13.	Dilution water <sup>2</sup>	Receiving water, other surface water, synthetic water adjusted to the hardness and alkalinity of the receiving water (prepared using either Millipore Milli-Q <sup>R</sup> or equivalent deionized water and reagent grade chemicals according to EPA acute toxicity test manual) or deionized water combined with mineral water to appropriate hardness.
14.	Dilution series	≥ 0.5, must bracket the permitted RWC
15.	Number of dilutions	5 plus receiving water and laboratory water control and thiosulfate control, as necessary. An additional dilution at the permitted effluent concentration (% effluent) is required if it is not included in the dilution

series.

- |                            |   |
|----------------------------|---|
| 16. Effect measured        | Mortality-no movement of body or appendages on gentle prodding  |
| 17. Test acceptability     | 90% or greater survival of test organisms in dilution water control solution  |
| 18. Sampling requirements  | For on-site tests, samples must be used within 24 hours of the time that they are removed from the sampling device. For off-site tests, samples must first be used within 36 hours of collection. |
| 19. Sample volume required | Minimum 1 liter   |

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Footnotes:

1. Adapted from EPA-821-R-02-012.
2. Standard prepared dilution water must have hardness requirements to generally reflect the characteristics of the receiving water.

**EPA NEW ENGLAND TEST CONDITIONS FOR THE FATHEAD MINNOW  
(PIMEPHALES PROMELAS) 48 HOUR ACUTE TEST<sup>1</sup>**

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1. Test Type	Static, non-renewal
2. Temperature (°C)	20 ± 1 ° C or 25 ± 1°C
3. Light quality	Ambient laboratory illumination
4. Photoperiod	16 hr light, 8 hr dark
5. Size of test vessels	250 mL minimum
6. Volume of test solution	Minimum 200 mL/replicate
7. Age of fish	1-14 days old and age within 24 hrs of each other
8. No. of fish per chamber	10
9. No. of replicate test vessels per treatment	4
10. Total no. organisms per concentration	40
11. Feeding regime	As per manual, lightly feed test age larvae using concentrated brine shrimp nauplii while holding prior to initiating test
12. Aeration	None, unless dissolved oxygen (D.O.) concentration falls below 4.0 mg/L, at which time gentle single bubble aeration should be started at a rate of less than 100 bubbles/min. (Routine D.O. check is recommended.)
13. dilution water <sup>2</sup>	Receiving water, other surface water, synthetic water adjusted to the hardness and alkalinity of the receiving water (prepared using either Millipore Milli-Q <sup>R</sup> or equivalent deionized and reagent grade chemicals according to EPA acute toxicity test manual) or deionized water combined with mineral water to appropriate hardness.
14. Dilution series	≥ 0.5, must bracket the permitted RWC

- |                            |  |
|----------------------------|--|
| 15. Number of dilutions    | 5 plus receiving water and laboratory water control and thiosulfate control, as necessary. An additional dilution at the permitted effluent concentration (% effluent) is required if it is not included in the dilution series. |
| 16. Effect measured        | Mortality-no movement on gentle prodding   |
| 17. Test acceptability     | 90% or greater survival of test organisms in dilution water control solution   |
| 18. Sampling requirements  | For on-site tests, samples must be used within 24 hours of the time that they are removed from the sampling device. For off-site tests, samples are used within 36 hours of collection.  |
| 19. Sample volume required | Minimum 2 liters   |

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Footnotes:

1. Adapted from EPA-821-R-02-012
2. Standard dilution water must have hardness requirements to generally reflect characteristics of the receiving water.

## VI. CHEMICAL ANALYSIS

At the beginning of a static acute toxicity test, pH, conductivity, total residual chlorine, oxygen, hardness, alkalinity and temperature must be measured in the highest effluent concentration and the dilution water. Dissolved oxygen, pH and temperature are also measured at 24 and 48 hour intervals in all dilutions. The following chemical analyses shall be performed on the 100 percent effluent sample and the upstream water sample for each sampling event.

<u>Parameter</u>	<u>Effluent</u>	<u>Receiving Water</u>	<u>ML (mg/l)</u>
Hardness <sup>1</sup>	x	x	0.5
Total Residual Chlorine (TRC) <sup>2, 3</sup>	x		0.02
Alkalinity	x	x	2.0
pH	x	x	--
Specific Conductance	x	x	--
Total Solids	x		--
Total Dissolved Solids	x		--
Ammonia	x	x	0.1
Total Organic Carbon	x	x	0.5
Total Metals			
Cd	x	x	0.0005
Pb	x	x	0.0005
Cu	x	x	0.003
Zn	x	x	0.005
Ni	x	x	0.005
Al	x	x	0.02
Other as permit requires			

### Notes:

- Hardness may be determined by:
  - APHA Standard Methods for the Examination of Water and Wastewater , 21st Edition
    - Method 2340B (hardness by calculation)
    - Method 2340C (titration)
- Total Residual Chlorine may be performed using any of the following methods provided the required minimum limit (ML) is met.
  - APHA Standard Methods for the Examination of Water and Wastewater , 21st Edition
    - Method 4500-CL E Low Level Amperometric Titration
    - Method 4500-CL G DPD Colorimetric Method
- Required to be performed on the sample used for WET testing prior to its use for toxicity testing.

## **VII. TOXICITY TEST DATA ANALYSIS**

### LC50 Median Lethal Concentration (Determined at 48 Hours)

Methods of Estimation:

- Probit Method
- Spearman-Karber
- Trimmed Spearman-Karber
- Graphical

See the flow chart in Figure 6 on p. 73 of EPA-821-R-02-012 for appropriate method to use on a given data set.

### No Observed Acute Effect Level (NOAEL)

See the flow chart in Figure 13 on p. 87 of EPA-821-R-02-012.

## **VIII. TOXICITY TEST REPORTING**

A report of the results will include the following:

- Description of sample collection procedures, site description
- Names of individuals collecting and transporting samples, times and dates of sample collection and analysis on chain-of-custody
- General description of tests: age of test organisms, origin, dates and results of standard toxicant tests; light and temperature regime; other information on test conditions if different than procedures recommended. Reference toxicant test data should be included.
- All chemical/physical data generated. (Include minimum detection levels and minimum quantification levels.)
- Raw data and bench sheets.
- Provide a description of dechlorination procedures (as applicable).
- Any other observations or test conditions affecting test outcome.

## EPA - New England

### Reassessment of Technically Based Industrial Discharge Limits

Under 40 CFR §122.21(j)(4), all Publicly Owned Treatment Works (POTWs) with approved Industrial Pretreatment Programs (IPPs) shall provide the following information to the Director: a written evaluation of the need to revise local industrial discharge limits under 40 CFR §403.5(c)(1).

Below is a form designed by the U.S. Environmental Protection Agency (EPA - New England) to assist POTWs with approved IPPs in evaluating whether their existing Technically Based Local Limits (TBLLs) need to be recalculated. The form allows the permittee and EPA to evaluate and compare pertinent information used in previous TBLLs calculations against present conditions at the POTW.

**Please read direction below before filling out form.**

#### ITEM I.

- \* In Column (1), list what your POTW's influent flow rate was when your existing TBLLs were calculated. In Column (2), list your POTW's present influent flow rate. Your current flow rate should be calculated using the POTW's average daily flow rate from the previous 12 months.
- \* In Column (1) list what your POTW's SIU flow rate was when your existing TBLLs were calculated. In Column (2), list your POTW's present SIU flow rate.
- \* In Column (1), list what dilution ratio and/or 7Q10 value was used in your old/expired NPDES permit. In Column (2), list what dilution ration and/or 7Q10 value is presently being used in your new/reissued NPDES permit.

The 7Q10 value is the lowest seven day average flow rate, in the river, over a ten year period. The 7Q10 value and/or dilution ratio used by EPA in your new NPDES permit can be found in your NPDES permit "Fact Sheet."

- \* In Column (1), list the safety factor, if any, that was used when your existing TBLLs were calculated.
- \* In Column (1), note how your bio-solids were managed when your existing TBLLs were calculated. In Column (2), note how your POTW is presently disposing of its biosolids and how your POTW will be disposing of its biosolids in the future.

## ITEM II.

- \* List what your existing TBLLs are - as they appear in your current Sewer Use Ordinance (SUO).

## ITEM III.

- \* Identify how your existing TBLLs are allocated out to your industrial community. Some pollutants may be allocated differently than others, if so please explain.

## ITEM IV.

- \* Since your existing TBLLs were calculated, identify the following in detail:
  - (1) if your POTW has experienced any upsets, inhibition, interference or pass-through as a result of an industrial discharge.
  - (2) if your POTW is presently violating any of its current NPDES permit limitations - include toxicity.

## ITEM V.

- \* Using current sampling data, list in Column (1) the average and maximum amount of pollutants (in pounds per day) received in the POTW's influent. Current sampling data is defined as data obtained over the last 24 month period.

All influent data collected and analyzed must be in accordance with 40 CFR §136. Sampling data collected should be analyzed using the lowest possible detection method(s), e.g. graphite furnace.

- \* Based on your existing TBLLs, as presented in Item II., list in Column (2), for each pollutant the Maximum Allowable Headwork Loading (MAHL) values derived from an applicable environmental criteria or standard, e.g. water quality, sludge, NPDES, inhibition, etc. For more information, please see EPA's Local Limit Guidance Document (July 2004).

## Item VI.

- \* Using current sampling data, list in Column (1) the average and maximum amount of pollutants (in micrograms per liter) present your POTW's effluent. Current sampling data is defined as data obtained during the last 24 month period.

**(Item VI. continued)**

All effluent data collected and analyzed must be in accordance with 40 CFR §136. Sampling data collected should be analyzed using the lowest possible detection method(s), e.g. graphite furnace.

- \* List in Column (2A) what the Water Quality Standards (WQS) were (in micrograms per liter) when your TBLs were calculated, please note what hardness value was used at that time. Hardness should be expressed in milligram per liter of Calcium Carbonate.

List in Column (2B) the current WQSs or "Chronic Gold Book" values for each pollutant multiplied by the dilution ratio used in your new/reissued NPDES permit. For example, with a dilution ratio of 25:1 at a hardness of 25 mg/l - Calcium Carbonate (copper's chronic WQS equals 6.54 ug/l) the chronic NPDES permit limit for copper would equal 156.25 ug/l.

**ITEM VII.**

- \* In Column (1), list all pollutants (in micrograms per liter) limited in your new/reissued NPDES permit. In Column (2), list all pollutants limited in your old/expired NPDES permit.

**ITEM VIII.**

- \* Using current sampling data, list in Column (1) the average and maximum amount of pollutants in your POTW's biosolids. Current data is defined as data obtained during the last 24 month period. Results are to be expressed as total dry weight.

All biosolids data collected and analyzed must be in accordance with 40 CFR §136.

In Column (2A), list current State and/or Federal sludge standards that your facility's biosolids must comply with. Also note how your POTW currently manages the disposal of its biosolids. If your POTW is planing on managing its biosolids differently, list in Column (2B) what your new biosolids criteria will be and method of disposal.

In general, please be sure the units reported are correct and all pertinent information is included in your evaluation. If you have any questions, please contact your pretreatment representative at EPA - New England.



**ITEM II.**

EXISTING TBLLs			
POLLUTANT	NUMERICAL LIMIT (mg/l) or (lb/day)	POLLUTANT	NUMERICAL LIMIT (mg/l) or (lb/day)

**ITEM III.**

Note how your existing TBLLs, listed in Item II., are allocated to your Significant Industrial Users (SIUs), i.e. uniform concentration, contributory flow, mass proportioning, other. Please specify by circling.

**ITEM IV.**

Has your POTW experienced any upsets, inhibition, interference or pass-through from industrial sources since your existing TBLLs were calculated?  
If yes, explain.

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Has your POTW violated any of its NPDES permit limits and/or toxicity test requirements?

If  yes,  no, explain.

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**ITEM V.**

Using current POTW influent sampling data fill in Column (1). In Column (2), list your Maximum Allowable Headwork Loading (MAHL) values used to derive your TBLLs listed in Item II. In addition, please note the Environmental Criteria for which each MAHL value was established, i.e. water quality, sludge, NPDES etc.

Pollutant	Column (1) Influent Data Analyses		Column (2) MAHL Values (lb/day)	Criteria
	Maximum (lb/day)	Average (lb/day)		
Arsenic				
Cadmium				
Chromium				
Copper				
Cyanide				
Lead				
Mercury				
Nickel				
Silver				
Zinc				
Other (List)				

**ITEM VI.**

Using current POTW effluent sampling data, fill in Column (1). In Column (2A) list what the Water Quality Standards (Gold Book Criteria) were at the time your existing TBLLs were developed. List in Column (2B) current Gold Book values multiplied by the dilution ratio used in your new/reissued NPDES permit.

Pollutant	Column (1)		Columns (2A) (2B)	
	Effluent Data Analyses		Water Quality Criteria (Gold Book)	
	Maximum (ug/l)	Average (ug/l)	From TBLLs Today (ug/l)	(ug/l)
Arsenic				
*Cadmium				
*Chromium				
*Copper				
Cyanide				
*Lead				
Mercury				
*Nickel				
Silver				
*Zinc				
Other (List)				

\*Hardness Dependent (mg/l - CaCO3)



**ITEM VIII.**

Using current POTW biosolids data, fill in Column (1). In Column (2A), list the biosolids criteria that was used at the time your existing TBLLs were calculated. If your POTW is planing on managing its biosolids differently, list in Column (2B) what your new biosolids criteria would be and method of disposal.

Pollutant	Column (1)	Biosolids	Columns	
	Data Analyses		(2A)	(2B)
	Average		Biosolids Criteria	New
	(mg/kg)		From TBLLs	(mg/kg)
				(mg/kg)
Arsenic				
Cadmium				
Chromium				
Copper				
Cyanide				
Lead				
Mercury				
Nickel				
Silver				
Zinc				
Molybdenum				
Selenium				
Other (List)				

NPDES PERMIT REQUIREMENT  
FOR  
INDUSTRIAL PRETREATMENT ANNUAL REPORT

The information described below shall be included in the pretreatment program annual reports:

1. An updated list of all industrial users by category, as set forth in 40 C.F.R. 403.8(f)(2)(i), indicating compliance or noncompliance with the following:
  - baseline monitoring reporting requirements for newly promulgated industries
  - compliance status reporting requirements for newly promulgated industries
  - periodic (semi-annual) monitoring reporting requirements,
  - categorical standards, and
  - local limits;
  
2. A summary of compliance and enforcement activities during the preceding year, including the number of:
  - significant industrial users inspected by POTW (include inspection dates for each industrial user),
  - significant industrial users sampled by POTW (include sampling dates for each industrial user),
  - compliance schedules issued (include list of subject users),
  - written notices of violations issued (include list of subject users),
  - administrative orders issued (include list of subject users),
  - criminal or civil suits filed (include list of subject users) and,
  - penalties obtained (include list of subject users and penalty amounts);
  
3. A list of significantly violating industries required to be published in a local newspaper in accordance with 40 C.F.R. 403.8(f)(2)(vii);
  
4. A narrative description of program effectiveness including present and proposed changes to the program, such as funding, staffing, ordinances, regulations, rules and/or statutory authority;
  
5. A summary of all pollutant analytical results for influent, effluent, sludge and any toxicity or bioassay data from the wastewater treatment facility. The summary shall include a comparison of influent sampling results versus threshold inhibitory concentrations for the Wastewater Treatment System and effluent sampling results versus water quality standards. Such a comparison shall be based on the sampling program described in the paragraph below or any similar sampling program described in this Permit.

At a minimum, annual sampling and analysis of the influent and effluent of the Wastewater Treatment Plant shall be conducted for the following pollutants:

- |                    |                   |
|--------------------|-------------------|
| a.) Total Cadmium  | f.) Total Nickel  |
| b.) Total Chromium | g.) Total Silver  |
| c.) Total Copper   | h.) Total Zinc    |
| d.) Total Lead     | i.) Total Cyanide |
| e.) Total Mercury  | j.) Total Arsenic |

The sampling program shall consist of one 24-hour flow-proportioned composite and at least one grab sample that is representative of the flows received by the POTW. The composite shall consist of hourly flow-proportioned grab samples taken over a 24-hour period if the sample is collected manually or shall consist of a minimum of 48 samples collected at 30 minute intervals if an automated sampler is used. Cyanide shall be taken as a grab sample during the same period as the composite sample. Sampling and preservation shall be consistent with 40 CFR Part 136.

6. A detailed description of all interference and pass-through that occurred during the past year;
7. A thorough description of all investigations into interference and pass-through during the past year;
8. A description of monitoring, sewer inspections and evaluations which were done during the past year to detect interference and pass-through, specifying parameters and frequencies;
9. A description of actions being taken to reduce the incidence of significant violations by significant industrial users; and,
10. The date of the latest adoption of local limits and an indication as to whether or not the permittee is under a State or Federal compliance schedule that includes steps to be taken to revise local limits.

NPDES PART II STANDARD CONDITIONS  
(January, 2007)

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NPDES PART II STANDARD CONDITIONS  
(January, 2007)

PART II. A. GENERAL REQUIREMENTS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

- a. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirements.
- b. The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any of such sections in a permit issued under Section 402, or any requirement imposed in a pretreatment program approved under Section 402 (a)(3) or 402 (b)(8) of the CWA is subject to a civil penalty not to exceed \$25,000 per day for each violation. Any person who negligently violates such requirements is subject to a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than 1 year, or both. Any person who knowingly violates such requirements is subject to a fine of not less than \$5,000 nor more than \$50,000 per day of violation, or by imprisonment for not more than 3 years, or both.
- c. Any person may be assessed an administrative penalty by the Administrator for violating Section 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA. Administrative penalties for Class I violations are not to exceed \$10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed \$25,000. Penalties for Class II violations are not to exceed \$10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed \$125,000.

Note: See 40 CFR §122.41(a)(2) for complete “Duty to Comply” regulations.

2. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or notifications of planned changes or anticipated noncompliance does not stay any permit condition.

3. Duty to Provide Information

The permittee shall furnish to the Regional Administrator, within a reasonable time, any information which the Regional Administrator may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Regional Administrator, upon request, copies of records required to be kept by this permit.

NPDES PART II STANDARD CONDITIONS  
(January, 2007)

4. Reopener Clause

The Regional Administrator reserves the right to make appropriate revisions to this permit in order to establish any appropriate effluent limitations, schedules of compliance, or other provisions which may be authorized under the CWA in order to bring all discharges into compliance with the CWA.

For any permit issued to a treatment works treating domestic sewage (including “sludge-only facilities”), the Regional Administrator or Director shall include a reopener clause to incorporate any applicable standard for sewage sludge use or disposal promulgated under Section 405 (d) of the CWA. The Regional Administrator or Director may promptly modify or revoke and reissue any permit containing the reopener clause required by this paragraph if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or contains a pollutant or practice not limited in the permit.

Federal regulations pertaining to permit modification, revocation and reissuance, and termination are found at 40 CFR §122.62, 122.63, 122.64, and 124.5.

5. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from responsibilities, liabilities or penalties to which the permittee is or may be subject under Section 311 of the CWA, or Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA).

6. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges.

7. Confidentiality of Information

- a. In accordance with 40 CFR Part 2, any information submitted to EPA pursuant to these regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submissions, by stamping the words “confidential business information” on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2 (Public Information).
- b. Claims of confidentiality for the following information will be denied:
  - (1) The name and address of any permit applicant or permittee;
  - (2) Permit applications, permits, and effluent data as defined in 40 CFR §2.302(a)(2).
- c. Information required by NPDES application forms provided by the Regional Administrator under 40 CFR §122.21 may not be claimed confidential. This includes information submitted on the forms themselves and any attachments used to supply information required by the forms.

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8. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after its expiration date, the permittee must apply for and obtain a new permit. The permittee shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Regional Administrator. (The Regional Administrator shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

9. State Authorities

Nothing in Part 122, 123, or 124 precludes more stringent State regulation of any activity covered by these regulations, whether or not under an approved State program.

10. Other Laws

The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights, nor does it relieve the permittee of its obligation to comply with any other applicable Federal, State, or local laws and regulations.

PART II. B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of storm water pollution prevention plans. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Need to Halt or Reduce Not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

4. Bypass

a. Definitions

- (1) *Bypass* means the intentional diversion of waste streams from any portion of a treatment facility.

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- (2) *Severe property damage* means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can be reasonably expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

### b. Bypass not exceeding limitations

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provision of Paragraphs B.4.c. and 4.d. of this section.

### c. Notice

- (1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.
- (2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph D.1.e. of this part (Twenty-four hour reporting).

### d. Prohibition of bypass

Bypass is prohibited, and the Regional Administrator may take enforcement action against a permittee for bypass, unless:

- (1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- (2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and
- (3)
  - i) The permittee submitted notices as required under Paragraph 4.c. of this section.
  - ii) The Regional Administrator may approve an anticipated bypass, after considering its adverse effects, if the Regional Administrator determines that it will meet the three conditions listed above in paragraph 4.d. of this section.

## 5. Upset

- a. Definition. *Upset* means an exceptional incident in which there is an unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
- b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph B.5.c. of this section are met. No determination made during

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administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

- c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
  - (1) An upset occurred and that the permittee can identify the cause(s) of the upset;
  - (2) The permitted facility was at the time being properly operated;
  - (3) The permittee submitted notice of the upset as required in paragraphs D.1.a. and 1.e. (Twenty-four hour notice); and
  - (4) The permittee complied with any remedial measures required under B.3. above.
- d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

### PART II. C. MONITORING REQUIREMENTS

#### 1. Monitoring and Records

- a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
- b. Except for records for monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application except for the information concerning storm water discharges which must be retained for a total of 6 years. This retention period may be extended by request of the Regional Administrator at any time.
- c. Records of monitoring information shall include:
  - (1) The date, exact place, and time of sampling or measurements;
  - (2) The individual(s) who performed the sampling or measurements;
  - (3) The date(s) analyses were performed;
  - (4) The individual(s) who performed the analyses;
  - (5) The analytical techniques or methods used; and
  - (6) The results of such analyses.
- d. Monitoring results must be conducted according to test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, unless other test procedures have been specified in the permit.
- e. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000, or by

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imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

### 2. Inspection and Entry

The permittee shall allow the Regional Administrator or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

- a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
- d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location.

## PART II. D. REPORTING REQUIREMENTS

### 1. Reporting Requirements

- a. **Planned Changes.** The permittee shall give notice to the Regional Administrator as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is only required when:
  - (1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR§122.29(b); or
  - (2) The alteration or addition could significantly change the nature or increase the quantities of the pollutants discharged. This notification applies to pollutants which are subject neither to the effluent limitations in the permit, nor to the notification requirements at 40 CFR§122.42(a)(1).
  - (3) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition or change may justify the application of permit conditions different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.
- b. **Anticipated noncompliance.** The permittee shall give advance notice to the Regional Administrator of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- c. **Transfers.** This permit is not transferable to any person except after notice to the Regional Administrator. The Regional Administrator may require modification or revocation and reissuance of the permit to change the name of the permittee and

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incorporate such other requirements as may be necessary under the CWA. (See 40 CFR Part 122.61; in some cases, modification or revocation and reissuance is mandatory.)

- d. Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this permit.
- (1) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices.
  - (2) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of the monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.
  - (3) Calculations for all limitations which require averaging or measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.
- e. Twenty-four hour reporting.
- (1) The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances.  
  
A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
  - (2) The following shall be included as information which must be reported within 24 hours under this paragraph.
    - (a) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR §122.41(g).)
    - (b) Any upset which exceeds any effluent limitation in the permit.
    - (c) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Regional Administrator in the permit to be reported within 24 hours. (See 40 CFR §122.44(g).)
  - (3) The Regional Administrator may waive the written report on a case-by-case basis for reports under Paragraph D.1.e. if the oral report has been received within 24 hours.

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- f. Compliance Schedules. Reports of compliance or noncompliance with, any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.
- g. Other noncompliance. The permittee shall report all instances of noncompliance not reported under Paragraphs D.1.d., D.1.e., and D.1.f. of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in Paragraph D.1.e. of this section.
- h. Other information. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Administrator, it shall promptly submit such facts or information.

2. Signatory Requirement

- a. All applications, reports, or information submitted to the Regional Administrator shall be signed and certified. (See 40 CFR §122.22)
- b. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than 2 years per violation, or by both.

3. Availability of Reports.

Except for data determined to be confidential under Paragraph A.8. above, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Regional Administrator. As required by the CWA, effluent data shall not be considered confidential. Knowingly making any false statements on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the CWA.

PART II. E. DEFINITIONS AND ABBREVIATIONS

1. Definitions for Individual NPDES Permits including Storm Water Requirements

*Administrator* means the Administrator of the United States Environmental Protection Agency, or an authorized representative.

*Applicable standards and limitations* means all, State, interstate, and Federal standards and limitations to which a “discharge”, a “sewage sludge use or disposal practice”, or a related activity is subject to, including “effluent limitations”, water quality standards, standards of performance, toxic effluent standards or prohibitions, “best management practices”, pretreatment standards, and “standards for sewage sludge use and disposal” under Sections 301, 302, 303, 304, 306, 307, 308, 403, and 405 of the CWA.

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*Application* means the EPA standard national forms for applying for a permit, including any additions, revisions, or modifications to the forms; or forms approved by EPA for use in “approved States”, including any approved modifications or revisions.

*Average* means the arithmetic mean of values taken at the frequency required for each parameter over the specified period. For total and/or fecal coliforms and Escherichia coli, the average shall be the geometric mean.

*Average monthly discharge limitation* means the highest allowable average of “daily discharges” over a calendar month calculated as the sum of all “daily discharges” measured during a calendar month divided by the number of “daily discharges” measured during that month.

*Average weekly discharge limitation* means the highest allowable average of “daily discharges” measured during the calendar week divided by the number of “daily discharges” measured during the week.

*Best Management Practices (BMPs)* means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of “waters of the United States.” BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

*Best Professional Judgment (BPJ)* means a case-by-case determination of Best Practicable Treatment (BPT), Best Available Treatment (BAT), or other appropriate technology-based standard based on an evaluation of the available technology to achieve a particular pollutant reduction and other factors set forth in 40 CFR §125.3 (d).

*Coal Pile Runoff* means the rainfall runoff from or through any coal storage pile.

*Composite Sample* means a sample consisting of a minimum of eight grab samples of equal volume collected at equal intervals during a 24-hour period (or lesser period as specified in the section on Monitoring and Reporting) and combined proportional to flow, or a sample consisting of the same number of grab samples, or greater, collected proportionally to flow over that same time period.

*Construction Activities* - The following definitions apply to construction activities:

- (a) Commencement of Construction is the initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.
- (b) Dedicated portable asphalt plant is a portable asphalt plant located on or contiguous to a construction site and that provides asphalt only to the construction site that the plant is located on or adjacent to. The term dedicated portable asphalt plant does not include facilities that are subject to the asphalt emulsion effluent limitation guideline at 40 CFR Part 443.
- (c) Dedicated portable concrete plant is a portable concrete plant located on or contiguous to a construction site and that provides concrete only to the construction site that the plant is located on or adjacent to.

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- (d) Final Stabilization means that all soil disturbing activities at the site have been complete, and that a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.
- (e) Runoff coefficient means the fraction of total rainfall that will appear at the conveyance as runoff.

*Contiguous zone* means the entire zone established by the United States under Article 24 of the Convention on the Territorial Sea and the Contiguous Zone.

*Continuous discharge* means a “discharge” which occurs without interruption throughout the operating hours of the facility except for infrequent shutdowns for maintenance, process changes, or similar activities.

*CWA* means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended by Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, and Pub. L. 97-117; 33 USC §§1251 et seq.

*Daily Discharge* means the discharge of a pollutant measured during the calendar day or any other 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the “daily discharge” is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the “daily discharge” is calculated as the average measurement of the pollutant over the day.

*Director* normally means the person authorized to sign NPDES permits by EPA or the State or an authorized representative. Conversely, it also could mean the Regional Administrator or the State Director as the context requires.

*Discharge Monitoring Report Form (DMR)* means the EPA standard national form, including any subsequent additions, revisions, or modifications for the reporting of self-monitoring results by permittees. DMRs must be used by “approved States” as well as by EPA. EPA will supply DMRs to any approved State upon request. The EPA national forms may be modified to substitute the State Agency name, address, logo, and other similar information, as appropriate, in place of EPA’s.

*Discharge of a pollutant* means:

- (a) Any addition of any “pollutant” or combination of pollutants to “waters of the United States” from any “point source”, or
- (b) Any addition of any pollutant or combination of pollutants to the waters of the “contiguous zone” or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation (See “Point Source” definition).

This definition includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead

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to a treatment works; and discharges through pipes, sewers, or other conveyances leading into privately owned treatment works.

This term does not include an addition of pollutants by any “indirect discharger.”

*Effluent limitation* means any restriction imposed by the Regional Administrator on quantities, discharge rates, and concentrations of “pollutants” which are “discharged” from “point sources” into “waters of the United States”, the waters of the “contiguous zone”, or the ocean.

*Effluent limitation guidelines* means a regulation published by the Administrator under Section 304(b) of CWA to adopt or revise “effluent limitations”.

*EPA* means the United States “Environmental Protection Agency”.

*Flow-weighted composite sample* means a composite sample consisting of a mixture of aliquots where the volume of each aliquot is proportional to the flow rate of the discharge.

*Grab Sample* – An individual sample collected in a period of less than 15 minutes.

*Hazardous Substance* means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the CWA.

*Indirect Discharger* means a non-domestic discharger introducing pollutants to a publicly owned treatment works.

*Interference* means a discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

- (a) Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and
- (b) Therefore is a cause of a violation of any requirement of the POTW’s NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act (CWA), the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resources Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of the SDWA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection Research and Sanctuaries Act.

*Landfill* means an area of land or an excavation in which wastes are placed for permanent disposal, and which is not a land application unit, surface impoundment, injection well, or waste pile.

*Land application unit* means an area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for treatment or disposal.

*Large and Medium municipal separate storm sewer system* means all municipal separate storm sewers that are either: (i) located in an incorporated place (city) with a population of 100,000 or more as determined by the latest Decennial Census by the Bureau of Census (these cities are listed in Appendices F and 40 CFR Part 122); or (ii) located in the counties with unincorporated urbanized

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populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships, or towns within such counties (these counties are listed in Appendices H and I of 40 CFR 122); or (iii) owned or operated by a municipality other than those described in Paragraph (i) or (ii) and that are designated by the Regional Administrator as part of the large or medium municipal separate storm sewer system.

*Maximum daily discharge limitation* means the highest allowable “daily discharge” concentration that occurs only during a normal day (24-hour duration).

*Maximum daily discharge limitation (as defined for the Steam Electric Power Plants only) when applied to Total Residual Chlorine (TRC) or Total Residual Oxidant (TRO)* is defined as “maximum concentration” or “Instantaneous Maximum Concentration” during the two hours of a chlorination cycle (or fraction thereof) prescribed in the Steam Electric Guidelines, 40 CFR Part 423. These three synonymous terms all mean “a value that shall not be exceeded” during the two-hour chlorination cycle. This interpretation differs from the specified NPDES Permit requirement, 40 CFR § 122.2, where the two terms of “Maximum Daily Discharge” and “Average Daily Discharge” concentrations are specifically limited to the daily (24-hour duration) values.

*Municipality* means a city, town, borough, county, parish, district, association, or other public body created by or under State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribe organization, or a designated and approved management agency under Section 208 of the CWA.

*National Pollutant Discharge Elimination System* means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of the CWA. The term includes an “approved program”.

*New Discharger* means any building, structure, facility, or installation:

- (a) From which there is or may be a “discharge of pollutants”;
- (b) That did not commence the “discharge of pollutants” at a particular “site” prior to August 13, 1979;
- (c) Which is not a “new source”; and
- (d) Which has never received a finally effective NPDES permit for discharges at that “site”.

This definition includes an “indirect discharger” which commences discharging into “waters of the United States” after August 13, 1979. It also includes any existing mobile point source (other than an offshore or coastal oil and gas exploratory drilling rig or a coastal oil and gas exploratory drilling rig or a coastal oil and gas developmental drilling rig) such as a seafood processing rig, seafood processing vessel, or aggregate plant, that begins discharging at a “site” for which it does not have a permit; and any offshore rig or coastal mobile oil and gas exploratory drilling rig or coastal mobile oil and gas developmental drilling rig that commences the discharge of pollutants after August 13, 1979, at a “site” under EPA’s permitting jurisdiction for which it is not covered by an individual or general permit and which is located in an area determined by the Regional Administrator in the issuance of a final permit to be in an area of biological concern. In determining whether an area is an area of biological concern, the Regional Administrator shall consider the factors specified in 40 CFR §§125.122 (a) (1) through (10).

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An offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig will be considered a “new discharger” only for the duration of its discharge in an area of biological concern.

*New source* means any building, structure, facility, or installation from which there is or may be a “discharge of pollutants”, the construction of which commenced:

- (a) After promulgation of standards of performance under Section 306 of CWA which are applicable to such source, or
- (b) After proposal of standards of performance in accordance with Section 306 of CWA which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 within 120 days of their proposal.

*NPDES* means “National Pollutant Discharge Elimination System”.

*Owner or operator* means the owner or operator of any “facility or activity” subject to regulation under the NPDES programs.

*Pass through* means a Discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW’s NPDES permit (including an increase in the magnitude or duration of a violation).

*Permit* means an authorization, license, or equivalent control document issued by EPA or an “approved” State.

*Person* means an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof.

*Point Source* means any discernible, confined, and discrete conveyance, including but not limited to any pipe ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff (see 40 CFR §122.2).

*Pollutant* means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. §§2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. It does not mean:

- (a) Sewage from vessels; or
- (b) Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well is used either to facilitate production or for disposal purposes is approved by the authority of the State in which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water resources.

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*Primary industry category* means any industry category listed in the NRDC settlement agreement (Natural Resources Defense Council et al. v. Train, 8 E.R.C. 2120 (D.D.C. 1976), modified 12 E.R.C. 1833 (D. D.C. 1979)); also listed in Appendix A of 40 CFR Part 122.

*Privately owned treatment works* means any device or system which is (a) used to treat wastes from any facility whose operation is not the operator of the treatment works or (b) not a “POTW”.

*Process wastewater* means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

*Publicly Owned Treatment Works (POTW)* means any facility or system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of a liquid nature which is owned by a “State” or “municipality”.

This definition includes sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.

*Regional Administrator* means the Regional Administrator, EPA, Region I, Boston, Massachusetts.

*Secondary Industry Category* means any industry which is not a “primary industry category”.

*Section 313 water priority chemical* means a chemical or chemical category which:

- (1) is listed at 40 CFR §372.65 pursuant to Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) (also known as Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986);
- (2) is present at or above threshold levels at a facility subject to EPCRA Section 313 reporting requirements; and
- (3) satisfies at least one of the following criteria:
  - (i) are listed in Appendix D of 40 CFR Part 122 on either Table II (organic priority pollutants), Table III (certain metals, cyanides, and phenols), or Table V (certain toxic pollutants and hazardous substances);
  - (ii) are listed as a hazardous substance pursuant to Section 311(b)(2)(A) of the CWA at 40 CFR §116.4; or
  - (iii) are pollutants for which EPA has published acute or chronic water quality criteria.

*Septage* means the liquid and solid material pumped from a septic tank, cesspool, or similar domestic sewage treatment system, or a holding tank when the system is cleaned or maintained.

*Sewage Sludge* means any solid, semisolid, or liquid residue removed during the treatment of municipal wastewater or domestic sewage. Sewage sludge includes, but is not limited to, solids removed during primary, secondary, or advanced wastewater treatment, scum, septage, portable toilet pumpings, Type III Marine Sanitation Device pumpings (33 CFR Part 159), and sewage sludge products. Sewage sludge does not include grit or screenings, or ash generated during the incineration of sewage sludge.

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*Sewage sludge use or disposal practice* means the collection, storage, treatment, transportation, processing, monitoring, use, or disposal of sewage sludge.

*Significant materials* includes, but is not limited to: raw materials, fuels, materials such as solvents, detergents, and plastic pellets, raw materials used in food processing or production, hazardous substance designated under section 101(14) of CERCLA, any chemical the facility is required to report pursuant to EPCRA Section 313, fertilizers, pesticides, and waste products such as ashes, slag, and sludge that have the potential to be released with storm water discharges.

*Significant spills* includes, but is not limited to, releases of oil or hazardous substances in excess of reportable quantities under Section 311 of the CWA (see 40 CFR §110.10 and §117.21) or Section 102 of CERCLA (see 40 CFR § 302.4).

*Sludge-only facility* means any “treatment works treating domestic sewage” whose methods of sewage sludge use or disposal are subject to regulations promulgated pursuant to Section 405(d) of the CWA, and is required to obtain a permit under 40 CFR §122.1(b)(3).

*State* means any of the 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, the Trust Territory of the Pacific Islands.

*Storm Water* means storm water runoff, snow melt runoff, and surface runoff and drainage.

*Storm water discharge associated with industrial activity* means the discharge from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. (See 40 CFR §122.26 (b)(14) for specifics of this definition.

*Time-weighted composite* means a composite sample consisting of a mixture of equal volume aliquots collected at a constant time interval.

*Toxic pollutants* means any pollutant listed as toxic under Section 307 (a)(1) or, in the case of “sludge use or disposal practices” any pollutant identified in regulations implementing Section 405(d) of the CWA.

*Treatment works treating domestic sewage* means a POTW or any other sewage sludge or wastewater treatment devices or systems, regardless of ownership (including federal facilities), used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated for the disposal of sewage sludge. This definition does not include septic tanks or similar devices.

For purposes of this definition, “domestic sewage” includes waste and wastewater from humans or household operations that are discharged to or otherwise enter a treatment works. In States where there is no approved State sludge management program under Section 405(f) of the CWA, the Regional Administrator may designate any person subject to the standards for sewage sludge use and disposal in 40 CFR Part 503 as a “treatment works treating domestic sewage”, where he or she finds that there is a potential for adverse effects on public health and the environment from poor sludge quality or poor sludge handling, use or disposal practices, or where he or she finds that such designation is necessary to ensure that such person is in compliance with 40 CFR Part 503.

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*Waste Pile* means any non-containerized accumulation of solid, non-flowing waste that is used for treatment or storage.

*Waters of the United States* means:

- (a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of tide;
- (b) All interstate waters, including interstate “wetlands”;
- (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, “wetlands”, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:
  - (1) Which are or could be used by interstate or foreign travelers for recreational or other purpose;
  - (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
  - (3) Which are used or could be used for industrial purposes by industries in interstate commerce;
- (d) All impoundments of waters otherwise defined as waters of the United States under this definition;
- (e) Tributaries of waters identified in Paragraphs (a) through (d) of this definition;
- (f) The territorial sea; and
- (g) “Wetlands” adjacent to waters (other than waters that are themselves wetlands) identified in Paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA (other than cooling ponds as defined in 40 CFR §423.11(m) which also meet the criteria of this definition) are not waters of the United States.

*Wetlands* means those areas that are inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

*Whole Effluent Toxicity (WET)* means the aggregate toxic effect of an effluent measured directly by a toxicity test. (See Abbreviations Section, following, for additional information.)

2. Definitions for NPDES Permit Sludge Use and Disposal Requirements.

*Active sewage sludge unit* is a sewage sludge unit that has not closed.

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*Aerobic Digestion* is the biochemical decomposition of organic matter in sewage sludge into carbon dioxide and water by microorganisms in the presence of air.

*Agricultural Land* is land on which a food crop, a feed crop, or a fiber crop is grown. This includes range land and land used as pasture.

*Agronomic rate* is the whole sludge application rate (dry weight basis) designed:

- (1) To provide the amount of nitrogen needed by the food crop, feed crop, fiber crop, cover crop, or vegetation grown on the land; and
- (2) To minimize the amount of nitrogen in the sewage sludge that passes below the root zone of the crop or vegetation grown on the land to the ground water.

*Air pollution control device* is one or more processes used to treat the exit gas from a sewage sludge incinerator stack.

*Anaerobic digestion* is the biochemical decomposition of organic matter in sewage sludge into methane gas and carbon dioxide by microorganisms in the absence of air.

*Annual pollutant loading rate* is the maximum amount of a pollutant that can be applied to a unit area of land during a 365 day period.

*Annual whole sludge application rate* is the maximum amount of sewage sludge (dry weight basis) that can be applied to a unit area of land during a 365 day period.

*Apply sewage sludge or sewage sludge applied to the land* means land application of sewage sludge.

*Aquifer* is a geologic formation, group of geologic formations, or a portion of a geologic formation capable of yielding ground water to wells or springs.

*Auxiliary fuel* is fuel used to augment the fuel value of sewage sludge. This includes, but is not limited to, natural gas, fuel oil, coal, gas generated during anaerobic digestion of sewage sludge, and municipal solid waste (not to exceed 30 percent of the dry weight of the sewage sludge and auxiliary fuel together). Hazardous wastes are not auxiliary fuel.

*Base flood* is a flood that has a one percent chance of occurring in any given year (i.e. a flood with a magnitude equaled once in 100 years).

*Bulk sewage sludge* is sewage sludge that is not sold or given away in a bag or other container for application to the land.

*Contaminate an aquifer* means to introduce a substance that causes the maximum contaminant level for nitrate in 40 CFR §141.11 to be exceeded in ground water or that causes the existing concentration of nitrate in the ground water to increase when the existing concentration of nitrate in the ground water exceeds the maximum contaminant level for nitrate in 40 CFR §141.11.

*Class I sludge management facility* is any publicly owned treatment works (POTW), as defined in 40 CFR §501.2, required to have an approved pretreatment program under 40 CFR §403.8 (a) (including any POTW located in a state that has elected to assume local program responsibilities pursuant to 40 CFR §403.10 (e) and any treatment works treating domestic sewage, as defined in 40 CFR § 122.2,

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classified as a Class I sludge management facility by the EPA Regional Administrator, or, in the case of approved state programs, the Regional Administrator in conjunction with the State Director, because of the potential for sewage sludge use or disposal practice to affect public health and the environment adversely.

*Control efficiency* is the mass of a pollutant in the sewage sludge fed to an incinerator minus the mass of that pollutant in the exit gas from the incinerator stack divided by the mass of the pollutant in the sewage sludge fed to the incinerator.

*Cover* is soil or other material used to cover sewage sludge placed on an active sewage sludge unit.

*Cover crop* is a small grain crop, such as oats, wheat, or barley, not grown for harvest.

*Cumulative pollutant loading rate* is the maximum amount of inorganic pollutant that can be applied to an area of land.

*Density of microorganisms* is the number of microorganisms per unit mass of total solids (dry weight) in the sewage sludge.

*Dispersion factor* is the ratio of the increase in the ground level ambient air concentration for a pollutant at or beyond the property line of the site where the sewage sludge incinerator is located to the mass emission rate for the pollutant from the incinerator stack.

*Displacement* is the relative movement of any two sides of a fault measured in any direction.

*Domestic septage* is either liquid or solid material removed from a septic tank, cesspool, portable toilet, Type III marine sanitation device, or similar treatment works that receives only domestic sewage. Domestic septage does not include liquid or solid material removed from a septic tank, cesspool, or similar treatment works that receives either commercial wastewater or industrial wastewater and does not include grease removed from a grease trap at a restaurant.

*Domestic sewage* is waste and wastewater from humans or household operations that is discharged to or otherwise enters a treatment works.

*Dry weight basis* means calculated on the basis of having been dried at 105 degrees Celsius (°C) until reaching a constant mass (i.e. essentially 100 percent solids content).

*Fault* is a fracture or zone of fractures in any materials along which strata on one side are displaced with respect to the strata on the other side.

*Feed crops* are crops produced primarily for consumption by animals.

*Fiber crops* are crops such as flax and cotton.

*Final cover* is the last layer of soil or other material placed on a sewage sludge unit at closure.

*Fluidized bed incinerator* is an enclosed device in which organic matter and inorganic matter in sewage sludge are combusted in a bed of particles suspended in the combustion chamber gas.

*Food crops* are crops consumed by humans. These include, but are not limited to, fruits, vegetables, and tobacco.

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*Forest* is a tract of land thick with trees and underbrush.

*Ground water* is water below the land surface in the saturated zone.

*Holocene time* is the most recent epoch of the Quaternary period, extending from the end of the Pleistocene epoch to the present.

*Hourly average* is the arithmetic mean of all the measurements taken during an hour. At least two measurements must be taken during the hour.

*Incineration* is the combustion of organic matter and inorganic matter in sewage sludge by high temperatures in an enclosed device.

*Industrial wastewater* is wastewater generated in a commercial or industrial process.

*Land application* is the spraying or spreading of sewage sludge onto the land surface; the injection of sewage sludge below the land surface; or the incorporation of sewage sludge into the soil so that the sewage sludge can either condition the soil or fertilize crops or vegetation grown in the soil.

*Land with a high potential for public exposure* is land that the public uses frequently. This includes, but is not limited to, a public contact site and reclamation site located in a populated area (e.g., a construction site located in a city).

*Land with low potential for public exposure* is land that the public uses infrequently. This includes, but is not limited to, agricultural land, forest and a reclamation site located in an unpopulated area (e.g., a strip mine located in a rural area).

*Leachate collection system* is a system or device installed immediately above a liner that is designed, constructed, maintained, and operated to collect and remove leachate from a sewage sludge unit.

*Liner* is soil or synthetic material that has a hydraulic conductivity of  $1 \times 10^{-7}$  centimeters per second or less.

*Lower explosive limit for methane gas* is the lowest percentage of methane gas in air, by volume, that propagates a flame at 25 degrees Celsius and atmospheric pressure.

*Monthly average (Incineration)* is the arithmetic mean of the hourly averages for the hours a sewage sludge incinerator operates during the month.

*Monthly average (Land Application)* is the arithmetic mean of all measurements taken during the month.

*Municipality* means a city, town, borough, county, parish, district, association, or other public body (including an intermunicipal agency of two or more of the foregoing entities) created by or under State law; an Indian tribe or an authorized Indian tribal organization having jurisdiction over sewage sludge management; or a designated and approved management agency under section 208 of the CWA, as amended. The definition includes a special district created under state law, such as a water district, sewer district, sanitary district, utility district, drainage district, or similar entity, or an integrated waste management facility as defined in section 201 (e) of the CWA, as amended, that has as one of its principal responsibilities the treatment, transport, use or disposal of sewage sludge.

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*Other container* is either an open or closed receptacle. This includes, but is not limited to, a bucket, a box, a carton, and a vehicle or trailer with a load capacity of one metric ton or less.

*Pasture* is land on which animals feed directly on feed crops such as legumes, grasses, grain stubble, or stover.

*Pathogenic organisms* are disease-causing organisms. These include, but are not limited to, certain bacteria, protozoa, viruses, and viable helminth ova.

*Permitting authority* is either EPA or a State with an EPA-approved sludge management program.

*Person* is an individual, association, partnership, corporation, municipality, State or Federal Agency, or an agent or employee thereof.

*Person who prepares sewage sludge* is either the person who generates sewage sludge during the treatment of domestic sewage in a treatment works or the person who derives a material from sewage sludge.

*pH* means the logarithm of the reciprocal of the hydrogen ion concentration; a measure of the acidity or alkalinity of a liquid or solid material.

*Place sewage sludge or sewage sludge placed* means disposal of sewage sludge on a surface disposal site.

*Pollutant (as defined in sludge disposal requirements)* is an organic substance, an inorganic substance, a combination of organic and inorganic substances, or pathogenic organism that, after discharge and upon exposure, ingestion, inhalation, or assimilation into an organism either directly from the environment or indirectly by ingestion through the food chain, could on the basis on information available to the Administrator of EPA, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunction in reproduction) or physical deformations in either organisms or offspring of the organisms.

*Pollutant limit (for sludge disposal requirements)* is a numerical value that describes the amount of a pollutant allowed per unit amount of sewage sludge (e.g., milligrams per kilogram of total solids); the amount of pollutant that can be applied to a unit of land (e.g., kilograms per hectare); or the volume of the material that can be applied to the land (e.g., gallons per acre).

*Public contact site* is a land with a high potential for contact by the public. This includes, but is not limited to, public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.

*Qualified ground water scientist* is an individual with a baccalaureate or post-graduate degree in the natural sciences or engineering who has sufficient training and experience in ground water hydrology and related fields, as may be demonstrated by State registration, professional certification, or completion of accredited university programs, to make sound professional judgments regarding ground water monitoring, pollutant fate and transport, and corrective action.

*Range land* is open land with indigenous vegetation.

*Reclamation site* is drastically disturbed land that is reclaimed using sewage sludge. This includes, but is not limited to, strip mines and construction sites.

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*Risk specific concentration* is the allowable increase in the average daily ground level ambient air concentration for a pollutant from the incineration of sewage sludge at or beyond the property line of a site where the sewage sludge incinerator is located.

*Runoff* is rainwater, leachate, or other liquid that drains overland on any part of a land surface and runs off the land surface.

*Seismic impact zone* is an area that has 10 percent or greater probability that the horizontal ground level acceleration to the rock in the area exceeds 0.10 gravity once in 250 years.

*Sewage sludge* is a solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to: domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in treatment works.

*Sewage sludge feed rate* is either the average daily amount of sewage sludge fired in all sewage sludge incinerators within the property line of the site where the sewage sludge incinerators are located for the number of days in a 365 day period that each sewage sludge incinerator operates, or the average daily design capacity for all sewage sludge incinerators within the property line of the site where the sewage sludge incinerators are located.

*Sewage sludge incinerator* is an enclosed device in which only sewage sludge and auxiliary fuel are fired.

*Sewage sludge unit* is land on which only sewage sludge is placed for final disposal. This does not include land on which sewage sludge is either stored or treated. Land does not include waters of the United States, as defined in 40 CFR §122.2.

*Sewage sludge unit boundary* is the outermost perimeter of an active sewage sludge unit.

*Specific oxygen uptake rate (SOUR)* is the mass of oxygen consumed per unit time per unit mass of total solids (dry weight basis) in sewage sludge.

*Stack height* is the difference between the elevation of the top of a sewage sludge incinerator stack and the elevation of the ground at the base of the stack when the difference is equal to or less than 65 meters. When the difference is greater than 65 meters, stack height is the creditable stack height determined in accordance with 40 CFR §51.100 (ii).

*State* is one of the United States of America, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Trust Territory of the Pacific Islands, the Commonwealth of the Northern Mariana Islands, and an Indian tribe eligible for treatment as a State pursuant to regulations promulgated under the authority of section 518(e) of the CWA.

*Store or storage of sewage sludge* is the placement of sewage sludge on land on which the sewage sludge remains for two years or less. This does not include the placement of sewage sludge on land for treatment.

*Surface disposal site* is an area of land that contains one or more active sewage sludge units.

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*Total hydrocarbons* means the organic compounds in the exit gas from a sewage sludge incinerator stack measured using a flame ionization detection instrument referenced to propane.

*Total solids* are the materials in sewage sludge that remain as residue when the sewage sludge is dried at 103 to 105 degrees Celsius.

*Treat or treatment of sewage sludge* is the preparation of sewage sludge for final use or disposal. This includes, but is not limited to, thickening, stabilization, and dewatering of sewage sludge. This does not include storage of sewage sludge.

*Treatment works* is either a federally owned, publicly owned, or privately owned device or system used to treat (including recycle and reclaim) either domestic sewage or a combination of domestic sewage and industrial waste of a liquid nature.

*Unstable area* is land subject to natural or human-induced forces that may damage the structural components of an active sewage sludge unit. This includes, but is not limited to, land on which the soils are subject to mass movement.

*Unstabilized solids* are organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.

*Vector attraction* is the characteristic of sewage sludge that attracts rodents, flies, mosquitoes, or other organisms capable of transporting infectious agents.

*Volatile solids* is the amount of the total solids in sewage sludge lost when the sewage sludge is combusted at 550 degrees Celsius in the presence of excess air.

*Wet electrostatic precipitator* is an air pollution control device that uses both electrical forces and water to remove pollutants in the exit gas from a sewage sludge incinerator stack.

*Wet scrubber* is an air pollution control device that uses water to remove pollutants in the exit gas from a sewage sludge incinerator stack.

3. Commonly Used Abbreviations

BOD	Five-day biochemical oxygen demand unless otherwise specified
CBOD	Carbonaceous BOD
CFS	Cubic feet per second
COD	Chemical oxygen demand
Chlorine	
Cl <sub>2</sub>	Total residual chlorine
TRC	Total residual chlorine which is a combination of free available chlorine (FAC, see below) and combined chlorine (chloramines, etc.)

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TRO	Total residual chlorine in marine waters where halogen compounds are present
FAC	Free available chlorine (aqueous molecular chlorine, hypochlorous acid, and hypochlorite ion)
Coliform	
Coliform, Fecal	Total fecal coliform bacteria
Coliform, Total	Total coliform bacteria
Cont. (Continuous)	Continuous recording of the parameter being monitored, i.e. flow, temperature, pH, etc.
Cu. M/day or M <sup>3</sup> /day	Cubic meters per day
DO	Dissolved oxygen
kg/day	Kilograms per day
lbs/day	Pounds per day
mg/l	Milligram(s) per liter
ml/l	Milliliters per liter
MGD	Million gallons per day
Nitrogen	
Total N	Total nitrogen
NH <sub>3</sub> -N	Ammonia nitrogen as nitrogen
NO <sub>3</sub> -N	Nitrate as nitrogen
NO <sub>2</sub> -N	Nitrite as nitrogen
NO <sub>3</sub> -NO <sub>2</sub>	Combined nitrate and nitrite nitrogen as nitrogen
TKN	Total Kjeldahl nitrogen as nitrogen
Oil & Grease	Freon extractable material
PCB	Polychlorinated biphenyl
pH	A measure of the hydrogen ion concentration. A measure of the acidity or alkalinity of a liquid or material
Surfactant	Surface-active agent

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Temp. °C	Temperature in degrees Centigrade
Temp. °F	Temperature in degrees Fahrenheit
TOC	Total organic carbon
Total P	Total phosphorus
TSS or NFR	Total suspended solids or total nonfilterable residue
Turb. or Turbidity	Turbidity measured by the Nephelometric Method (NTU)
ug/l	Microgram(s) per liter
WET	“Whole effluent toxicity” is the total effect of an effluent measured directly with a toxicity test.
C-NOEC	“Chronic (Long-term Exposure Test) – No Observed Effect Concentration”. The highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specified time of observation.
A-NOEC	“Acute (Short-term Exposure Test) – No Observed Effect Concentration” (see C-NOEC definition).
LC <sub>50</sub>	LC <sub>50</sub> is the concentration of a sample that causes mortality of 50% of the test population at a specific time of observation. The LC <sub>50</sub> = 100% is defined as a sample of undiluted effluent.
ZID	Zone of Initial Dilution means the region of initial mixing surrounding or adjacent to the end of the outfall pipe or diffuser ports.

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NEW ENGLAND - REGION I  
5 POST OFFICE SQUARE, SUITE 100  
BOSTON, MASSACHUSETTS 02109**

FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)  
PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES

NPDES PERMIT NO: **MA0101010**

PUBLIC NOTICE START AND END DATES: February 20, 2015 – April 20, 2015

NAME AND ADDRESS OF APPLICANT:

**City of Brockton  
City Hall, 45 School Street  
Brockton, Massachusetts 02401**

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

**Brockton Advanced Water Reclamation Facility  
303 Oak Hill Way  
Brockton, Massachusetts 02301**

The municipalities of Abington and Whitman are co-permittees for specific activities required by the permit, as set forth in Section VIII of this Fact Sheet and Sections 1.B and 1.C. of the Draft Permit. The responsible municipal departments are:

**Town of Abington  
Sewer Department  
350 Summer Street  
Abington, MA 02351**

**Town of Whitman  
Department of Public Works  
100 Essex Street, P.O. Box 454  
Whitman, MA 02382**

RECEIVING WATER: **Salisbury Plain River** (Taunton River Basin - MA62)

CLASSIFICATION: **Class B**

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**Fact Sheet Attachments:**

Figure 1. Location Map

Figure 2. Flow Process Diagram

Table 1. DMR data

Table 12. Metals Effluent Data and Criteria Calculations

Attachment A. LOADEST analysis description

Attachment B. Nitrogen Attenuation

Attachment C. EPA Region 1 NPDES Permitting Approach for Publicly Owned Treatment Works that Include Municipal Satellite Sewage Collection Systems

## **I. PROPOSED ACTION, TYPE OF FACILITY AND DISCHARGE LOCATION**

The above named applicant has applied to the U.S. Environmental Protection Agency for the re-issuance of its National Pollutant Discharge Elimination System (NPDES) permit to discharge into the designated receiving water. The current permit was issued on May 11, 2005. The permit expired in 2010 and has been administratively continued pursuant to 40 C.F.R. 122.6.

The Brockton Advanced Water Reclamation Facility is an advanced secondary treatment plant that was originally constructed in 1963 with a design flow of 18 mgd. The facility has received a major upgrade since the issuance of the current permit to provide for improved nutrient removal, maintain permit compliance and extend facility life. According to the City this upgrade has increased the capacity of the facility to 20.49 mgd (See Application form 2A, Section A.6.), although the City has not received authorization for increased flow pursuant to the state antidegradation policy (see discussion in Section VI.B.1 below). The treatment plant discharges to the Salisbury Plain River (Outfall 001). See Figure 1 (attached).

The treatment plant and the Brockton collection system are owned by the City of Brockton and are currently operated under contract by Veolia Water. Veolia submitted the application for renewal of the NPDES permit as required by 40 CFR §122.22(b). The City shall be the sole permittee for the treatment plant consistent with other contract operated publicly owned treatment works (POTWs). The Towns of Abington and Whitman shall be co-permittees for their collection systems that discharge to the Brockton AWRF.

## **II. DESCRIPTION OF DISCHARGE**

Quantitative descriptions of the discharge in terms of significant effluent parameters based on recent discharge monitoring reports (DMRs) for January 2011 through December 2013 may be found in Fact Sheet Table 1 (attached).

## **III. RECEIVING WATER DESCRIPTION**

The receiving water, Salisbury Plain River, is classified as a Class B warm water fishery in the Massachusetts Surface Water Quality Standards, 314 CMR 4.05(4)(a). Class B waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. The waters should have consistently good aesthetic value.

A warm water fishery is defined in the Massachusetts Surface Water Quality Standards (314 CMR 4.02) as water in which the maximum mean monthly temperature generally exceeds 20° Celsius during the summer months and are not capable of supporting a year-round population of cold water stenothermal aquatic life.

The Salisbury Plain River is an effluent dominated stream. The Brockton AWRF makes up over 95% of the flow in the Salisbury Plain River under 7Q10 conditions, and effluent-dominated conditions extend downstream through the Matfield (the Brockton AWRF flow is 50-90% of

mean August flows at the former USGS streamgage site on the Matfield River in Bridgewater) and into the Taunton River in dry weather.

The segment of the Salisbury Plain River to which the Brockton AWRP discharges (segment 62-06) is listed in the Massachusetts 303(d) list for impairments to aquatic macroinvertebrate bioassessments, excess algal growth, fecal coliform (TDML completed), dissolved oxygen, total phosphorus, taste and odor, turbidity and debris/floatables/trash (denoted 'not a pollutant'; no TMDL required). The Salisbury Plain River joins Beaver Brook in East Bridgewater to form the Matfield River (segment 62-32), which is also listed in the 303(d) list (impairments due to aquatic macroinvertebrate bioassessments, excess algal growth, fecal coliform (TDML completed), dissolved oxygen, total phosphorus, taste and odor). The Matfield River joins with the Town River in Bridgewater to become the Taunton River. The Taunton River from Bridgewater to the Route 24 bridge in Taunton is listed as attaining the Aquatic Life use, with other uses not assessed. The Taunton River is a designated Wild and Scenic River under 16 U.S.C. 1271-1287, and is the longest undammed river in Massachusetts. The Taunton River flows into Mount Hope Bay at Fall River; estuarine conditions extend upstream as far as the City of Taunton.

#### **IV. LIMITATIONS AND CONDITIONS**

The effluent limitations and monitoring requirements may be found in the draft NPDES permit.

#### **V. PERMIT BASIS: STATUTORY AND REGULATORY AUTHORITY**

The Clean Water Act (the "CWA") prohibits the discharge of pollutants to waters of the United States without an NPDES permit unless such a discharge is otherwise authorized by the Act. A NPDES permit is used to implement technology-based and water quality-based effluent limitations as well as other requirements including monitoring and reporting. This draft NPDES permit was developed in accordance with statutory and regulatory authorities established pursuant to the Act. The regulations governing the NPDES program are found in 40 CFR Parts 122, 124 and 125.

Under Section 301(b)(1)(B) of the CWA, POTWs are required to achieve technology-based effluent limitations based upon secondary treatment. The secondary treatment requirements are set forth in 40 CFR Part 133 and define secondary treatment as an effluent achieving specific limitations for biochemical oxygen demand (BOD<sub>5</sub>), total suspended solids (TSS), and pH.

Under Section 301(b)(1)(C) of the CWA, discharges are also subject to effluent limitations based on water quality standards. The MA SWQS, 314 CMR 4.00, include requirements for the regulation and control of toxic constituents and also require that EPA criteria, established pursuant to Section 304(a) of the CWA, shall be used unless a site specific criteria is established. Massachusetts regulations similarly require that its permits contain limitations which are adequate to assure the attainment and maintenance of the water quality standards of the receiving waters as assigned in the MA SWQS, 314 CMR 4.00. See 314 CMR 3.11(3). Additionally, under 40 CFR §122.44 (d)(1)(i), "[l]imitations must control all pollutants or pollutant parameters which the Director determines are or may be discharged at a level which will cause, have the

reasonable potential to cause, or contribute to an excursion above any state water quality standard."

## VI. EXPLANATION OF THE PERMIT'S EFFLUENT LIMITATIONS

### A. TREATMENT PROCESS AND COLLECTION SYSTEM DESCRIPTION

The Brockton AWRP is engaged in the collection and treatment of municipal wastewater, including industrial wastewater from nine non-categorical significant industrial users and six categorical industrial users (including sheet metal manufacturers and finishers and medical and pharmaceutical users). The facility provides advanced treatment, filtration and UV disinfection. Figure 2. The wastewater treatment processes are as follows:

At the headworks wastewater is screened and passes through grit removal, then flows to the influent pump station and a distribution structure to one of four primary clarification tanks. After settling in the primary clarifiers, the flow continues on through one of two parallel treatment trains. The North train consists of four aeration basins and three secondary clarifiers. The South treatment train consists of three aeration basins and three secondary clarifiers. Both sets of aeration basins were upgraded as of 2010 to a biological nitrogen removal system with chemical phosphorus removal. Flows to the south treatment train pass through the primary effluent lift station; in extremely high flow conditions primary effluent is also on occasion diverted directly from the primary effluent lift station to UV disinfection (secondary bypass; see restrictions on such practices at Draft Permit Part II.B.4). After settling in the secondary clarifiers, the flow is recombined at the Filter Building, containing four AquaDiamond cloth media filters and two sand filters. The effluent then flows to UV disinfection, and passes over a reaeration cascade to the Salisbury Plain River. Sludge is dewatered by centrifuge and incinerated on site.

The treatment process described reflects a treatment plant upgrade project completed in 2010. The upgrade included conversion of the existing aeration basins into a biological nitrogen removal system; replacement of sludge collection equipment in the primary clarifiers; expansion of the existing effluent filter capacity; installation of chemical systems to achieve chemical phosphorus removal; replacement of the sodium hypochlorite disinfection system with a new ultraviolet (UV) disinfection system; new electrical feed/distribution systems; and odor control systems.

The sewage collection system is entirely separate sanitary sewer. Table 2 below shows the number of households served in each municipality.

**Table 2. Communities served**

<b>Town</b>	<b>Population served by AWRP</b>
Brockton	90,000
Abington	10,000 (est)
Whitman	10,000 (est)

The collection system has historically been subject to extremely high wet weather flows due to infiltration and inflow (I/I) to the system. The City of Brockton has engaged in an extensive

program to remove I/I from its system, and has been successful in reducing both peak flows and average annual flows to the AWRF.

The collection system and facility upgrade were performed pursuant to a judicial consent decree issued in September 2006; the work required under that decree has been completed and the judicial decree was terminated in March 2013. EPA also issued an administrative order in April 2006 relating to violations of the copper limit and establishing an interim limit of 20 ug/l. That order remains in effect but will be superseded by the new copper limits in the reissued permit (see Copper section below).

## B. DERIVATION OF EFFLUENT LIMITATIONS

### 1. Effluent Flow

The draft permit contains a new 12 month rolling average effluent flow limit of 18.0 MGD. Sewage treatment plant discharge is encompassed within the definition of “pollutant” and is subject to regulation under the CWA. The CWA defines “pollutant” to mean, *inter alia*, “municipal . . . waste” and “sewage . . . discharged into water.” 33 U.S.C. § 1362(6). The limitation on sewage effluent flow is within EPA’s authority to condition a permit in order to carry out the objectives of the Act. *See* CWA §§ Sections 402(a)(2) and 301(b)(1)(C); 40 C.F.R. §§ 122.4(a) and (d); 122.43 and 122.44(d). Regulating the quantity of pollutants in the discharge through a restriction on the quantity of wastewater effluent is consistent with the overall structure and purposes of the CWA.

The draft permit does not include any changes from the current permit that reflect the increased capacity of the upgraded facility (20.5 mgd) requested by the City of Brockton and others, as EPA has determined that such an increase cannot be authorized at this time consistent with the Massachusetts Antidegradation regulations (314 CMR 4.04) and procedures. The basis for this determination is set forth below.

#### a. Background

As discussed above, the Brockton AWRF was designed to treat an average effluent flow of 18 MGD.<sup>1</sup> This design flow is reflected in the current permit in the calculation of mass load limits for CBOD<sub>5</sub>, TSS and ammonia. The Brockton AWRF has not had a numeric flow limit in its current or previous permits; EPA notes that this is different from standard practice in Massachusetts NPDES permits, which generally contain an effluent flow limit based on a facility’s design flow, implemented as a 12 month rolling average limit. While not containing a numeric flow limit, the current permit did contain restrictions on increased wastewater flow to the facility, with a condition stating that:

Flows originating from the Towns of Abington and Whitman are limited each to an annual average of 1 MGD. The Co-permittees shall not accept flow from any new sewer connections in other communities although, EPA and MA DEP may allow such a tie-in through a permit modification, if an abutting Town with a completed Comprehensive

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<sup>1</sup> This is the facility’s design flow in its upgrade in the 1970s. See Response to Comments, MA0101010 (2005), City of Brockton comment #1.

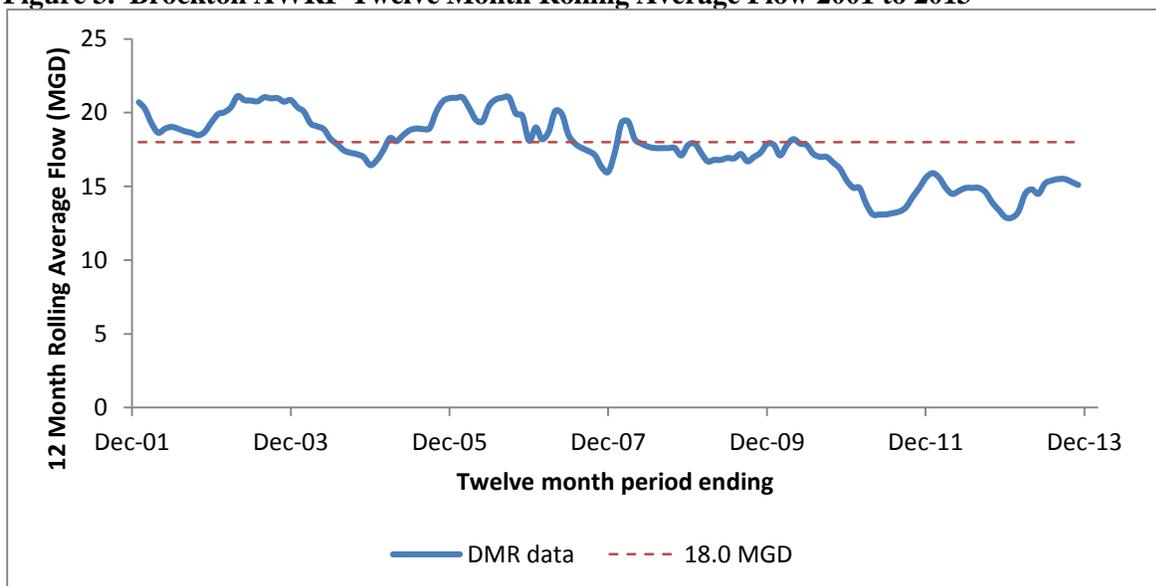
Wastewater Management Plan (CWMP) demonstrates that a tie-in to Abington or Whitman is an appropriate option.

Increased flows from facilities currently connected directly to the Brockton sewer system shall be offset, to the extent feasible, in order to minimize any net increase in flow to the WWTP.

Final Permit MA0101010, Part I.A.1 n.3 (2005). Historically (until 2007) the Brockton AWRF has operated for lengthy periods above the 18.0 MGD design flow. See Figure 3.

The upgraded AWRF was designed with an increased capacity of 20.49 MGD and construction was completed in 2010. In the meantime the City was engaged in an intensive effort to reduce infiltration and inflow (I/I) in its system pursuant to a judicial consent order with EPA. This effort has dramatically reduced peak and average flows from the Brockton AWRF. Figure 3.

**Figure 3. Brockton AWRF Twelve Month Rolling Average Flow 2001 to 2013**



In conjunction with the reissuance of its NPDES permit the City of Brockton has requested that the new permit reflect the upgraded capacity of the facility of 20.49 MGD, most recently by letter of June 7, 2014. EPA has also received requests for increases to Brockton's permitted flows from other entities, including elected officials, and seeking consideration of the expansion of Brockton's role as a regional facility for wastewater disposal for surrounding communities. EPA has also received correspondence opposing such an increase. This Fact Sheet represents EPA's formal consideration of the proposed flow increase and EPA invites comment from all interested entities on its determination here.

The City's plan to upgrade with an increased capacity was raised in connection with the issuance of the current permit in 2005, and EPA's response at that time was as follows:

We understand that the City's current plans are to construct upgraded facilities with a

design flow of 20.48 MGD. However, the facilities plan which proposes this design flow increase has not yet been approved by MADEP, it has not been shown that Class B water quality standards can be attained at the increased flow, nor has the state conducted a review which demonstrates that this increase can be authorized under its antidegradation policy.

An increase in design flow at the facility may be reflected in the City's permit after their facility's plan has been approved, it has been shown that the Class B water quality standards can be achieved at the increased flow and that the increased discharge can be authorized under the MADEP antidegradation policy. Limitations in the permit based upon a dilution factor [metals] would need to be adjusted to reflect the change in dilution at the low flow conditions.

Response to Comments, MA0101010 (2005), Response #1. As the state has approved the facility plan and the upgrade construction is complete, EPA proceeds to assess antidegradation and the meeting of water quality standards below.

In making this assessment, EPA acknowledges the extensive effort that has gone into evaluating wastewater treatment alternatives in this region, including the *Upper Taunton River Regional Wastewater Evaluation* (CDM Smith/Weston & Sampson, 2012) and the MEPA process for construction of the upgraded Brockton AWRP (EEA #13109). EPA also recognizes the needs expressed by a number of surrounding communities. Indeed in moving forward on permit issuance EPA intends to provide some relief to communities who now or in the future have agreements with the City of Brockton by removing the strict limitation on additional connections that is included in the current permit, so that some of the capacity that has opened up through removal of I/I, even within the original 18 mgd, can be allocated.

However, as indicated in the Response to Comments to the previous, jointly-issued EPA and MassDEP permit for this facility, an antidegradation review and assessment of the meeting of water quality standards under an increased flow is needed before the permit can reflect any increase in design flow from 18 to 20.5 mgd, and the regional studies and MEPA processes do not themselves satisfy these requirements. An increase in design flow is itself an increase in pollutants to the receiving water,<sup>2</sup> as well as having potential for increasing loading of individual pollutants, some of which (pharmaceuticals, endocrine disrupters, etc.) have not been monitored. Therefore any increase in flow requires antidegradation review to ensure that all increases are within the assimilative capacity of the river or otherwise authorized pursuant to the antidegradation regulations, both at the point of discharge and further downstream. In addition, EPA's regulations require that no permit be issued unless conditions can be imposed that ensure compliance with water quality standards. These requirements are addressed in turn below.

#### b. Antidegradation Review

In accordance with 40 CFR 131.12, the State Water Quality Standards at 314 CMR 4.04 include

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<sup>2</sup> Effluent flows are treated sewage and are expressly included in the definition of "pollutant" under the Clean Water Act and EPA's regulations. 33 U.S.C. 1362(6) ("The term 'pollutant' means . . . sewage . . . discharged into water.").

an antidegradation provision that apply to all new or increased point source discharges to waters of the Commonwealth requiring a permit under 314 CMR 3.00. The Implementation Procedures ensures that existing instream water uses are protected and maintained, and water quality levels in high quality waters are protected and maintained. MassDEP published a policy document, titled *Implementation Procedures for the Antidegradation Provisions of the Massachusetts Surface Water Quality Standards (Implementation Procedures)* on October 21, 2009 that explains how the antidegradation provisions of the State standards are implemented. The Implementation Procedures establish a technology-based review for all discharges, and four tiers of additional review dependent on the quality of the receiving water.

i. Background

As context for the antidegradation analysis, it should be noted that the receiving water, and the overall Taunton River watershed, are extremely effluent dominated even under the historic design flow conditions. Under 7Q10 conditions (the specified conditions for antidegradation analysis, *see Implementation Procedures* at 2), the natural baseflow in the Salisbury Plain River is only 2% of the 18.0 mgd historic design flow. Even under less severe conditions the plant effluent flows dwarf the natural flows in the Salisbury Plain River; a USGS Streamstats estimate of median August flows just upstream of the discharge is 3.35 cfs (2.2 mgd), only 12% of the 18 mgd design flow.

These effluent dominated conditions persist well downstream of the point of discharge. The Salisbury Plain River flows 2.3 miles into the Matfield River, then 6.7 miles to the confluence with the Town River to form the Taunton River. The natural 7Q10 flow in the lowermost Matfield River is calculated as 2.27 cfs (1.5 mgd), only 8% of Brockton's 18 mgd historic design flow. Even in the Taunton River, a designated Wild and Scenic River and the longest undammed river in the northeast, the majority of flow in low flow conditions is Brockton effluent. The Town River 7Q10 is about 2.7 cfs (1.7 mgd), so that the uppermost Taunton River is only 3.2 MGD at 7Q10 flows. Even as far downstream as the City of Taunton the river is more than 50% effluent under 7Q10 conditions (at that point including other effluent sources in addition to Brockton). See Taunton WWTP Fact Sheet, MA0100897.

The 2.5 mgd additional flow sought by the City of Brockton is by itself larger than the 7Q10 or median August flows at the point of discharge, and larger than the 7Q10 flows in either the Matfield or the Town Rivers at the point where they join to form the Taunton River. A 2.5 mgd discharge would itself constitute a "Major" NPDES discharge if it were a separate facility; indeed it would be the third largest POTW discharging to the freshwater Taunton River or its tributaries (behind Brockton and Mansfield (3.14 mgd) and larger than Middleborough (2.16 mgd) and Bridgewater (1.44 mgd)).

i. Technology-based review

As stated in the Implementation Procedures, the "minimum technology based treatment requirements for publicly owned treatment works (POTWs) consist of secondary treatment and applicable limitations and standards promulgated by EPA" and "[t]he technology based review for POTWs subject to the SRF process generally is satisfied upon completion of the Comprehensive Wastewater Management Plan or Project Evaluation Report, public participation

and Department approval.” Section II. While the City of Brockton has not completed a CWMP, in this case the treatment provided for the increased flow is far better than required to achieve secondary treatment requirements and construction proceeded through the SRF process, so the technology-based requirements of the Implementation Procedures have been satisfied.

ii. Tier Review

The primary focus of each Tier review is listed below:

Tier 1	review to protect existing uses in all waters
Tier 2	review to protect and maintain existing water quality in high quality waters
Tier 2 1/2	review to protect outstanding resource waters
Tier 3	review to protect special resource waters

As can be seen, each tier is associated with a specific receiving water designation. The Implementation Procedures require greater protection for higher value waters.

New or increased discharges to special resource waters (Tier 3) are essentially prohibited.

New or increased discharges to outstanding resource waters (Tier 2 ½ ) are allowed only where the discharge is determined, among other things, to be for the express purpose and intent of maintaining or enhancing the resource for its designated use.

New or increased discharges to high quality waters (Tier 2) are limited to increases that are insignificant, or are authorized pursuant to 314 CMR 4.04(5). These waters must be protected and maintained for their existing water quality. Authorization of a significant increase requires a demonstration that:

1. The discharge is necessary to accommodate important economic or social development in the area in which the waters are located<sup>3</sup>;
2. No less environmentally damaging alternative site for the activity, receptor for the disposal, or method of elimination of the discharge is reasonably available or feasible;
3. To the maximum extent feasible, the discharge and activity are designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices; and
4. The discharge will not impair existing water uses and will not result in a level of water quality less than that specified for the Class.

314 CMR 4.04(5)(a).

New or increased discharges to all other waters (Tier 1) may be allowed, providing that existing uses, and water quality to protect those uses, is maintained and protected.

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<sup>3</sup> For POTWs, if the proposed discharge is subject to the Clean Water State Revolving Fund (SRF) process, is in accordance with a Comprehensive Wastewater Management Plan (CWMP) or Project Evaluation Report, has been subject to public participation, and is approved by the State, then it is presumed that the requirement of economic or social importance has been met.

The first step then, is to determine the receiving water(s) classification and condition in order to determine the applicable tier(s). As noted above, the receiving water, Salisbury Plain River, is classified as a Class B warm water surface water and is an effluent dominated stream (the Brockton AWRF makes up over 95% of the flow in the Salisbury Plain River under 7Q10 conditions).

The segment of the Salisbury Plain River to which the Brockton AWRF discharges (segment 62-06) is listed in the Massachusetts 303(d) list for impairments to aquatic macroinvertebrate bioassessments, excess algal growth, fecal coliform (TDML completed), dissolved oxygen, total phosphorus, taste and odor, turbidity and debris/floatables/trash (denoted ‘not a pollutant’; no TMDL required). The Salisbury Plain River joins Beaver Brook in East Bridgewater to form the Matfield River (segment 62-32), which is also listed in the 303(d) list (impairments due to aquatic macroinvertebrate bioassessments, excess algal growth, fecal coliform (TDML completed), dissolved oxygen, total phosphorus, taste and odor). The Matfield River joins with the Town River in Bridgewater to become the Taunton River.

Given the extensive and comprehensive impairments, in general the Salisbury Plain and Matfield Rivers would not be considered “high quality” waters, although there may be individual pollutants for which high quality status could be demonstrated in these segments on a case by case basis (antidegradation analysis is performed on a criteria by criteria basis). These segments would therefore be subject to Tier 1 review. The Taunton River segments downstream of the Matfield (confluence with the Town River) have been assessed as achieving aquatic life uses, are not listed on the Massachusetts 303(d) list, and are likely to be high quality for many pollutants (Tier 2 review). There are no Outstanding or Special Resource Waters downstream of the discharge, so Tiers 2½ and 3 do not apply.

To determine which criteria and pollutants are subject to Tier 1 review, EPA reviewed the available water quality data for the receiving water as well as the water quality based limits in the current permit, which are based on previous analyses indicating that such limits are necessary to meet water quality standards in the receiving water (no additional assimilative capacity is available). A listing of identified Tier 1 pollutants is shown in Table 3.

**Table 3. Tier 1 Pollutants in Salisbury Plain River**

<b>Tier 1 Pollutant</b>	<b>Basis for Tier 1 Determination</b>
BOD	Permit limit, Wasteload Allocation, 303(d) listed DO impairment
TSS	Permit limit, Wasteload Allocation
DO	Permit limit, 303(d) listed DO impairment
Bacteria	Permit limit, 303(d) listed impairment
Ammonia	Permit limit, Wasteload Allocation, 303(d) listed DO impairment
Phosphorus	Permit limit, 303(d) listed impairment
Copper	Permit limit

For these criteria the receiving water no longer has any assimilative capacity for an increase in pollutant loads. In order to protect existing uses with respect to these pollutants, no increase in pollutant loads to the receiving water is permitted. This means that for pollutants with existing

numeric permit limits, the existing load limit is maintained even if an increase in flow is authorized. The City of Brockton's request for an increase in load limits to reflect the increase in facility capacity is therefore denied.

The Salisbury Plain and Matfield Rivers have also been determined to have impairments that are not specifically linked to an individual pollutant. Both waters are listed on the 303(d) list with impairments to "taste and odor" and to "aquatic macroinvertebrate bioassessments." Both of these impairments are in connection with narrative criteria within the Massachusetts narrative water quality standards. [taste and odor] 314 CMR 4.05(5)(b) provides:

Bottom Pollutants or Alterations. All surface waters shall be free from pollutants in concentrations or combinations or from alterations that adversely affect the physical or chemical nature of the bottom, interfere with the propagation of fish or shellfish, or adversely affect populations of non-mobile or sessile benthic organisms.

While these impairments are based on data prior to the facility upgrade, receiving water monitoring performed by the City's consultants as part of a Supplemental Environmental Project in 2010 indicated that impaired benthic macroinvertebrate conditions continue subsequent to the improvements in the facility (and are present both upstream and downstream of the facility).

One of the most striking aspects of the biological samples from the Salisbury Plain River and Matfield River is the near absence of pollution intolerant macroinvertebrate taxa, especially the EPT taxa.

- The caddisflies *Cheumatopsyche* sp. and *Hydropsyche betteni* were the only EPT taxa consistently found, yet these are among the most tolerant stream caddisflies and are often used as indicators of organic pollution rather than indicators of clean water.
- No stoneflies and only two individual mayflies were detected, despite the presence of suitable habitat in four of the survey sites.

Macroinvertebrate samples were comprised of a low diversity of habitat generalists that are tolerant of a range of conditions in warmwater streams.

CDM, *Brockton Receiving Water Assessment SEP* (2011). The impairment downstream of the facility appears to be directly related to the discharge; while impaired conditions exist both upstream and downstream of the facility, the nature of the macroinvertebrate population changes in a manner consistent with the nutrient-enriched discharge of the Brockton AWRF.<sup>4</sup>

The same study included a Habitat Assessment, Macrophyte Assessment and Fish Population Survey, concluding that "[t]he biological communities in the Salisbury Plain River and Matfield River are mostly comprised of habitat generalists"; that "[o]nly seven fish species were detected; tessellated darters comprised 86 percent (184 of 214) of all fish captured" and that "[h]abitat conditions are suboptimal or poor throughout these rivers". *Id.* at 12.

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<sup>4</sup> As summarized in the *Brockton Receiving Water Assessment SEP* at 12-13: "There seems to be a general trend from a highly polluted, fungal/bacterial-dominated river upstream of Brockton's AWRF to a more typical nutrient-rich, algal-dominated river downstream. It is difficult to quantify the effects of Brockton's AWRF on biological communities because of the highly degraded state of the Salisbury Plain River upstream of the facility. A suitable upstream control does not exist."

While EPA hopes to address these downstream conditions at least in part with the imposition of more stringent limits on Total Phosphorus in this Draft Permit (see Section VI.B.5 of this Fact Sheet), it remains unclear whether healthy macroinvertebrate conditions can be achieved with this high (let alone a higher) a proportion of effluent in the receiving water. Therefore EPA cannot conclude on current information that increasing the volume of flow to this system can be assimilated consistent with antidegradation requirements.

## Tier 2

EPA must also consider whether the proposed increase is consistent with Tier 2 review, both for the immediate receiving water (for any parameters for which the stream is high quality) and downstream waters. The Taunton River downstream of the confluence of the Matfield and Town Rivers is listed as attaining the Aquatic Life use, with other uses not assessed. The Taunton River is the longest undammed river in Massachusetts. It is a designated Wild and Scenic River under 16 U.S.C. §§ 1271-1287, which was enacted to preserve outstanding rivers (although the Act does not prescribe specific regulatory implications under the Clean Water Act):

It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations.

*Wild & Scenic Rivers Act* (October 2, 1968).

As discussed above, the first question with respect to Tier 2 review is whether the increased discharge is “insignificant.” As set forth in the Massachusetts Antidegradation Implementation Procedures:

Insignificant discharges - Except where the Department determines that in order to adequately protect water quality a particular discharge of the type described below requires an antidegradation authorization under 314 CMR 4.04(5), the Department has determined that the following discharges are insignificant:

- a) Temporary discharges – [not applicable] . . .; and
- b) New or increased loadings of a pollutant that use < 10% of the unused loading capacity of a receiving water - a new or increased discharge of a pollutant that would use less than 10% of the available assimilative capacity of the receiving water for that pollutant.

In general monitoring data for the Taunton mainstem has indicated Tier 2 status for the commonly monitored parameters (phosphorus, ammonia, TSS, DO, copper) but there is a limited amount of recent data available to perform a current assessment of the assimilative capacity of the receiving water. However, as the City’s request for an increase in load limits is not being granted, no increase in loads will occur for such pollutants.

EPA also notes that the Salisbury Plain and Matfield Rivers suffer from impaired benthic

macroinvertebrate communities, and taste and odor impairments, that have not been linked to specific pollutants but appear to be related to the Brockton AWRF. The Taunton mainstem is currently high quality for these water quality standards, and it is difficult to assess the amount of assimilative capacity available given lack of clear evidence of the specific effluent components that are causing these impairments. However, in order to satisfy antidegradation requirements it must be demonstrated that the increased discharge of effluent uses less than 10% of the Taunton River's assimilative capacity, or this increase must be treated as a significant increase requiring a full authorization process.

A further concern is the range of emerging contaminants, including endocrine disrupters, pharmaceuticals, personal care products and other substances, known to be present in POTW effluent and receiving waters downstream of wastewater treatment facilities. See, e.g., EPA, *Occurrence of Contaminants of Emerging Concern in Wastewater from Nine Publicly Owned Treatment Works* (2009); USGS, *A Reconnaissance for Emerging Contaminants in the South Branch Potomac River, Cacapon River, and Williams River Basins, West Virginia, April-October*, USGS OFR 2006-1393 (2006). While there are no numeric water quality criteria for such pollutants to date, these pollutants are known to impact aquatic life<sup>5</sup> and are subject to state narrative water quality standards.<sup>6</sup> There is no data available for such contaminants for either the Brockton AWRF or the receiving water on which to base an analysis of assimilative capacity. In order for EPA to properly assess whether the proposed increase is "insignificant" EPA would require a detailed study of a range of emerging contaminants. See, e.g., Kipp, K. *An Investigation into the Extent and Biological Impacts of Endocrine Disrupting Chemical (EDCs) in a Highly Effluent-Dominated River in New England: Preliminary Results* (2011) <https://www.neiwpcc.org/ppcpconference/ppcp-docs/2011presentations/Session%204/4.2%20Kipp.pdf>

Even in the absence of more comprehensive data, EPA notes that on a qualitative level it is difficult to characterize the proposed increase in discharge as "insignificant". As noted above under 7Q10 conditions flow in the uppermost reach of the Taunton River is only 3.2 mgd,

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<sup>5</sup> Iwanowicz, et al., "Reproductive Health of Bass in the Potomac, USA Drainage: Part 1. Exploring the Effects of Proximity to Wastewater Treatment Plant Discharge," 28 *Env. Toxicology and Chemistry* 1072-1083 (2009); Kidd, et al., "Collapse of a fish population after exposure to synthetic estrogen," 104 *Proc. Nat'l Acad. Of Sciences* 8897-8901 (2007); Gagne, et al., "Effects of pharmaceutical products and municipal wastewaters on temperature-dependent mitochondrial electron transport activity in *Elliptio complanata* mussels," 143 *Comp. Biochem. And Physiol., Part C*, 388-393 (2006); Pait, A.S. and J.O. Nelson, *Endocrine Disruption in Fish: An Assessment of Recent Research and Results*. NOAA Tech Memo. NOS NCCOS CCMA 149 (2002).

<sup>6</sup> The MA SWQS require that "Discharges shall be limited or prohibited to protect existing uses and not interfere with the attainment of designated uses in downstream and adjacent segments. The Department will provide a reasonable margin of safety to account for any lack of knowledge concerning the relationship between the pollutants being discharged and their impact on water quality." 314 CMR 403(1)(a). Designated uses for these water are "Class B. These waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value." 314 C.M.R. 403(3)(b). The MA SWQS also state that "all surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife." 314 CMR 405(5)(e).

dwarfed by the current 18 mgd design flow of the Brockton AWRF and only slightly more than the proposed increase; if the proposed increase were a new facility it would be the third largest POTW discharge to the freshwater portion of the Taunton River. In this context EPA would encourage MassDEP to use its authority under the Antidegradation Implementation Procedures to require an authorization under 314 CMR 4.04(5) even if specific pollutant loads are not shown to use more than 10% of assimilative capacity.

Authorization under 314 CMR 4.04(5) requires a demonstration that:

1. The discharge is necessary to accommodate important economic or social development in the area in which the waters are located;
2. No less environmentally damaging alternative site for the activity, receptor for the disposal, or method of elimination of the discharge is reasonably available or feasible;
3. To the maximum extent feasible, the discharge and activity are designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices; and
4. The discharge will not impair existing water uses and will not result in a level of water quality less than that specified for the Class.

314 CMR 4.04(5)(a). Normally the requirement of “important economic or social development” is met through approval of a CWMP; as no CWMP has been completed or approved for the City of Brockton or its copermittees Abington or Whitman, this requirement would have to be met prior to authorization. Further, the City would have to show that there is no feasible alternative to the flow increase, not only for its own wastewater disposal but for any other community seeking to connect to the Brockton AWRF. No such showing has been made here.

EPA acknowledges that, as pointed out by the City, the upgraded capacity was subject to a certificate from the Massachusetts Executive Office of Environmental Affairs pursuant to the MEPA process in 2003. However, the MEPA process itself does not establish consistency with antidegradation requirements pursuant to the Massachusetts Antidegradation Implementation Procedures. Indeed, even if the full CWMP/SRF approval process were followed (not the case here as neither Brockton nor its current copermittees has a CWMP), that process is relevant to only one of the four requirements for antidegradation authorization, that of economic and social importance.<sup>7</sup> In addition the EOE certificate was issued based on design documents indicating that the facility’s existing flow had averaged 19.79 mgd from 1998 to 2002, *Design Memorandum W1-A* (July 2003), so that the upgraded facility was sized essentially to treat existing flows; a revised assessment of economic and social importance would be justified in light of the substantial reduction in flow achieved through the I/I mitigation work performed under the City’s consent decree which has reduced current flows well below the 18.0 mgd permitted flow.

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<sup>7</sup> The CWMP process does not, and is not designed to, establish the other three factors for authorization. For example, an antidegradation authorization for a significant lowering of water quality requires that “no less environmentally damaging alternative . . . is reasonably available and feasible”; this is a far different standard from the CWMP direction to select the alternative with “the greatest environmental and cost benefit.” See MassDEP, *Guide to Comprehensive Wastewater Management Planning* (1996) at 26.  
<http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/wwtrfpg.pdf>

c. Water Quality Standards

As discussed in section V of this Fact Sheet, NPDES permits are required to include limitations that ensure the meeting of water quality standards in the receiving water. Specifically, 40 C.F.R. 122.4 provides that “No permit may be issued . . . [w]hen the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States.”

In general these requirements are implemented through numeric permit limits calculated using a dilution factor for the receiving water under 7Q10 flow conditions. This approach is generally considered to address the critical conditions of maximum pollutant impact, where dilution of the discharge is at a minimum. Since at most times receiving water flow is well above the 7Q10, use of the 7Q10 as an assumed flow ensures that exceedances of the water quality criteria will be limited in duration and frequency as assumed in the calculation of the criteria (for example, chronic criteria reflect concentrations to be exceeded less than once every three years for a four day period), so that the limit is protective.

Facilities such as the Brockton AWWF, which have essentially no dilution by the receiving water for extended periods of time, represent a challenge in the context of setting water quality based limits. In essence, with a receiving water flow that is about 2% of the facility’s design flow at 7Q10, permit limits must be set that ensure that the discharge itself meets water quality standards. However, where the varying flow of the receiving water is not sufficient to ensure that critical pollutant concentrations are limited in duration and frequency, it is not always clear that average monthly and maximum daily permit limits will be sufficiently protective to meet water quality standards. For example, as discussed below the draft permit contains a permit limit of 100 ug/l total phosphorus to address eutrophication in the Salisbury Plain and Matfield Rivers, based on the Gold Book target that streams should not exceed 100 ug/l TP. For most facilities a permit limit based on that target will ensure that concentrations are well below 100 ug/l for most of the year, which should be sufficient to protect against eutrophication impacts. However for Brockton a 100 ug/l permit limit may result in stream concentrations of approximately the target concentration for long periods of the summer; it is unclear whether eutrophication impairments will be prevented under those circumstances of consistent and relatively high TP concentrations.

Therefore, EPA’s approach to permitting of the Brockton AWWF discharge includes reassessment of instream conditions as treatment has improved to determine the effectiveness of the permit limits and conditions. For example, in Brockton’s previous permit a TP limit of 0.2 mg/l was set; receiving water assessments performed by the City of Brockton’s consultants revealed continued impairments consistent with nutrient overenrichment downstream of the AWWF. Under the new permit Brockton will need to improve its nutrient reduction to achieve at most 100 ug/l TP; EPA expects to review receiving water conditions downstream of the AWWF to determine if that limit is sufficient to protect against eutrophication impacts from the discharge or if a more stringent limit is necessary; EPA will also consider any calibrated and verified water quality modeling of the system that may be completed for this system.<sup>8</sup> This assessment will not

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<sup>8</sup> EPA notes that USGS and MassDEP have performed some preliminary work on modelling loads in the upper Taunton River Basin, including calibrating a precipitation-runoff HSPF model, although it is not clear whether a calibrated and verified water quality model will be forthcoming as the project continues. See USGS, *Nutrient and Sediment Concentrations, Yields, and Loads in Impaired Streams and Rivers in the Taunton River Basin, Massachusetts, 1997–2008*, SIR 2012-5277 (2012).

be limited to nutrients; under such extreme effluent-dominated conditions there is potential for other pollutants, or the combined effects of multiple pollutants, to impact receiving water habitat and aquatic life that may not be captured by individual pollutant criteria.

In this context, when considering a flow increase EPA must also carefully consider the ability to issue a permit that ensures the meeting of water quality standards at an increased effluent flow up to 20.49 mgd. EPA notes that this is a significant increase in total flow; the increase alone is more than six times the 7Q10 flow in the Salisbury Plain River, and would itself be a major discharge and the third largest discharge on the Taunton River. Increasing the design flow will further increase the duration of conditions under which the Brockton AWRP represents the vast majority of receiving water flow, and increase the extent of the entire Taunton River system under which the AWRP is the majority of flow. Thus, until the evidence indicates that water quality standards can be met in the Salisbury Plain River under existing flows (which to date has not been the case), EPA will not authorize an even larger discharge to this receiving water.

#### d. Conclusion

For the reasons given above, the City of Brockton's request for an increase in permitted flow and load limits to reflect a 20.5 mgd flow is denied. A twelve month rolling average flow limit of 18.0 mgd is included in the Draft Permit.

EPA understands that the City wishes to pursue authorization of a flow increase. EPA therefore provides the following as guidance to the process by which a flow increase can be evaluated for purposes of further review and potential authorization.

1. Process to demonstrate meeting of water quality standards
  - a. Institute plant improvements to achieve new permit limits; plant improvements should be in place at least one year and preferably two to allow assimilation of receiving water to new conditions; and
  - b. Perform receiving stream evaluation similar to that performed in 2010 Receiving Water Assessment, but extending to sites in the Taunton River mainstem; and either
  - c. If results confirm the discharge is no longer contributing to water quality impairments, can request increase if consistent with antidegradation requirements (below); or
  - d. If results indicate discharge is contributing to water quality impairments, can
    - i. Propose plan with permit limits that will ensure discharge will not contribute to impairments at current and increased effluent flow; or
    - ii. Initiate water quality standards proceeding for variance or downgrade of receiving water classification, including Use Attainability Analysis and public process
2. Process to demonstrate meeting of Antidegradation requirements
  - a. Perform monitoring and evaluation of emerging contaminants, particularly endocrine disrupters, in effluent and in receiving water to

- determine concentration, loads and assimilative capacity (EPA is available to assist in defining scope of monitoring and evaluation); and
- b. Evaluate benthic macroinvertebrate and taste/odor conditions in impaired reaches and in Taunton River mainstem to determine extent of impairment and contributing pollutants and evaluate assimilative capacity in unimpaired reaches (may be best to wait until after plant improvements as in 1.b. above); and
  - c. Determine whether flow increase will result in loss of more than 10% assimilative capacity in any downstream reach. If it can be demonstrated that it does not, proceed to request flow increase; or
  - d. If increase cannot be demonstrated to be insignificant, proceed to antidegradation authorization proceeding under 314 CMR 4.04(5). Upon authorization pursuant to 314 CMR 4.04(5) (including “No less environmentally damaging alternative . . . is reasonably available or feasible” showing), can proceed to request flow increase.

EPA presumes that the City, MassDEP, and perhaps other regional entities will coordinate the work required to meet these requirements. EPA is available to provide technical assistance as necessary during this process. EPA notes that protection and improvement of baseflow conditions in the watershed is an important component of the assimilative capacity of the receiving water and downstream segments. EPA therefore encourages exploration of groundwater recharge opportunities in this process.

Finally, as the City has made substantial progress in addressing I/I issues and is operating below the 18.0 mgd flow limit, the specific limitation on additional flow from Abington, Whitman or other communities has been deleted from the permit. While the City of Brockton has discretion to allocate its available capacity as it deems appropriate, EPA encourages the City to ensure that it reserves capacity for its future needs, and encourages surrounding communities to utilize local recharge solutions to wastewater management needs where feasible, consistent with the *Massachusetts Water Policy* (2004) (<http://www.mass.gov/eea/waste-mgmt-recycling/water-resources/preserving-water-resources/massachusetts-water-policy-2004.html>)

## 2. Dilution

Water quality based limitations are established with the use of a calculated available dilution. Title 314 CMR 4.03(3)(a) requires that effluent dilution be calculated based on the receiving water 7Q10. The 7Q10 is the lowest observed mean river flow for 7 consecutive days, recorded over a 10 year recurrence interval. Additionally, the plant design flow is used to calculate available effluent dilution; permit limits are expressed in terms of mass as well as concentration to ensure that the assumptions of the dilution calculation are met.

The plant design flow used to calculate the dilution factor for the current permit was 18.0 mgd. The City in its application stated that the current design flow rate of the (upgraded) facility was 20.49 mgd, and requested by letter that the increased flow capacity be used in calculation of permit limits. Because such an increase would not be consistent with MassDEP’s antidegradation regulations (see discussion above), EPA has used 18.0 MGD in these calculations.

There is no stream gaging information available on the Salisbury Plain River. The prior permit calculated a 7Q10 based on the Wading River, stating that the Wading River is a near-by river with similar hydrologic characteristics. This produced an in-stream 7Q10 flow of 0.39 MGD that was used to determine the dilution factor. EPA has reviewed the available data for 7Q10 flows in this watershed and determined that this continues to be a reasonable value for 7Q10 flows.<sup>9</sup>

$Q_s = \text{In stream 7 day 10 year low flow (7Q10)} = 0.39 \text{ MGD}$   
 $\text{Dilution Factor} = (Q_s + Q_d) / Q_d = (0.39 + 18) / 18 = 1.02$

### 3. Conventional Pollutants

Carbonaceous Biochemical Oxygen Demand (CBOD<sub>5</sub>) – Limits for CBOD<sub>5</sub> and TSS are the same as in the current permit. These are water quality based limits that are more stringent than the secondary treatment requirements set forth at 40 CFR Part § 137.102(a)(4).

For May through October, the limits are an average monthly concentration of 5 mg/l, a weekly average concentration of 8 mg/l, and a maximum daily concentration of 15 mg/l. For November through April the limits are 15 mg/l average monthly, 25 mg/l average weekly, and 30 mg/l daily maximum. These were established by the MassDEP as a wasteload allocation. There were no violations of the CBOD<sub>5</sub> or TSS limits in the period January 2010 through December 2013. The average summer CBOD and TSS were 1.3 mg/l and 1.2 mg/l respectively. The monitoring frequency remains the same at 1/day.

The permit utilizes CBOD<sub>5</sub> as the measure of oxygen demand due to high nitrogenous oxygen demand in the effluent, as allowed under 40 CFR § 133.102(a)(4). The CBOD<sub>5</sub> test reduces the interference from nitrogenous compounds that would otherwise make accurate assessment of the organic (carbonaceous) oxygen demand impossible.

The permit also contains accompanying mass limitations that are based on the facility's approved design flow of 18.0 mgd. Average monthly and average weekly CBOD<sub>5</sub> and TSS mass limits (lbs per day) are consistent with 40 CFR §122.45(f).

#### CBOD<sub>5</sub> and TSS Mass Loading Calculations:

Calculations of maximum allowable loads for average monthly BOD<sub>5</sub> and TSS are based on the following equation:

$$L = C \times 18.0 \times 8.34$$

L = Maximum allowable load in lbs/day.

C = Maximum allowable effluent concentration for reporting period in mg/l.

Reporting periods are average monthly and weekly and daily maximum.

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<sup>9</sup> For comparison, an estimate of 7Q10 flow from the USGS StreamStats model, based on regression equations, yields a 7Q10 flow at the Brockton AWRP of 0.47 cfs or 0.3 mgd. This would result in a dilution factor of 1.02, the same as used in the current permit.

18.0 = Approved design flow of facility

8.34 = Factor to convert effluent concentration in mg/l and design flow in mgd to lbs/day.

(Concentration limit) [30] x 8.34 (Constant) x 18.0 (design flow) = 4,500 lb/day

(Concentration limit) [25] x 8.34 (Constant) x 18.0 (design flow) = 3,750 lb/day

(Concentration limit) [15] x 8.34 (Constant) x 18.0 (design flow) = 2,250 lb/day

(Concentration limit) [8] x 8.34 (Constant) x 18.0 (design flow) = 1,200 lb/day

(Concentration limit) [5] x 8.34 (Constant) x 18.0 (design flow) = 750 lb/day

Eighty-Five Percent (85%) BOD<sub>5</sub> and TSS Removal - the provisions of 40 CFR §133.102(a)(3) and (4), require that the 30 day average percent removal for CBOD<sub>5</sub> and TSS be not less than 85%. There were no violations of the CBOD<sub>5</sub> or TSS percent removal limits in the period January 2010 through December 2013. The average summer CBOD and TSS percent removal were 99% for both parameters.

pH - The draft permit includes pH limitations of a minimum of 6.5 standard units (s.u.) and maximum of 8.3 s.u. These pH limits are required as a condition of state certification and are protective of pH standards set forth at 314 CMR 4.05(4)(b)(3) for Class B waters, requiring that pH “[s]hall be in the range of 6.5 through 8.3 standard units and not more than 0.5 units outside of the natural background range.” There were no violations of the pH limits in the period January 2010 through December 2013. The range of pH measured was 6.5 to 7.5 s.u., which is within the range of upstream Salisbury Plain River pH values (6.5 to 7.6 s.u.) as reported in the 2001 Taunton River Water Quality Assessment Report. The monitoring frequency remains the same at 1/day.

#### Bacteria

Limitations for bacteria in the existing permit are based upon state water quality standards for Massachusetts. There were no violations of the fecal coliform limit in the period January 2010 through December 2013.

The limits are modified in the Draft Permit to reflect the *E. coli* criteria in the revisions to the MA SWQS, 314 CMR § 4.05(3)(b), approved by EPA in 2007. The monthly average limitation in the draft permit is 126 colony forming units (cfu) per 100 ml, and shall be expressed as a monthly geometric mean. The daily maximum limitation in the draft permit is 409 cfu/100 ml, which represents the 90<sup>th</sup> percentile of a lognormal distribution with a geometric mean equal to 126 cfu/100 ml. EPA, *1986 Ambient Water Quality for Bacteria*. These limitations are a State certification requirement and are consistent with EPA guidance recommending that no dilution be considered in establishing permit limits for discharges to rivers designated for primary contact recreation. *EPA Memorandum re: Initial Zones of Dilution for Bacteria in Rivers and Streams Designated for Primary Contact Recreation*, November 12, 2008. The monitoring frequency is maintained at five times per week.

#### 4. Dissolved Oxygen (DO) and Total Residual Chlorine

Dissolved Oxygen - The instantaneous minimum effluent DO limit of 6.0 mg/l or greater is

carried forward from the current permit. The limit ensures that DO levels depleted during wastewater treatment process are restored prior to discharge to the Salisbury Plain River. The limit is established to protect the DO minimum Water Quality Criteria of 5.0 mg/l for waters designated by the State as Class SB. There were no violations of the DO limit in the period January 2011 to December 2013.

Total Residual Chlorine (TRC) – The Brockton AWRf uses ultraviolet (UV) disinfection. TRC limit are included in the permit in the event that chlorine compounds are used in the treatment process. No monitoring is required in periods when no chlorine compounds are used, and no monitoring was reported in the January 2011 to December 2013 period.

For any period in which chlorine compounds are used, permit limits are in effect based on the instream chlorine criteria defined in *National Recommended Water Quality Criteria: 2002*, EPA 822R-02-047 (November 2002), as adopted by the MassDEP into the state water quality standards at 314 CMR 4.05(5)(e). The criteria establish that the total residual chlorine in the receiving water should not exceed 11 ug/l (chronic) and 19 ug/l (acute). The following is a water quality based calculation of chlorine limits:

Acute Chlorine Fresh Water Criteria = 19 ug/l

Chronic Chlorine Fresh Water Criteria = 11 ug/l

(acute criteria \* dilution factor) = Acute (Maximum Daily)  
 $19 \text{ ug/l} \times 1.02 = 19.4 \text{ ug/l} = \mathbf{19 \text{ ug/l Maximum Daily}}$

(chronic criteria \* dilution factor) = Chronic (Average Monthly)  
 $11 \text{ ug/l} \times 1.02 = 11.2 \text{ ug/l} = \mathbf{11 \text{ ug/l mg/l Average Monthly}}$

## 5. Phosphorus

The existing total phosphorus permit limit of 0.2 mg/l average monthly is reduced in the draft permit to 100 ug/l in order to meet the Gold Book target of 100 ug/l to prevent eutrophication in the receiving water. The facility averaged 0.16 mg/l total phosphorus in the January 2011 to December 2013 period.

Eutrophication is an aspect of nutrient overenrichment and is defined as an increase in the rate of supply of organic matter to a waterbody (EPA, 2001). The primary symptoms of nutrient overenrichment include an increase in the rate of organic matter supply, changes in algal dominance, and loss of water clarity and are followed by one or more secondary symptoms such as nuisance/toxic algal blooms and low dissolved oxygen. (EPA, 2001). In freshwater systems such as the Salisbury Plain River, phosphorus is the primary nutrient of concern.

The MA SWQS at 314 CMR 4.00 do not contain numerical criteria for total phosphorus. They include a narrative criterion for nutrients at 314 CMR 4.05(5)(c), which provides that “all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses.” They also include a requirement that “[a]ny existing

point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs” Id. MassDEP has interpreted the “highest and best practicable treatment” (HBPT) requirement in its standards as requiring an effluent limit of 0.2 mg/l (200 ug/l) for phosphorus.

The City’s current permit limit of 0.2 mg/l is based on HBPT. In determining whether the 0.2 mg/l limit is sufficient to ensure that water quality standards are met, EPA has assessed information concerning downstream conditions after the facility achieved the permit limit, and predicted instream concentrations as compared to threshold levels identified in the scientific literature for eutrophication impacts.

First, downstream assessments conducted by the City’s consultants as part of a Supplemental Environmental Project (SEP) indicate that impaired benthic macroinvertebrate conditions continue subsequent to the improvements in the facility to achieve the 0.2 mg/l limit. As set forth in the SEP Report:

**Benthic Macroinvertebrates**

One of the most striking aspects of the biological samples from the Salisbury Plain River and Matfield River is the near absence of pollution intolerant macroinvertebrate taxa, especially the EPT taxa.

- The caddisflies *Cheumatopsyche* sp. and *Hydropsyche betteni* were the only EPT taxa consistently found, yet these are among the most tolerant stream caddisflies and are often used as indicators of organic pollution rather than indicators of clean water.
- No stoneflies and only two individual mayflies were detected, despite the presence of suitable habitat in four of the survey sites.

Macroinvertebrate samples were comprised of a low diversity of habitat generalists that are tolerant of a range of conditions in warmwater streams.

CDM, *Brockton Receiving Water Assessment SEP* (2011). The impairment is thought to be related to nutrient discharges from the AWRP; conditions were described in the report as a “typical nutrient-rich, algal-dominated river downstream”. Thus the available evidence from downstream monitoring indicates continued nutrient-related impairment with a 0.2 mg/l permit limit.

Second, EPA considers whether the predicted instream concentration at the permit limit is such that water quality standards will be met. In the absence of a numeric criterion for phosphorus, EPA looks to nationally recommended criteria and other technical guidance documents. See 40 CFR 122.44(d)(1)(vi)(B). EPA has produced several guidance documents which contain recommended total phosphorus thresholds for receiving waters. The *1986 Quality Criteria for Water* (“Gold Book”) recommends in-stream phosphorus concentrations of no greater than 50 ug/l in any stream entering a lake or reservoir, 100 ug/l for any stream not discharging directly to lakes or impoundments, and 25 ug/l within a lake or reservoir. EPA has also released “Ecoregional Nutrient Criteria,” established as part of an effort to reduce problems associated with excess nutrients in water bodies in specific areas of the country. *Ambient Water Quality*

*Criteria Recommendations: Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams*, December 2000 (EPA- 822-B-00-022). The published criteria represent conditions in waters in that ecoregion that are minimally impacted by human activities, and thus representative of water without cultural eutrophication. The Brockton AWRP is within Ecoregion XIV, Eastern Coastal Plains. The recommended total phosphorus criterion for this ecoregion is 24 ug/l.

EPA has decided to rely on the Gold Book threshold of 100 ug/l rather than the more stringent ecoregion criteria of 24 ug/l, given that it was developed from an effects-based approach, versus the ecoregion criteria that were developed on the basis of reference conditions. The effects-based approach is taken because it is often more directly associated with an impairment to a designated use (i.e. fishing, swimming). The effects-based approach provides a threshold value above which adverse effects (i.e., water quality impairments) are likely to occur. It applies empirical observations of a causal variable (i.e., phosphorus) and a response variable (i.e., chlorophyll *a*) associated with designated use impairments. In contrast, the ecoregion reference-based values are statistically derived from a comparison within a population of rivers in the same ecoregion class. They are a quantitative set of river characteristics (physical, chemical and biological) that represent minimally impacted conditions.

The effects-based Gold Book threshold is a general target applicable in free-flowing streams. As the Gold Book notes, there are natural conditions of a water body that can result in either increased or reduced eutrophication response to phosphorus inputs; in some waters more stringent phosphorus reductions may be needed, while in some others a higher total phosphorus threshold could be assimilated without inducing a eutrophic response. In this case EPA is not aware of any evidence that the Salisbury Plain River is unusually susceptible to eutrophication impacts, so that the 100 ug/l threshold appears sufficient in this receiving water. With respect to factors that can reduce susceptibility, the Gold Book identifies morphometric features (steep banks, great depths and substantial flows), limitation by nutrients other than phosphorus, reduced light penetration where waters are highly laden with natural silts or color, or other naturally occurring phenomena that limit plant growth.<sup>10</sup> EPA is not aware of evidence that any of these factors are reducing eutrophic response in the Salisbury Plain River downstream of the discharge.

Therefore EPA has evaluated the projected instream concentration under current permit limits, and calculated a revised total phosphorus limit based on meeting the Gold Book target of 100 ug/l for preventing eutrophication, applied under 7Q10 conditions. In performing this calculation EPA assumes an upstream receiving water concentration of 48 ug/l, as reported from the upstream site in the *Brockton Receiving Water Assessment SEP*. The mass balance calculation is as follows:

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<sup>10</sup> The Gold Book also includes waters where “technological or cost-effective limitations may help control induced pollutants”; “waters managed primarily for waterfowl or other wildlife” and waters where “phosphorus control cannot be sufficiently effective under present technology to make phosphorus the limiting nutrient”. As these factors do not address water body response but instead alternative technological solutions or changes in management goals, EPA does not consider them as altering the threshold necessary to meet the narrative water quality standard.

$$(C_d * Q_d + C_s * Q_s) = C_r * Q_r ; \text{ where}$$

$C_d$  = Effluent concentration

$Q_d$  = Design flow of facility = 18 mgd

$C_s$  = Median concentration in the Salisbury Plain River upstream of discharge = 48 ug/l

$Q_s$  = 7Q10 streamflow in the Salisbury Plain River upstream of discharge = 0.39 mgd

$C_r$  = Receiving water concentration downstream

$Q_r$  = Flow in receiving water downstream =  $Q_s + Q_d$

At the current permit limit of 0.2 mg/l (200 ug/l), the projected receiving water concentration would be:

$$C_r = \frac{(C_d * Q_d + C_s * Q_s)}{(Q_r)} = \frac{[(18 * 200 \text{ ug/l} + 0.39 \text{ mgd} * 48 \text{ ug/l})]}{(18.39 \text{ mgd})} = 197 \text{ ug/l}$$

This is well over the Gold Book target and indicates that current discharges have the reasonable potential to cause exceedances of water quality standards. A revised permit limit based on meeting the Gold Book standard is calculated as follows:

$$\text{Permit limit } (C_d) = \frac{(C_r * Q_r - C_s * Q_s)}{(Q_d)}$$

$$\text{Limit} = \frac{[(18 + 0.39 \text{ mgd}) * 100 \text{ ug/l} - 0.39 \text{ mgd} * 48 \text{ ug/l}]}{18 \text{ mgd}} = 101 \text{ ug/l}$$

The draft permit also includes a load limit of 15.2 lb/day, calculated using the effluent concentration limit and the facility design flow.

The draft permit provides a compliance schedule for meeting the new total phosphorus limit at the earliest practicable time, pursuant to 314 CMR 4.03(1)(b) and 40 CFR 122.47(a)(1).

## 6. Total Nitrogen

The draft permit includes a monthly average total nitrogen limit of 450 lb/day total nitrogen, in effect for the months of May through October, in order to address cultural eutrophication in the Taunton River Estuary and Mount Hope Bay. In addition to this May to October numeric limit, the permit requires the permittee to optimize the treatment facility operations for the removal of total nitrogen during the months of November through April using all available treatment equipment at the facility. The basis for this determination is set forth below.

### *a. Ecological Setting: the Taunton River Estuary, Mount Hope Bay, Narragansett Bay and Estuarine Systems Generally*

The saltwater portions of the Taunton River (the “Taunton River Estuary”) and Mount Hope Bay are part of the greater Narragansett Bay Estuary system, which covers approximately 147 square miles within Massachusetts and Rhode Island. The Narragansett Bay Estuary is one of only 28 “estuaries of national significance” under the National Estuary Program (NEP), which was

established in 1987 by amendments to the CWA to identify, restore and protect estuaries along the coasts of the United States.

Mt. Hope Bay (the Bay) is situated in the northeast corner of Narragansett Bay, lying within both Rhode Island to the south and west and Massachusetts to the north and east. The Bay connects to the East Passage of Narragansett Bay proper to the southwest, via a deep, narrow channel where the Mt. Hope Bridge crosses over from Aquidneck Island to Bristol Point, and to Rhode Island Sound to the South via the Sakonnet River (actually an embayment) between Tiverton, RI and Aquidneck Island. The Bay covers an area of 13.6 square miles, and has a volume of 53.3 billion gallons at mean low water (MLW). <http://www.smast.umassd.edu/MHBNL/report2003.php>. The Bay has a tidal range averaging approximately 4.5 feet.

The Taunton River is the largest freshwater source to Mount Hope Bay. It discharges into the Bay from the north at Fall River. The Taunton River Estuary consists of the saltwater portions of the Taunton River, extending from the Braga Bridge at the confluence with Mount Hope Bay upstream to the Route 24 bridge (Taunton/Raynham), approximately four miles upstream of the Taunton WWTP discharge. (MassDEP, 2001). It is the longest river unobstructed by dams in New England, with tidal influence extending upriver approximately 20 miles. (Horsley Witten, 2007). The Salisbury Plain River, to which the Brockton AWRP discharges, flows into the Matfield River which combines with the Town River in Bridgewater to form the Taunton River.

Estuaries are extremely significant aquatic resources. An estuary is a partially enclosed coastal body of water located between freshwater ecosystems (lakes, rivers, and streams; freshwater and coastal wetlands; and groundwater systems) and coastal shelf systems where freshwater from the land measurably dilutes saltwater from the ocean. This mixture of water types creates a unique transitional environment that is critical for the survival of many species of fish, birds, and other wildlife. Estuarine environments are among the most productive on earth, creating more organic matter each year than comparably sized areas of forest, grassland, or agricultural land (EPA, 2001).

Maintaining water quality within an estuary is important for many reasons. Estuaries provide a variety of habitats such as shallow open waters, freshwater and saltwater marshes, sandy beaches, mud and sand flats, rocky shores, oyster reefs, tidal pools, and seagrass beds. Tens of thousands of birds, mammals, fish, and other wildlife depend on estuarine habitats as places to live, feed, and reproduce. Many species of fish and shellfish rely on the sheltered waters of estuaries as protected places to spawn.

Moreover, estuaries also provide a number of recreational values such as swimming, boating, fishing, and bird watching. In addition, estuaries have an important commercial value since they serve as nursery grounds for two-thirds of the nation's commercial fish and shellfish, and support tourism drawing on the natural resources that estuaries supply. (EPA, 1998). Consequently, EPA believes sound environmental policy reasons favor a pollution control approach that is both protective and undertaken expeditiously to prevent degradation of these critical natural resources.

Because estuaries are the intermediary between oceans and land, both of these geographic features influence their physical, chemical, and biological properties. In the course of flowing

downstream through a watershed to an estuary, tributaries pick up materials that wash off the land or are discharged directly into the water by land-based activities. Eventually, the materials that accumulate in the tributaries are delivered to estuaries. The types of materials that eventually enter an estuary largely depend on how the land is used. Undisturbed land, for example, will discharge considerably fewer pollutants than an urban center or areas with large amounts of impervious cover. Accordingly, an estuary's overall health can be heavily impacted by surrounding land uses.

Unlike free-flowing rivers, which tend to flush out sediments and pollutants relatively quickly, an estuary will often have a lengthy retention period as up-estuary saltwater movement interacts with down-estuary freshwater flow (EPA, 2001). Estuaries are particle-rich relative to coastal systems and have physical mechanisms that tend to retain particles. These suspended particles mediate a number of activities (e.g., absorbing and scattering light, or absorbing hydroscopic materials such as phosphate and toxic contaminants). New particles enter with river flow and may be resuspended from the bottom by tidal currents and wind-wave activity. Many estuaries are naturally nutrient-rich because of inputs from the land surface and geochemical and biological processes that act as "filters" to retain nutrients within estuaries (EPA, 2001). Consequently, waterborne pollutants, along with contaminated sediment, may remain in the estuary for a long time, magnifying their potential to adversely affect the estuary's plants and animals.

#### *b. Effects of Nutrients on Estuarine Water Quality*

The basic cause of nutrient problems in estuaries and nearshore coastal waters is the enrichment of freshwater with nitrogen (N) and phosphorus (P) (EPA, 2001). EPA defines nutrient overenrichment as the anthropogenic addition of nutrients, in addition to any natural processes, causing adverse effects or impairments to beneficial uses of a waterbody. (EPA, 2001).

Eutrophication is an aspect of nutrient overenrichment and is defined as an increase in the rate of supply of organic matter to a waterbody (EPA, 2001). Increased nutrient inputs promote a progression of symptoms beginning with excessive growth of phytoplankton and macroalgae to the point where grazers cannot control growth (NOAA, 2007). Phytoplankton is microscopic algae growing in the water column and is measured by chlorophyll-a. Macroalgae are large algae, commonly referred to as "seaweed." The primary symptoms of nutrient overenrichment include an increase in the rate of organic matter supply, changes in algal dominance, and loss of water clarity and are followed by one or more secondary symptoms such as loss of submerged aquatic vegetation, nuisance/toxic algal blooms and low dissolved oxygen. (EPA, 2001). In U.S. coastal waters, nutrient overenrichment is a common thread that ties together a diverse suite of coastal problems such as red tides, fish kills, some marine mammal deaths, outbreaks of shellfish poisonings, loss of seagrass and bottom shellfish habitats, coral reef destruction, and hypoxia and anoxia now experienced as the Gulf of Mexico's "dead zone." (EPA, 2001). Figure 4 shows the progression of nutrient impacts on a waterbody.

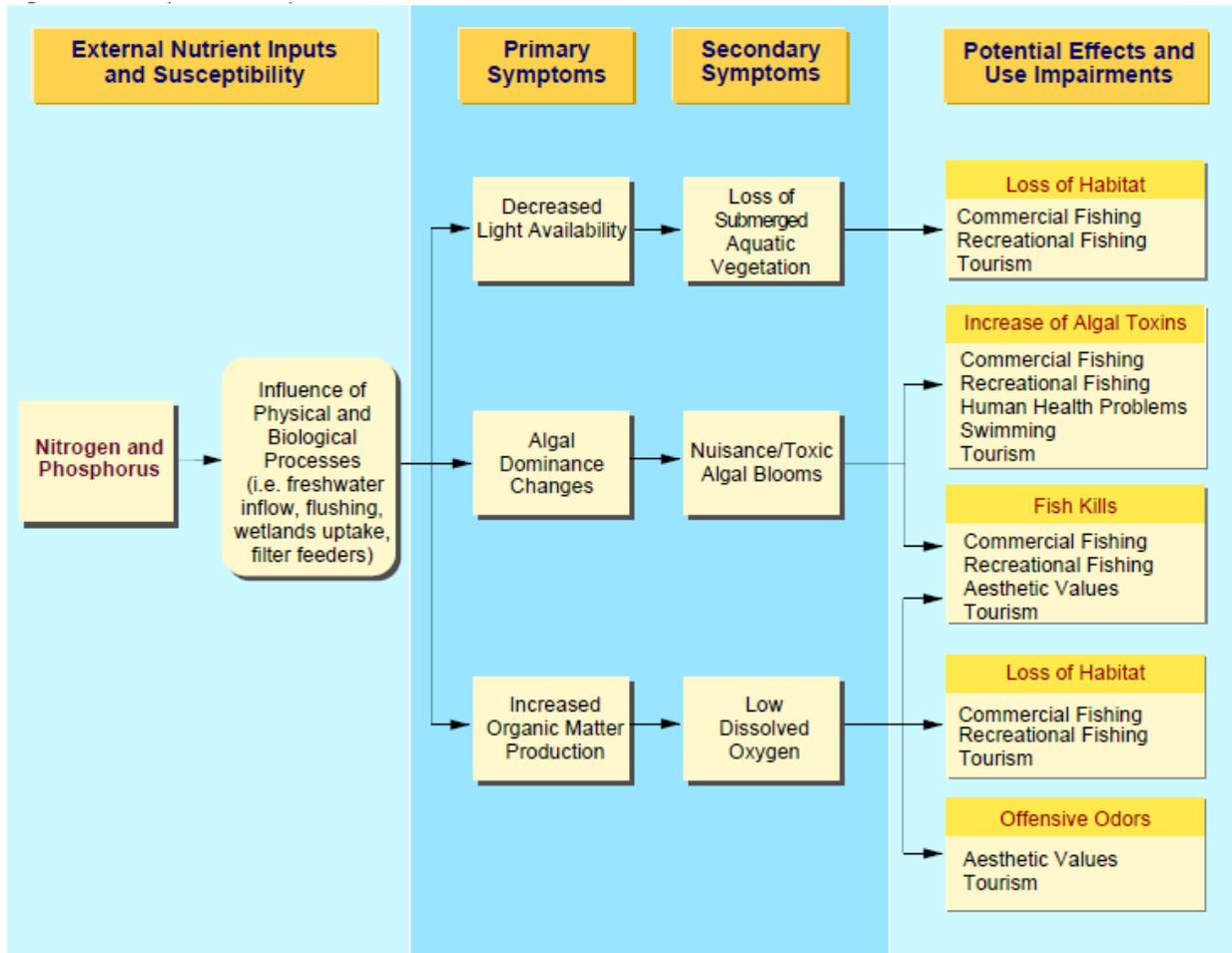


Figure 4. Nutrient enrichment model. Source: Bricker, 1999 as cited in EPA, 2001.

Estuarine nutrient dynamics are complex and are influenced by flushing time, freshwater inflow and stratification, among other factors. The deleterious physical, chemical, and biological responses in surface water resulting from excessive plant growth impair designated uses in both receiving and downstream waterbodies. Excessive plant growth can result in a loss of diversity and other changes in the aquatic plant, invertebrate, and fish community structure and habitat.

Nutrient-driven impacts on aquatic life and habitat are felt throughout the eutrophic cycle of plant growth and decomposition. Nutrient-laden plant detritus can settle to the bottom of a water body. In addition to physically altering the benthic environment and aquatic habitat, organic materials (*i.e.*, nutrients) in the sediments can become available for future uptake by aquatic plant growth, further perpetuating and potentially intensifying the eutrophic cycle.

Excessive aquatic plant growth, in addition, degrades aesthetic and recreational uses. Unsightly algal growth is unappealing to swimmers and other stream users and reduces water clarity. Decomposing plant matter also produces unpleasant sights and strong odors. Heavy growths of algae on rocks can make streambeds slippery and difficult or dangerous to walk on. Algae and macrophytes can interfere with angling by fouling fishing lures and equipment. Boat propellers and oars may also get tangled by aquatic vegetation.

When nutrients exceed the assimilative capacity of a water body, the ensuing eutrophic cycle can negatively impact in-stream dissolved oxygen (DO) levels. Through respiration, and the decomposition of dead plant matter, excessive algae and plant growth can reduce instream DO concentrations to levels that could negatively impact aquatic life. During the day, primary producers (*e.g.*, algae, plants) provide oxygen to the water as a by-product of photosynthesis. At night, however, when photosynthesis ceases but respiration continues, DO concentrations decline. Furthermore, as primary producers die, they are decomposed by bacteria that consume oxygen, and large populations of decomposers can consume large amounts of DO. Many aquatic insects, fish, and other organisms become stressed and may even die when DO levels drop below a particular threshold level.

Nutrient overenrichment of estuaries and nearshore coastal waters from human-based causes is now recognized as a national problem on the basis of Clean Water Act Section 305(b) reports from coastal States (EPA, 2001). Most of the nation's estuarine and coastal waters are moderately to severely polluted by excessive nutrients, especially nitrogen and phosphorus (NOAA, 2007; NOAA, 1999, EPA, 2006; EPA, 2004, EPA; and EPA, 2001). The State of Rhode Island has undertaken extensive efforts to reduce nitrogen discharges to Narragansett Bay proper to address eutrophic conditions there, with wastewater treatment facilities investing upward of \$250 million on nitrogen removal upgrades. Letter from RI Governor Lincoln Chafee, December 22, 2014; see also Fact Sheet, Upper Blackstone Water Pollution Abatement District, NPDES No. MA0102369 (2008).

*c. Water Quality Standards Applicable to the Taunton River Estuary and Mount Hope Bay*

Under the MA SWQS, 314 CMR 4.00, surface waters are divided into water "use" classifications, including Class SA and SB for marine and coastal waters. The Taunton River Estuary and the eastern portion of Mount Hope Bay are classified as SB waters, with designations for Shellfishing (Restricted and Conditionally Restricted Shellfish Areas) and CSO. Class SB waters are designated as a "habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. In certain waters, habitat for fish, other aquatic life and wildlife may include, but is not limited to, seagrass. Where designated in the tables to 314 CMR 4.00 for shellfishing, these waters shall be suitable for shellfish harvesting with depuration (Restricted and Conditionally Restricted Shellfish Areas)." 314 CMR 4.05(4)(b). Waters in this classification "shall have consistently good aesthetic value." *Id.*

Class SB waters are subject to class-specific narrative and/or numeric water quality criteria. 314 CMR 4.05(4)(b)1 to 8. DO concentrations in Class SB waters "[s]hall not be less than 5.0 mg/l. Seasonal and daily variations that are necessary to protect existing and designated uses shall be maintained. Where natural background conditions are lower, DO shall not be less than natural background."

The western portion of Mount Hope Bay is designated as a Class SA – Shellfishing water. These waters are designated as an excellent habitat for fish, other aquatic life and wildlife and for primary and secondary contact recreation. In approved areas, they shall be suitable for shellfish

harvesting without depuration (Open Shellfish Areas). These waters shall have excellent aesthetic value. With respect to DO, the criteria for class SA waters is “not less than 6.0 mg/. Where natural background conditions are lower, DO shall not be less than the natural background. Natural seasonal and daily variations that are necessary to protect existing and designated uses shall be maintained.”

Both Class SA and Class SB waters are also subject to additional minimum standards applicable to all surface waters, as set forth at 314 CMR 4.05(5). With respect to nutrients, the MA SWQS provide:

Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses.

314 CMR 4.05(5)(c). In addition, the MA SWQS require:

Aesthetics – All surface waters shall be free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum, or other matter to form nuisances; produce objectionable odor, color, taste, or turbidity; or produce undesirable or nuisance species of aquatic life. 314 CMR 4.05(5)(a)

Massachusetts has not adopted numeric criteria for total nitrogen or other nutrients. MassDEP has, however, used a number of indicators in interpreting its narrative nutrient standard. The DEP/SMASST Massachusetts Estuaries Project report, *Site-Specific Nitrogen Thresholds for Southeastern Massachusetts Embayments: Critical Indicators - Interim Report* (Howes et al., 2003) (Critical Indicators Report), was developed to provide “a translator between the current narrative standard and nitrogen thresholds (as they relate to the ecological health of each embayment) which can be further refined based on the specific physical, chemical and biological characteristics of each embayment. This report is intended to provide a detailed discussion of the issue and types of indicators that can be used, as well as propose an acceptable range of nitrogen thresholds that will be used to interpret the current narrative standard.”

<http://www.oceanscience.net/estuaries/pdf/nitroest.pdf>. This interpretive guidance has been used in a number of TMDLs for estuarine waters in southeastern Massachusetts.

The Critical Indicators Report finds that the indicators of primary concern to be:

- plant presence and diversity (eelgrass, macroalgae, etc.)
- animal species presence and diversity (finfish, shellfish, infauna)
- nutrient concentrations (nitrogen species)

- chlorophyll-a concentration
- dissolved oxygen levels in the embayment water column

(Howes et al., 2003 at 11). With respect to total nitrogen, it concluded:

It is not possible at this time to put quantitative nitrogen levels on each Water Quality Class. In fact, initial results of the Massachusetts Estuaries Project (Chatham Embayment Report 2003) indicate that the total nitrogen level associated with a particular ecological response can vary by over 1.4 fold (e.g. Stage Harbor versus Bassing Harbor in Chatham MA). Although between embayments nitrogen criteria may be different, it does appear that within a single embayment a consistent quantitative nitrogen criterion can be developed.

However, the Critical Indicators Report provides guidance for indicators, including total nitrogen, for various water quality classes. The nitrogen indicator ranges are based on long-term (>3 yr) average mid-ebb tide concentrations of total nitrogen (mg/L) in the water column. For “Excellent to Good” nitrogen related water quality conditions, equivalent to SA classification, the Report guidance is as follows: “Eelgrass beds are present, macroalgae is generally non-existent but in some cases may be present, benthic animal diversity and shellfish productivity are high, oxygen levels are generally not less than 6.0 mg/l with occasional depletions being rare (if at all), chlorophyll-a levels are in the 3 to 5 µg/L range. . . . For the case study, total nitrogen levels of 0.30-0.39 mg N/L were used to designate “excellent to good” quality areas.” Id at 21-22.

For SB waters, the Critical Indicators Report provides the following guidance for indicators of unimpaired conditions, to be refined based on data from the specific embayments: “benthic animal diversity and shellfish productivity are high, oxygen levels are generally not less than 5.0 mg/l with depletions to <4 mg/L being infrequent, chlorophyll-a levels are in the 3 to 5 µg/L range and nitrogen levels are in the 0.39 - 0.50 range. . . . eelgrass is not present . . . and macroalgae is not present or present in limited amounts even though a good healthy aquatic community still exists.” Id. at 22.

“Moderate Impairment” is indicated by “Shellfisheries may shift to more resistant species. Oxygen levels generally do not fall below 4 mg/L, although phytoplankton blooms raise chlorophyll a levels to around 10 µg/L. Eelgrass is not sustainable and macro-algae accumulations occur in some regions of the embayment. In the Case Study, embayment regions supporting total nitrogen levels >0.5 mg N/L were clearly impaired.” Significant Impairment is indicated by total nitrogen concentrations of 0.6/0.7 mg/l and above. In “severely degraded” conditions, “algal blooms are typical with chlorophyll-a levels generally >20 µg/L, oxygen depletions to hypoxic levels are common, there are periodic fish kills, and macro-algal accumulations occur with both ecological and aesthetic impacts.”

In addition to the Massachusetts water quality standards, water quality standards applicable to the Rhode Island portion of Mount Hope Bay must also be satisfied. As in Massachusetts, the Rhode Island portions of Mount Hope Bay are designated SB waters in the eastern portion and SA waters in the western portion of the Bay. Rhode Island, like Massachusetts, has specific

numeric criteria for DO in SA and SB waters<sup>11</sup>, and narrative criteria for nutrients<sup>12</sup> and aesthetics.<sup>13</sup> The Rhode Island portions of Mount Hope Bay, like the Massachusetts portions are listed for impairments due to total nitrogen, dissolved oxygen (as well as fishes bioassessments and temperature impairments linked to the Brayton Point power plant). As discussed below, permit limits designed to meet water quality standards in the Taunton River Estuary and the Massachusetts portions of Mount Hope Bay are expected to achieve water quality standards in Rhode Island.

*d. Receiving Water Quality Violations*

The Taunton River Estuary and Mount Hope Bay have reached their assimilative capacity for nitrogen and are suffering from the adverse water quality impacts of nutrient overenrichment, including cultural eutrophication. They are, consequently, failing to attain the water quality standards described above. The impacts of excessive nutrients are evident throughout the Taunton River Estuary and Mount Hope Bay as indicated by historic studies, a comprehensive monitoring study of the Taunton River Estuary/Mount Hope Bay in 2004-06, and ongoing (to the present) monitoring conducted as part of the larger Narragansett Bay monitoring program.

Both Massachusetts and Rhode Island have documented these impairments in their reporting on impaired waters. Section 303(d) of the CWA requires states to identify those waterbodies that are not expected to meet surface water quality standards after implementation of technology-based controls. The State of Massachusetts has identified Mount Hope Bay and the lower

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<sup>11</sup> Rule 8.D.3. Table 3. For waters with a seasonal pycnocline, no less than 4.8 mg/l above the seasonal pycnocline; below the seasonal pycnocline DO concentrations above 4.8 mg/l shall be considered protective of Aquatic Life Uses. When instantaneous DO values fall below 4.8 mg/l, the waters shall not be (1) Less than 2.9 mg/l for more than 24 consecutive hours during the recruitment season; nor (2) Less than 1.4 mg/l for more than 1 hour more than twice during the recruitment season; nor (3) Shall they exceed the allowable cumulative DO exposure (Table 3.A).

For waters without a seasonal pycnocline, DO concentrations above 4.8 mg/l shall be considered protective of Aquatic Life Uses. When instantaneous DO values fall below 4.8 mg/l, the waters shall not be: (1) Less than 3.0 mg/l for more than 24 consecutive hours during the recruitment season; nor (2) Less than 1.4 mg/l for more than 1 hour more than twice during the recruitment season; nor (3) Shall they exceed the allowable cumulative DO exposure presented (Table 3.A. and Table 3.B).

<sup>12</sup> Rule 8.D.1(d). Nutrients - Nutrients shall not exceed the limitations specified in rule 8.D.(2) (freshwaters) and 8.D.(3) (seawaters) and/or more stringent site-specific limits necessary to prevent or minimize accelerated or cultural eutrophication.

Rule 8.D.3. None in such concentration that would impair any usages specifically assigned to said Class, or cause undesirable or nuisance aquatic species associated with cultural eutrophication. Shall not exceed site-specific limits if deemed necessary by the Director to prevent or minimize accelerated or cultural eutrophication. Total phosphorus, nitrates and ammonia may be assigned site-specific permit limits based on reasonable Best Available Technologies. Where waters have low tidal flushing rates, applicable treatment to prevent or minimize accelerated or cultural eutrophication may be required for regulated nonpoint source activities.

<sup>13</sup> Rule 8.D.1(b)(iv). Aesthetics - all waters shall be free from pollutants in concentrations or combinations that: iv. Result in the dominance of species of fish and wildlife to such a degree as to create a nuisance or interfere with the existing or designated uses.

reaches of the Taunton River Estuary for impairments due to low dissolved oxygen, with Total Nitrogen specifically identified as a cause of impairments in Mount Hope Bay.

Early studies focused predominantly on Narragansett Bay proper, rather than Mount Hope Bay, and established the need for significant nitrogen reductions in order to address eutrophication in the system, as evidenced by high chlorophyll-a concentrations and pervasive DO depletions. The state of Rhode Island established a legislative goal of a 50% reduction in nitrogen discharges to Narragansett Bay, which has been implemented through permit limits on total nitrogen. Early studies also indicated the need for nitrogen reductions in Mount Hope Bay, although additional study was needed for setting reduction targets. See e.g. Isaac, R.A., Estimation of Nutrient Loadings and Their Impacts on Dissolved Oxygen Demonstrated at Mount Hope Bay, 23 *Environment International* 151 (1997).

To remedy the paucity of data in Mount Hope Bay and the Taunton River Estuary, a three-year water quality monitoring study was conducted by the School for Marine Science and Technology at UMass-Dartmouth (SMAST) with funding and oversight from MassDEP. The study involved monthly sampling at 22 sites across Mount Hope Bay and the Taunton River Estuary from 2004 to 2006 (see Figure 5).<sup>14</sup> This study showed that average chlorophyll-a over the three year period was above 10 ug/l at all monitoring stations across the Taunton River Estuary and Mount Hope Bay. The 20<sup>th</sup> percentile DO concentrations for the three year period were below the 5.0 mg/l water quality standard at four of the six sites in the Taunton River Estuary.<sup>15</sup> Table 4, reproduced from SMAST, *Summary of Water Quality Monitoring Program for the Mount Hope Bay Embayment System (2004 – 2006)* at 24 (August 16, 2007).

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<sup>14</sup> This monitoring program forms the baseline of EPA's load analysis due to the comprehensive nature of the available data and the quality assurance provided by MassDEP oversight, including data collection and analysis under an approved QAPP.

<sup>15</sup> The six Taunton River stations are MHB 1, 2 and 18-21; MHB 2, 18, 19 and 21 had 20% low DO below 5.0 mg/l for the three year period.

Figure 5. Mount Hope Bay Monitoring Program estuarine stations.

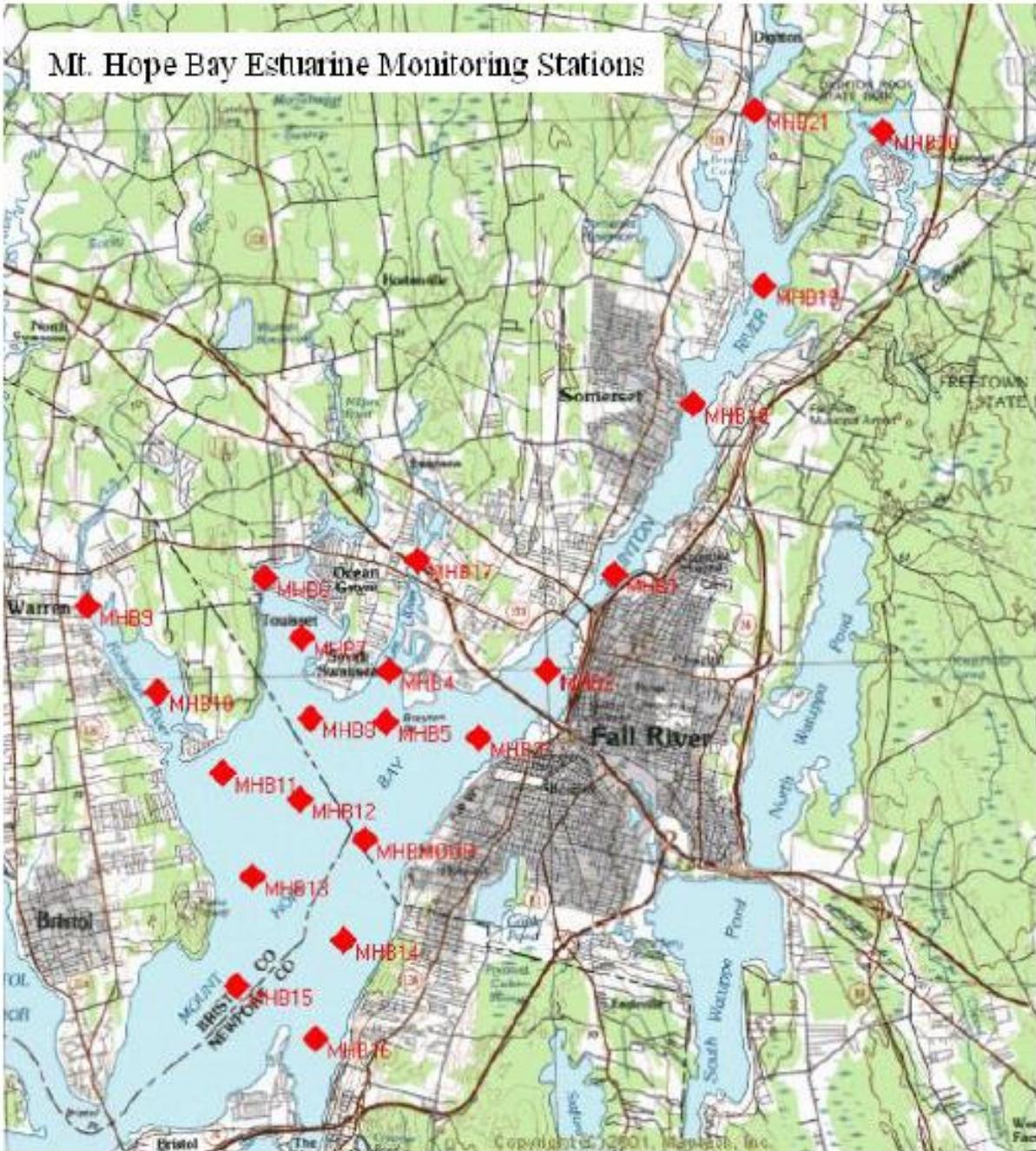


Table 4. Mount Hope Bay Monitoring Program results as reported in SMAST, 2007.

Station	Total Depth (m)	20% Low* D.O. (mg/L)	Sal (ppt)	PO4 (mg/L)	NH4 (mg/L)	NOX (mg/L)	DIN (mg/L)	DON (mg/L)	PON (mg/L)	TN (mg/L)	DIN/DIP Molar Ratio	Total Chl a (ug/L)
MHB1	10.0	5.02	23.3	0.054	0.052	0.095	0.147	0.299	0.155	0.601	6	11.75
MHB2	8.9	4.94	26.1	0.052	0.047	0.043	0.090	0.312	0.170	0.572	4	13.50
MHB3	5.2	5.49	26.0	0.051	0.037	0.035	0.072	0.282	0.163	0.517	3	14.32
MHB4	3.5	5.61	25.7	0.052	0.026	0.017	0.043	0.308	0.173	0.525	3	14.71
MHB5	5.6	5.20	26.2	0.050	0.029	0.020	0.050	0.294	0.169	0.512	2	14.53
MHB6	3.9	5.09	24.1	0.061	0.049	0.030	0.079	0.359	0.168	0.606	3	12.87
MHB7	4.5	5.94	25.5	0.049	0.023	0.016	0.039	0.308	0.189	0.536	2	17.46
MHB8	5.1	4.93	25.8	0.046	0.022	0.019	0.041	0.280	0.165	0.486	2	15.84
MHB9	ND	ND	19.7	0.062	0.049	0.040	0.089	0.453	0.263	0.805	3	14.02
MHB10	3.2	5.86	25.7	0.048	0.017	0.012	0.027	0.314	0.167	0.508	1	14.11
MHB11	4.9	5.02	26.2	0.043	0.017	0.012	0.029	0.268	0.175	0.472	1	16.23
MHB12	5.0	5.36	26.4	0.049	0.020	0.021	0.040	0.284	0.168	0.493	2	16.12
MHB13	5.9	6.00	26.8	0.045	0.020	0.013	0.033	0.282	0.158	0.473	2	15.40
MHB14	6.5	5.34	27.0	0.044	0.024	0.009	0.033	0.289	0.197	0.519	2	16.78
MHB15	12.9	6.46	27.9	0.035	0.021	0.009	0.029	0.273	0.143	0.445	2	12.68
MHB16	11.2	6.33	27.7	0.043	0.028	0.012	0.039	0.265	0.157	0.461	2	13.02
MHB17	ND	ND	24.6	0.064	0.057	0.026	0.083	0.404	0.181	0.669	3	11.81
MHB18	6.7	4.96	22.3	0.062	0.061	0.136	0.197	0.300	0.156	0.652	7	11.44
MHB19	4.0	4.93	18.7	0.058	0.074	0.201	0.275	0.342	0.178	0.799	10	12.27
MHB20	1.8	5.09	17.5	0.054	0.063	0.144	0.207	0.372	0.192	0.771	8	13.59
MHB21	2.6	4.60	14.2	0.061	0.066	0.350	0.415	0.420	0.219	1.058	15	13.34
MHBMOOR	6.3	5.85	26.8	0.045	0.025	0.013	0.038	0.284	0.181	0.503	2	15.57

\* Average of the lowest 20% of recorded values

Table 5 below shows the results of the SMAST monitoring for each of the three years of the monitoring program, with the Taunton River stations highlighted. Minimum measured DO concentrations in each year were below 5.0 mg/l at all the Taunton River stations in 2004 and 2006, and a majority of those stations in 2005. In Mount Hope Bay proper, minimum DO concentrations below 5.0 mg/l were encountered at all but one of the Mount Hope Bay stations at least once during the three year period, and at five of the ten stations in both 2004 and 2005. This is compelling evidence of pervasive low DO conditions throughout the Taunton River Estuary and Mount Hope Bay, given that the sampling was intermittent (and therefore unlikely to capture isolated low DO events) and was not timed to reflect the lowest DO conditions in the waterbody (just before dawn, when oxygen depletion due to respiration is greatest).

Elevated chlorophyll-a concentrations are similarly pervasive based on the SMAST monitoring data. Mean chlorophyll-a concentrations are above the Critical Indicators Report guidelines for unimpaired waters (3-5 ug/l) at every station monitored, in all three of the monitoring seasons. See Table 5. Maximum chlorophyll-a concentrations are routinely above 20 ug/l, far exceeding the chlorophyll concentrations found in unimpaired waters. Again, given the likelihood of intermittent sampling missing the worst conditions in terms of algal blooms, this is compelling evidence of pervasive eutrophic conditions throughout the Taunton River Estuary and Mount Hope Bay.

The study showed total nitrogen concentrations are elevated throughout the system, with a three year average TN concentration above 0.5 mg/l at sixteen of the 22 sites and above 0.45 mg/l at 21 of 22 sites. SMAST, 2007. Total Nitrogen concentrations are generally highest in the tidal rivers, including the Taunton River (e.g. Station 19, TN range 0.66 to 0.99 mg/l). Molar N/P ratios are consistent with nitrogen limitation ( $\leq 10$  at all stations other than MHB21, the uppermost Taunton River station).

Table 5. SMAST Monitoring Data Summarized by Year. **Taunton River stations highlighted.**

Station	Location	State	2004				2005				2006			
			DO min (mg/l)	Chl-a max (ug/l)	Chl-a mean (ug/l)	TN mean (mg/l)	DO min (mg/l)	Chl-a max (ug/l)	Chl-a mean (ug/l)	TN mean (mg/l)	DO min (mg/l)	Chl-a max (ug/l)	Chl-a mean (ug/l)	TN mean (mg/l)
1	Taunton River	MA	4.8	24.2	7.8	0.53	5.1	49.2	10.9	0.56	4.1	26.6	10.3	0.74
2	Taunton River	MA	4.7	33.2	9.6	0.53	5.0	16.6	8.2	0.51	3.0	48.6	14.2	0.68
3	MHB proper (61-06)	MA	5.1	65.1	11.9	0.51	5.2	20.0	10.2	0.45	4.8	41.5	16.8	0.60
4	Lee River	MA	4.7	19.5	10.5	0.51	5.1	16.0	10.8	0.48	6.1	28.6	16.3	0.59
5	MHB proper (61-07)	MA	4.7	22.4	10.5	0.48	4.6	22.6	11.7	0.49	5.1	29.7	14.3	0.57
6	Cole River	MA	4.9	26.4	11.1	0.52	4.7	16.0	11.0	0.56	5.3	18.6	8.5	0.74
7	MHB proper (61-07)	MA	3.4	37.2	14.2	0.47	5.3	22.3	13.3	0.54	7.1	24.9	16.2	0.60
8	MHB proper (61-07)	MA	3.8	38.8	12.7	0.46	2.6	27.5	11.8	0.45	5.6	32.7	14.1	0.55
9	Kickamut River	RI	No data	19.1	11.9	0.70	No Data	17.7	9.7	0.73	No data	33.1	13.1	1.03
10	Kickamut River	RI	6.0	12.5	8.5	0.48	5.4	29.9	13.6	0.49	5.4	28.9	14.6	0.57
11	MHB-proper	RI	3.2	26.3	10.4	0.44	4.5	33.2	14.3	0.45	5.5	35.6	17.1	0.53
12	MHB-proper	RI	4.0	29.2	10.8	0.45	4.0	29.6	14.4	0.50	5.4	36.4	14.1	0.52
13	MHB-proper	RI	6.5	25.8	11.2	0.42	4.1	27.9	13.4	0.46	6.2	26.5	13.7	0.53
14	MHB-proper	RI	6.0	36.8	14.2	0.58	6.1	32.4	12.1	0.41	2.1	80.6	19.4	0.57
15	MHB-proper	RI	6.9	23.1	9.8	0.45	6.3	23.6	8.8	0.42	4.3	42.4	14.5	0.46
16	MHB-proper	RI	6.2	25.5	10.5	0.45	6.0	33.3	10.3	0.44	5.3	30.4	14.1	0.50
17	Lee River	MA	No data	9.2	4.7	0.65	No Data	17.3	7.9	0.61	No data	27.2	13.8	0.76
18	Taunton River	MA	4.7	16.1	7.5	0.61	4.4	38.0	9.0	0.60	4.3	12.9	7.2	0.80
19	Taunton River	MA	4.4	27.0	10.8	0.72	4.7	33.2	10.5	0.73	4.6	15.0	5.5	0.99
20	Assonet River	MA	5.1	15.7	9.1	0.72	5.6	27.1	12.2	0.63	4.8	16.9	7.6	0.94
21	Taunton River	MA	3.8	23.1	10.5	0.98	4.1	19.8	10.5	1.04	4.8	14.3	5.9	1.24
MOOR	MHB proper (61-06)	MA	6.3	21.4	11.4	0.51	5.4	19.9	11.5	0.45	2.7	35.4	16.5	0.55

Based on these data, the SMAST report concluded that a Massachusetts Estuaries Project (“MEP”) analysis of nitrogen loading was warranted for restoration of the Mount Hope Bay/Taunton River complex, stating:

Given the high population within the watershed and resultant N loading to this down gradient estuary and the observed high chlorophyll levels and oxygen depletions, it is not surprising that nitrogen levels are moderately to highly enriched over offshore waters. The Taunton River estuarine reach, as the focus of upper watershed N loading, showed very high total nitrogen levels (TN) in its upper reach (1.058 mg N L<sup>-1</sup>) and maintained high levels throughout most of its reach (>0.6 mg N L<sup>-1</sup>). The main basin of Mt. Hope Bay supported lower TN levels primarily as a result of mixing with incoming waters (generally 0.5-0.6 mg N L<sup>-1</sup>). This is consistent with the observed oxygen depletions and infauna animal communities. The highest (Moderate) water quality was found at the stations in the main basin and lower reaches of Mt Hope Bay out to the channels to lower Narragansett Bay and the Sakonet River.

. . .  
In general, the Taunton River Estuary, with its large watershed N load and high TN levels, is showing poor water quality due to its high chlorophyll and oxygen depletions. The main basin of Mt. Hope Bay, with its greater flushing and access to higher quality waters of the lower Bay, is showing less impairment with moderate water quality. Finally, the lower basin of Mt. Hope Bay, nearest the tidal "inlet", is generally showing moderate water quality. . . . [T]hese data indicate that the MEP analysis of this system should focus on restoration of the main basin of Mt. Hope Bay and the Taunton River estuarine reach, and that it is likely that restoration of the Taunton River Estuary will have a significant positive effect on the habitat quality of the main basin of Mt. Hope Bay.

To date, the MEP analysis, along with the TMDL that would result from the analysis, has not been completed.<sup>16</sup>

Additional evidence of conditions in Mount Hope Bay is provided from the Narragansett Bay Water Quality Network fixed monitoring station in the Bay, equipped with two datasondes that measured temperature, salinity, dissolved oxygen and depth at approximately 1 meter from the bottom and 0.5 meters below the surface, and chlorophyll fluorescence at the near surface sonde. ([http://www.narrbay.org/d\\_projects/buoy/buoydata.htm](http://www.narrbay.org/d_projects/buoy/buoydata.htm)). The datasondes were deployed in the Rhode Island portion of Mount Hope Bay near SMAST site MHB13, from May or June through October, from 2005 through 2014. Analysis of the DO data from the deep sonde at this site in 2005 and 2006 showed multiple events (three in 2005; seven in 2006) of DO depletion below the 4.8 mg/l RI water quality threshold, with individual events lasting between two and twelve days.

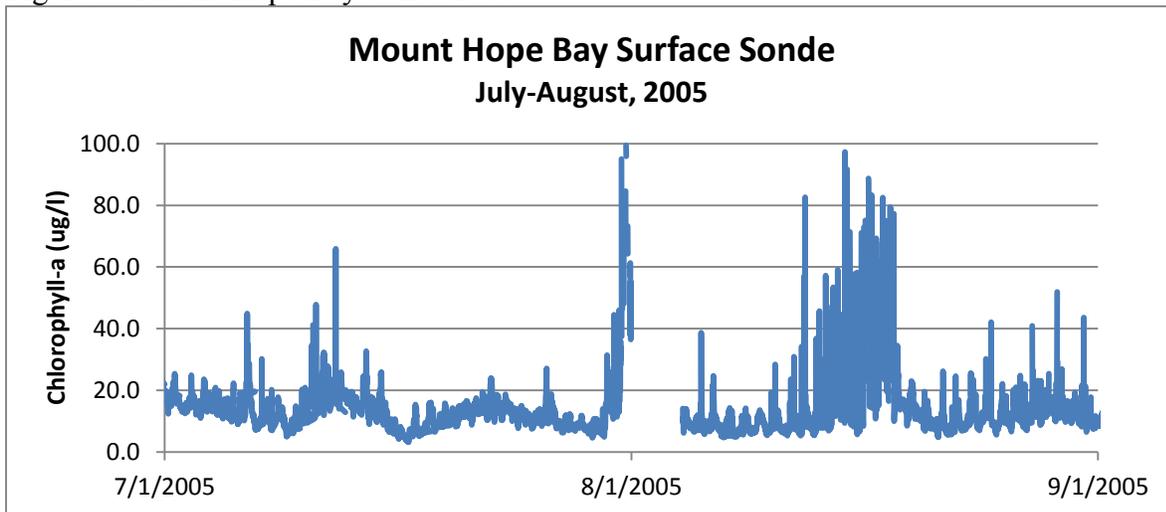
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<sup>16</sup> EPA is required to issue the permit with limits and conditions necessary to ensure compliance with State water quality standards at the time of permit reissuance. Neither the CWA nor EPA regulations require that a TMDL be completed before a water quality-based limit may be included in a permit. Rather, water quality-based effluent limitations in NPDES permits must be “consistent with the assumptions and requirements of any *available* [emphasis added] wasteload allocation.” 40 C.F.R. § 122.44(d)(1)(vii)(B). Thus, an approved TMDL is not a precondition to the issuance of an NPDES permit for discharges to an impaired waterway; nor does EPA have discretion to wait for the issuance of a TMDL to include effluent limitation on discharges of pollutants that contribute to impairments.

Codiga et al, “Narragansett Bay Hypoxic Even Characteristics Based on Fixed-Site Monitoring Network Time Series: Intermittency, Geographic Distribution, Spatial Synchronicity, and Interannual Variability,” *Estuaries and Coasts* 32:621-641 (2009). Two of the 2006 events were characterized as “hypoxic”, with DO concentrations less than 2.9 mg/l persisting for over two days. Id.

The sonde data also confirms the occurrence of algal blooms and generally elevated chlorophyll-a concentrations in Mount Hope Bay. The 2005 sonde data, Figure 6, shows multiple events with chlorophyll-a concentrations well above 20 ug/l, and above the maximum concentrations captured with the intermittent SMAST sampling.

Figure 6. Mount Hope Bay Sonde 2005



Charts by EPA. Source data: Narragansett Bay Fixed-Site Monitoring Network (NBFSMN), 2005. 2005 Datasets. Rhode Island Department of Environmental Management, Office of Water Resources. Data available at [www.dem.ri.gov/bart](http://www.dem.ri.gov/bart)

The sonde monitoring also confirms that these water quality violations continue to the present. The most recent published continuous data (for 2011) show elevated chlorophyll-a concentrations, corresponding periods of supersaturated DO at the surface, persistent bottom DO concentrations below 5 mg/l and frequent excursions below 3 mg/l. See Figure 7.

Figure 7a. Surface Chlorophyll and DO percent saturation, 2011

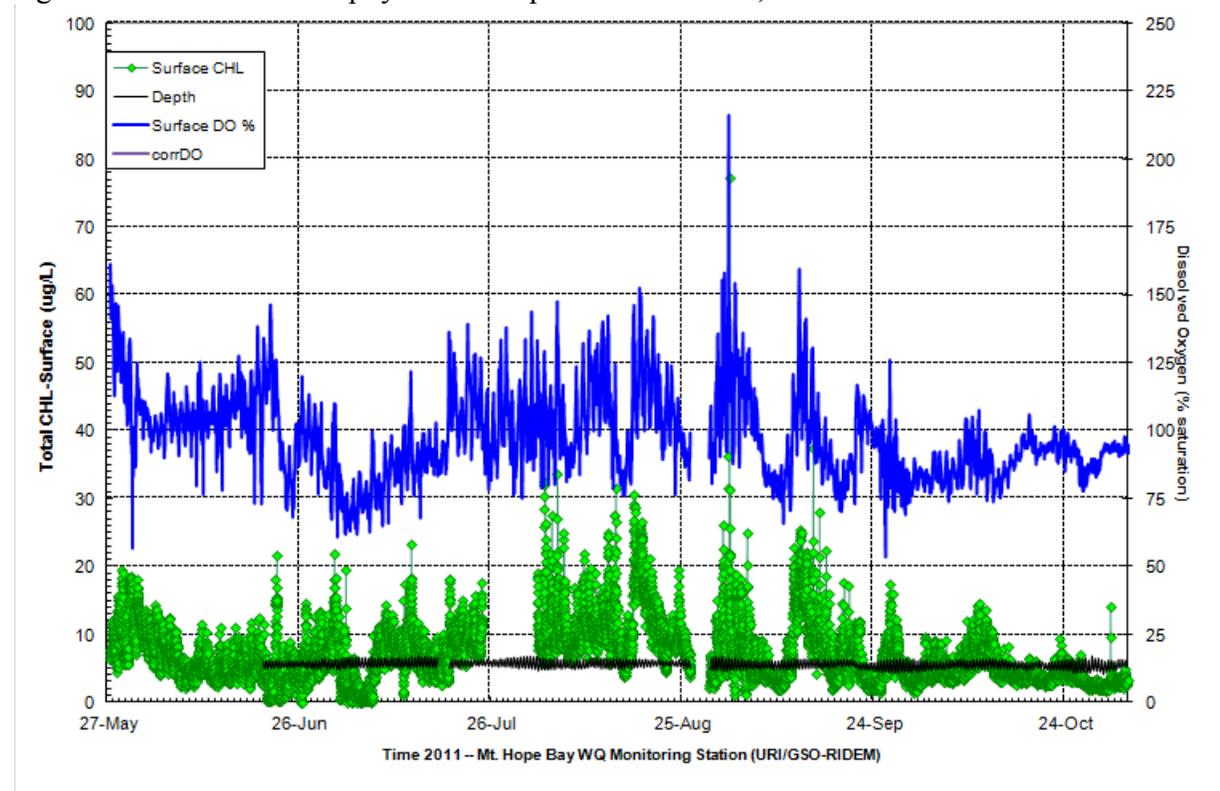
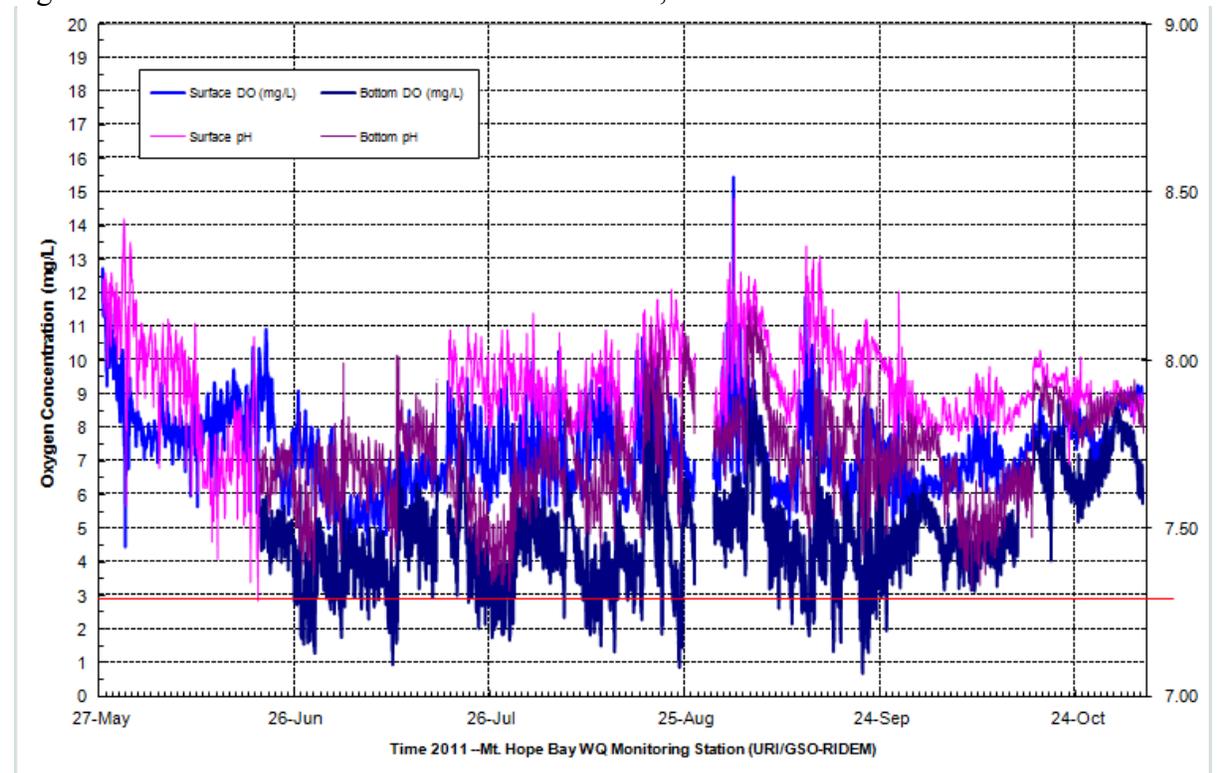


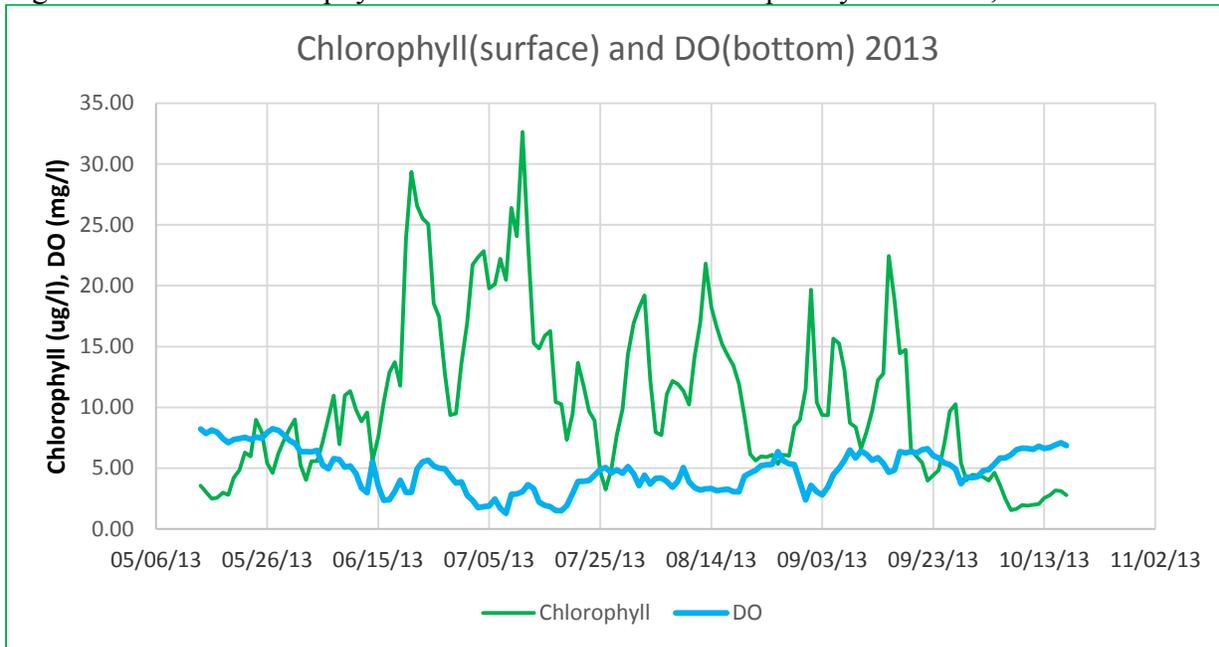
Figure 7b. DO concentration at surface and bottom, 2011



Charts by URI/GSO-RIDEM. Chart and data available at [www.dem.ri.gov/bart](http://www.dem.ri.gov/bart)

In addition daily average data has been published through 2013, and confirms continued elevated algae with accompanying extended periods of low DO, consistent with continuing nutrient impacts. In 2013 most of the summer had daily average DO below the 5.0 mg/l Massachusetts DO standard, and extensive periods below the 2.8 mg/l threshold in Rhode Island water quality standards.

Figure 8. Surface chlorophyll and bottom DO at Mount Hope Bay datasonde, 2013.



Based on these data, EPA has concluded that cultural eutrophication due to nitrogen overenrichment in the Taunton River Estuary and Mount Hope Bay has reached and continues to exhibit the level of a violation of both Massachusetts and Rhode Island water quality standards for nutrients and aesthetics, and has also resulted in violations of the numeric DO standards in these waters.

*e. Reasonable Potential Analysis*

Pursuant to 40 C.F.R. § 122.44(d)(1), NPDES permits must contain any requirements in addition to technology-based limits necessary to achieve water quality standards established under Section 303 of the CWA, including state narrative criteria for water quality. In addition, limitations “must control any pollutant or pollutant parameter (conventional, non-conventional, or toxic) that the Director has determined are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any water quality standard, including State narrative criteria for water quality” (40 C.F.R. § 122.44(d)(1)(i)). An excursion occurs if the actual or projected instream data exceeds any numeric or narrative water quality criterion.

To determine the extent of the facility’s contribution to the violation of the MA SWQS, EPA performed an analysis of nitrogen loading to the Taunton River Estuary using as a baseline data

from the SMAST monitoring program, which included monitoring on the Taunton River and major tributaries to the Taunton River Estuary, in addition to the estuarine stations. These data represent the most comprehensive dataset available for the Mount Hope Bay and Taunton River Estuary system. The analysis focuses on the Taunton River Estuary because that area shows the greatest eutrophication impacts and greatest nitrogen concentrations. Using the 2004-2005 to representative a “typical year” based on precipitation data,<sup>17</sup> EPA used the USGS LOADEST program to calculate a seasonal average (June to September) nitrogen load for the Taunton River and each tributary using measured nitrogen concentrations and flow for several discrete events. A description of the LOADEST analysis is provided in Attachment A.

EPA also calculated the point source loads to the Taunton River Estuary derived from wastewater treatment plants based on DMR data from each facility from June through September 2004-05. These include direct discharges to the Taunton River Estuary (Taunton and Somerset WWTPs), and discharges to the tributaries from other POTWs, which are a component of the tributary loads calculated above. For POTWs discharging to tributaries to the Taunton River, an attenuation factor was applied to account for instream uptake of nitrogen. A description of the attenuation calculation is provided in Attachment B. Attenuation was determined to range from four to eighteen percent for the major (> 1 mgd) facilities located on tributaries (eleven percent for Brockton, the largest discharger), with higher attenuation for some of the smaller facilities on smaller tributaries. Table 6 shows the point sources, the receiving stream, their nitrogen discharges and the delivered load to the estuary.

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<sup>17</sup> Rainfall during the summers of 2004 and 2005 totalled 17.82 and 11.03 inches respectively ([http://weather-warehouse.com/WeatherHistory/PastWeatherData\\_TauntonMuniArpt\\_EastTaunton\\_MA\\_September.html](http://weather-warehouse.com/WeatherHistory/PastWeatherData_TauntonMuniArpt_EastTaunton_MA_September.html)), compared to a long term average of 15.24 inches (<http://www.weather.com/weather/wxclimatology/monthly/graph/02780>). The third monitoring year, 2006, was excluded because extremely high rainfall in May and June (over 9 inches per month, or more than twice the long term average) has potential to disturb the “steady-state” assumption that underlies EPA’s load analysis.

Table 6. Point Source Discharges and Delivered Loads

WWTF	Design Flow (MGD)	Receiving stream	Average 2004-05 Summer TN discharged (lb/d)	Average 2004-05 Summer TN delivered to Estuary (lb/d)
<i>Direct discharges to Estuary</i>				
Taunton	8.4	Taunton River Estuary	610	610
Somerset	4.2	Taunton River Estuary	349.5	349.5
<i>Total direct point source load:</i>				959
<i>Upstream discharges</i>				
MCI Bridgewater	0.55	Taunton River	37	33
Brockton	18	Salisbury Plain River	1303	1160
Bridgewater	1.44	Town River	137.5	132
Dighton-Rehoboth Schools	0.01	Segregansett River	1	1
Mansfield	3.14	Three Mile River	375.5	312
Middleboro	2.16	Nemasket River	207.5	191
Wheaton College	0.12	Three Mile River	6	3
Oak Point	0.18	Bartlett Brook	9	8
East Bridgewater High School	0.01	Matfield River	1.5	1
<i>Total upstream point source load:</i>				1841

Finally, EPA calculated total loads to the estuary and allocated those loads between point sources and nonpoint sources. For upstream loads, nonpoint sources were calculated by subtracting the delivered point source loads from the LOADEST total load. Nonpoint source loads from the watershed area downstream of the SMAST monitoring sites, not accounted for in the LOADEST analysis, were calculated using an areal loading factor derived from the LOADEST loading figures. Direct atmospheric deposition to the Taunton River Estuary was not included in the model as it is a relatively small contribution given the relatively small area of the estuary.<sup>18</sup> The average summer load to the estuary in 2004 to 2005 is 4,228 lbs/day.

Table 7 and Figure 9 show the total watershed nitrogen loads to the Taunton River Estuary in the baseline analysis. Wastewater treatment plant loads make up 66% of the total nitrogen load. Nonpoint sources make up the remaining 34%. The Brockton AWRF load, at 1,303 lbs/day, was approximately 31% of the total nitrogen load.

EPA also considered the impacts of changes since the 2004-05 baseline. Specifically, (the Brockton AWRF was upgraded as of 2010, reducing its total nitrogen load discharges from 1303 lbs/day to an average of 527 lbs/day in 2012-13. This reduction reduces delivered loads from the baseline of 4,228 lbs/day to 3537 lbs/day. The load from Brockton is a smaller percentage of that total, but would still make up approximately 13% of total loads. Monitoring done by the Narragansett Bay Commission on the Taunton River also indicate continuing high total nitrogen

<sup>18</sup> Atmospheric deposition to the watershed is included in the nonpoint source loading figures.

concentrations, consistent with EPA’s analysis, with TN concentrations at the Berkley Bridge in Dighton ranging between 0.6 to 2.7 mg/l (median 1.06 mg/l) in 2014. NBC River and Bay Nutrients Data, <http://snapshot.narrabay.com/app/MonitoringInitiatives/NutrientMonitoring>. (Unfortunately the NBC data includes total nitrogen only since mid-2013, and the monitoring data is from an estuarine portion of the river so is influenced by dilution by marine waters, so that trends over time and direct comparison to SMAST baseline data are not possible.)

Figure 9. Taunton River Estuary Loads by Category

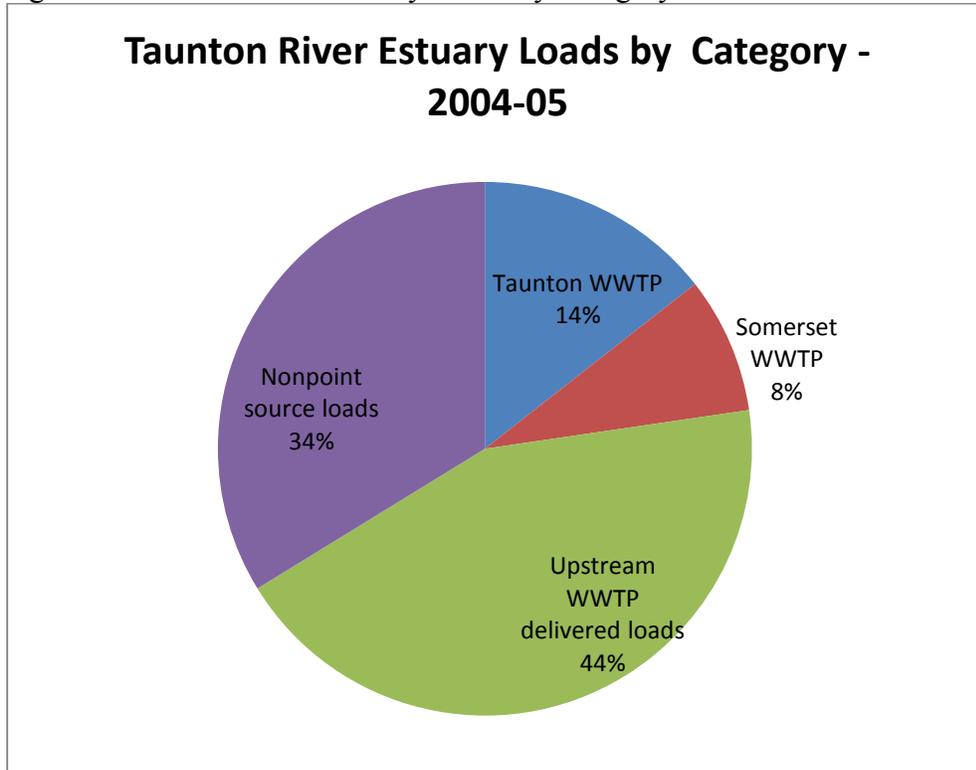


Table 7. Taunton River Estuary Loads by Category

Total loads	Avg 2004-05 Summer Load (lb/d)
Taunton WWTP	610
Somerset WWTP	350
Upstream WWTP delivered loads	1841
Nonpoint source loads	1428
<b>Total</b>	<b>4228</b>

On this basis, EPA concludes that the Brockton AWRF’s nitrogen discharges “cause, have a reasonable potential to cause, or contribute” to nitrogen-related water quality violations in the Taunton River Estuary. Therefore, an effluent limit must be included in the permit.

EPA notes that the reduction in loads associated with the Brockton AWWF upgrade has resulted in about a 17% reduction in the total load to the Taunton River estuary. EPA commends this voluntary reduction, which is a significant step (although not sufficient in itself, see section f.ii below) towards achieving the necessary load reductions in this watershed.

*f. Effluent limitation calculation*

EPA's calculation of an effluent limitation for nitrogen consists of two parts. First, EPA determines a threshold nitrogen concentration in the water body that is consistent with unimpaired conditions. Second, EPA determines the allowable load from watershed sources generally, and this facility specifically, that will result in receiving water concentrations at or below the allowable threshold.

*i. Threshold nitrogen concentration*

To determine an appropriate threshold concentration, EPA applies the procedure developed by the Massachusetts Estuaries Project ("MEP") of identifying a target nitrogen concentration threshold based on a location within the estuary where water quality standards are not violated, in order to identify a nitrogen concentration consistent with unimpaired conditions. See, e.g., SMAST/MassDEP, Massachusetts Estuaries Project Linked Watershed-Embayment Modeling to Determine Critical Nitrogen Loading Thresholds for Stage Harbor, Sulphur Springs, Taylors Pond, Bassing Harbor and Muddy Creek, Chatham, MA (2003) at 227 ("the nitrogen level associated with high and stable habitat quality typically derived from a lower reach of the same system or an adjacent embayment is used as the nitrogen concentration target").<sup>19</sup> This approach is consistent with EPA guidance regarding the use of reference conditions for the purposes of developing nutrient water quality criteria. The MEP process also distinguishes areas where eelgrass restoration is targeted, which generally require much lower TN concentrations. The Taunton River Estuary is classified as an SB water and is not a location where eelgrass has historically been found.<sup>20</sup> Therefore the primary water quality parameter considered in determining a reference location is protection of DO conditions, with algae growth (chlorophyll) and water clarity also considered. EPA notes that concentrations previously found to be protective of DO in other southeastern Massachusetts estuaries have ranged between 0.35 and 0.55 mg/l.<sup>21</sup>

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<sup>19</sup> The Massachusetts Estuaries Project use the term "sentinel" location to describe the critical location(s) that are targeted for nitrogen reductions, such that "restoration or protection of the sentinel sub-embayment will necessarily create high quality habitat throughout the estuary."

<sup>20</sup> Known historic eelgrass locations within Mount Hope Bay are located on the western portion of the Bay, including the mouths of the Kickamuit, Cole and Lee Rivers, and in the Sakkonet River. See Restoration Sites and Historical Eelgrass Distribution in Narragansett Bay, Rhode Island (2001), <http://www.edc.uri.edu/restoration/images/maps/historiceelgrass.pdf>. Water quality based TN thresholds would be lower in those areas to protect eelgrass habitat. The DO-based thresholds used for development of permit limits will also protect eelgrass in those locations due to much greater dilution of the Taunton River discharges in those areas of the Bay.

<sup>21</sup> See, e.g. MassDEP, *FINAL West Falmouth Harbor Embayment System Total Maximum Daily Loads For Total Nitrogen* (2007) (Harbor Head threshold 0.35 – SA water); MassDEP, *Oyster Pond Embayment System Total Maximum Daily Loads For Total Nitrogen* (2008) (threshold 0.55).

Data from the SMAST monitoring program indicates widespread DO violations at a range of TN concentrations. Table 5 of the SMAST report (Table 4 of this Fact Sheet above) provides the three year period 20% low DO concentration, which was below the 5 mg/l water quality standard at four stations, with long term average TN concentrations ranging from 0.486 to 1.058 mg/l. However, EPA does not consider a three year, 20% low DO to be a sufficiently sensitive indicator of water quality violations because the water quality criteria are based on a minimum DO concentration of 5 mg/l.

Closer examination of the SMAST monitoring data indicates multiple stations with minimum DO violations during the year with corresponding TN mean concentrations below 0.48 mg/l. Indeed minimum DO concentrations of less than 5.0 mg/l were encountered at all but one site (MHB16) during the three year monitoring program. See Table 5.

In addition, DO concentrations from the fixed site monitoring station indicate extensive periods with DO below 5.0 mg/l in 2005 and 2006 (the datasonde was not operating in 2004). EPA considers fixed site monitoring to be superior to intermittent sampling data with respect to DO concentrations because the continuous monitoring includes critical conditions and time periods (e.g. early morning DO minimums) that are generally missed in intermittent sampling. The SMAST monitoring station that is closest to the fixed site station is MHB13. The average TN concentration at MHB13 between 2004 and 2006 was 0.473 mg/l, indicating that the threshold concentration must be lower than that value.

This is consistent with SMAST findings based on the entire tropic health index, which includes indices for water clarity (secchi depth) and algae. SMAST determined that stations MHB15 and MHB16 had the highest eutrophication index values, consistent with moderate water quality. See Table 7 of the SMAST report which is shown as Figure 10 of this Fact Sheet..

Figure 10. SMAST Trophic health index scores for Mount Hope Bay

Table 7 Trophic health index scores and status for water quality monitoring stations, Mt. Hope Bay, 2004-2006 (described in Howes et al. 1999 and also at www.savebuzzardsbay.org.)							
Station	Secchi SCORE	Low20% Oxsat SCORE	DIN SCORE	TON SCORE	T-Pig SCORE	EUTRO Index	Health Status
MHB1	52.2	57.8	0.0	36.5	0.0	29	Fair/Poor
MHB2	67.7	58.5	19.3	28.7	0.0	35	Mod/Fair
MHB3	62.1	79.4	29.0	39.1	0.0	42	Mod
MHB4	62.0	79.0	51.5	28.7	0.0	44	Mod
MHB5	61.2	71.8	44.9	34.2	0.0	42	Mod
MHB6	65.7	73.5	24.9	17.0	0.0	36	Mod/Fair
MHB7	61.5	87.9	55.4	24.8	0.0	46	Mod
MHB8	61.7	65.3	53.5	39.1	0.0	44	Mod
MHB9	ND	ND	19.6	0.0	0.0	ND	ND
MHB10	60.4	89.4	70.7	29.1	0.0	50	Mod
MHB11	61.6	66.2	68.5	39.8	0.0	47	Mod
MHB12	58.5	78.2	54.1	37.1	0.0	46	Mod
MHB13	57.4	89.9	63.4	40.6	0.0	50	Mod
MHB14	58.8	73.0	63.3	27.5	0.0	45	Mod
MHB15	68.6	92.8	68.3	48.1	0.0	56	Mod
MHB16	65.6	95.5	55.8	45.9	0.0	53	Mod
MHB17	ND	ND	22.5	3.3	0.0	ND	ND
MHB18	47.1	58.0	0.0	36.1	0.0	28	Fair/Poor
MHB19	36.9	54.6	0.0	19.1	0.0	22	Fair/Poor
MHB20	30.5	60.7	0.0	8.1	0.0	20	Fair/Poor
MHB21	24.1	43.5	0.0	0.0	0.0	14	Fair/Poor
MHBMOOR	57.4	84.0	57.1	33.3	0.0	46	Mod

High Quality = >69; High/Moderate = 61-69; Moderate = 39-61; Moderate/Fair = 31-39; Fair/Poor = <31

On the basis of these data, EPA determined that station MHB16 was appropriate as a reference site where dissolved oxygen standards were met, and that a total nitrogen concentration of **0.45 mg/l** (the average of 2004-05 concentrations) represents the threshold protective of the dissolved oxygen water quality standard of 5.0 mg/l. Higher TN concentrations are associated with multiple DO violations, based on the available monitoring data. EPA notes that this value is within the range of target nitrogen thresholds previously determined in southeastern Massachusetts embayments, and is also consistent with TN concentration thresholds to protect dissolved oxygen standards identified in other estuaries.<sup>22</sup>

ii. Allowable TN load

EPA next determined an allowable total nitrogen load from the watershed that would result in TN concentrations at or below the 0.45 mg/l TN threshold. To do so, EPA applied a steady state

<sup>22</sup> EPA notes that a probable range of criteria for total nitrogen “in the vicinity of 0.35 to 0.40 mg/l” is suggested in Deacutis & Pryor, *Nutrient Conditions in Narragansett Bay & Numeric Nutrient Criteria Development Strategies for Rhode Island Estuarine Waters* (2011). While this range is lower than the endpoint identified by EPA for this analysis EPA believes the site specific information supports the 0.45 mg/l target. NHDES identified a target of 0.45 mg/l TN to protect DO conditions in the Great Bay estuary, NHDES, *Draft Numeric Nutrient Criteria for the Great Bay Estuary* (2009), although that draft numeric nutrient criterion is no longer used in 305(b) and 303(d) water quality assessments in the Great Bay estuary, see Settlement Agreement and Release, NH Supreme Ct No. 2013-0119 (2014).

ocean water dilution model based on salinity, from Fischer et al. (1979). A similar approach was used by the New Hampshire Department of Environmental Services to develop loading scenarios for the Great Bay Estuary (NHDES, 2009). The basic premise is that steady state concentrations of nitrogen in an estuary will be equal to the nitrogen load divided by the total water flushing rate from freshwater and ocean water. Estuaries are complicated systems with variability due to tides, weather, and stream flows. However, by making the steady state assumption, it is not necessary to model all of these factors. The steady state assumption can be valid for calculations based on long term average conditions, which approximate steady state conditions.

Salinity data is used to determine the proportion of fresh and ocean water in the estuary. Freshwater input is calculated from streamflow measurements at USGS gages in the watershed. Then, ocean water inputs are estimated using salinity measurements and the freshwater inputs. The total flushing rate is then used with the target nitrogen threshold to determine the total allowable load to the estuary. For this calculation, salinity at Station MHB19 during 2004-05<sup>23</sup> was used to represent the reference location for meeting the target threshold, because it is the uppermost station that appears clearly nitrogen limited based on the Mount Hope Bay Monitoring Program data.

Freshwater Flow: Average freshwater flow input to the estuary in the summers of 2004 and 2005 is shown in Table 8. Freshwater flows at the mouths of the river is determined based on the USGS streamgage data using a drainage area ratio calculation as follows:

$$\text{Flow at mouth} = \text{Flow at USGS gage} * \text{Drainage area at mouth} / \text{Drainage area at gage}$$

Table 8. Average Freshwater Flow 2004-05

	1 Taunton River (Bridge- water) <i>USGS Gage</i>	2 Taunton River (area to mouth of estuary minus tributaries) <i>Drainage Area calculation</i>	3 Three Mile River (North Dighton) <i>USGS Gage</i>	4 Three Mile River (mouth) <i>Drainage Area calculation</i>	5 Segre- ganset River (Dighton) <i>USGS Gage</i>	6 Segre- ganset River (mouth) <i>Drainage Area calculation</i>	7 Assonet River (dam) <i>based on Segregansett</i>	8 Quequechan River (mouth) <i>based on Segregansett</i>	Total Fresh- water Flow (Sum of Columns 2 4+6+ 7+8)
Drainage Area	261 sq. miles	410 sq. miles	84 sq. miles	85 sq. miles	10.6 sq. miles	14.9 sq. miles	21.9 sq. miles	30.5 sq. miles	
2004	195 cfs	306 cfs	54 cfs	55 cfs	4.4 cfs	6.1 cfs	9.0 cfs	12.6 cfs	<b>389 cfs</b>
2005	217 cfs	341 cfs	55 cfs	56 cfs	4.6 cfs	6.4 cfs	9.4 cfs	13.1 cfs	<b>427 cfs</b>
							Average:		<b>408 cfs</b>

Salinity: A mass balance equation is applied as follows:

Average salinity at ocean boundary (Rhode Island Sound) = 30 ppt (Kincaid and Pockalny, 2003)

<sup>23</sup> As discussed above, 2004-05 represent a typical year.

Average salinity at MHB19 in Taunton River Estuary for 2004-05 = 22.35 ppt

Average freshwater flow 2004-05 (Table 8) = 408 cfs

$(30 \text{ ppt} * X \text{ cfs} + 0 \text{ ppt} * 408 \text{ cfs}) / (408 \text{ cfs} + X) = 22.35 \text{ ppt}$

$X = 1,192 \text{ cfs ocean water}$

Nitrogen Target: The nitrogen target load in lbs per day is calculated by combining all water inputs and multiplying by the threshold concentration and the appropriate conversion factors.

$(408 \text{ cfs} + 1,192 \text{ cfs}) * (0.646) * (8.34) * (0.45 \text{ mg/l}) = 3,879 \text{ lbs/day}$

The nitrogen concentration at the seaward boundary is 0.28 mg/l (from Oviatt, et al., *Annual Primary Production in Narragansett Bay with no Bay-Wide Winter-Spring Phytoplankton Bloom* (2001)). The ocean load can then be calculated:

$\text{Ocean load} = 1,192 \text{ cfs} * (0.646) * (8.34) * (0.28 \text{ mg/l}) = 1,798 \text{ lbs/day}$

Based on the overall flow of the estuary (average of summers 2004 and 2005), the allowable TN load to the Taunton River Estuary, including both ocean and watershed loads, is 3,879 lbs/day.<sup>24</sup> The load from the ocean is 1,798 lbs/day, leaving an allowable load of **2,081** lbs/day from watershed sources. As noted above, actual loads in 2004-05 averaged 4,228 lbs/day. This means a reduction in watershed loads of 2,147, or approximately 51% from the 2004-05 baseline, is required in order to meet water quality standards in the Taunton River Estuary.<sup>25</sup> The Brockton AWRP upgrade already completed has reduced loads by approximately 17%, which while a significant step forward is not expected to be sufficient to achieve water quality standards in the estuary without substantial additional reductions. The ongoing monitoring in Mount Hope Bay indicates that this prediction is correct; the continuous DO and chlorophyll monitoring at the Mount Hope Bay NBFSMN station indicates that high chlorophyll concentrations and accompanying DO depletions in bottom waters have continued subsequent to completion of the upgrade in 2010. See part d above for charts of datasonde data.

The required load reduction is greater than the load discharged from any single facility and can be achieved only through permit limits on multiple facilities. Furthermore, the reduction should be fairly allocated among all discharges to the estuary. EPA notes that all the wastewater treatment plants contributing to the Taunton River are due for permit reissuance, and it is EPA's intent to include nitrogen limits in those permits as appropriate, consistent with this analysis. In doing so, EPA considers not only the facility's current discharges, but their potential discharges under their approved design flows. As this analysis considers summer flows only, an estimated summer flow is calculated at 90% of design flow, consistent with the analysis done by the Rhode

<sup>24</sup> To provide a check on this calculation, EPA calculated the predicted TN concentration in the estuary using calculated loads from 2004-05 using the same mass balance equation. Using the calculated watershed load of 4,228 lbs/day and an ocean load of 1,803 lbs/day as calculated above, the predicted concentration in the estuary is 0.70 mg/l. The monitoring data indicates that the average TN concentration was 0.73 mg/l, within 5% of the predicted value.

<sup>25</sup> Ocean loads are not considered controllable.

Island Department of Environmental Management (RIDEM) for Narragansett Bay facilities. (RIDEM, 2004) See Table 9. This accounts for the fact that a facility discharging at an annual average flow equal to its design flow will average less than design flow during the drier summer months.

For purposes of allocating the required load reduction, EPA first notes that nonpoint sources are unlikely to be reduced by 51% (the overall reduction required in the estuary), and that therefore a higher proportion of the reduction will be allocated to wastewater point sources in the estuary. This is consistent with approaches in approved TMDLs in Massachusetts and elsewhere. EPA considers a 20% nonpoint source reduction to be a reasonably aggressive target for nonpoint source reduction in this watershed based on the prevalence of regulated MS4 stormwater discharges, trends in agricultural uses and population, and potential reductions in atmospheric deposition through air quality programs. EPA notes that should nonpoint source reductions fail to be achieved, permit limits for WWTPs in the watershed shall be revisited to ensure that water quality standards are met.

Using the baseline NPS load of 1,428 lbs/day from 2004-05, a 20% reduction would result in a NPS load of 1,142 lbs/day. This leaves an available load for wastewater discharges of 939 lbs/day. Of the eleven facilities discharging to the watershed, five are minor discharges (< 1 MGD) with a combined load of less than 50 lbs/day. These facilities are considered de minimis contributors for the purposes of this analysis and are not analyzed further here.

To determine an equitable load allocation, EPA first determined the permit limit that would be required to meet the allowable load if a uniform limit were applied to all facilities. While permit limits are generally set to be more stringent on larger dischargers/direct discharges to impaired waters, calculating a uniform limit allows EPA to determine the range of options for permit limits. As shown in Table 9 below, a uniform permit limit on all discharges > 1 MGD in the Taunton would have to be between 3.4 and 3.5 mg/l for the allowable loading threshold to be met. For the largest discharges such as Taunton and Brockton, therefore, a 3.4 mg/l limit represents the upper bound of possible discharge concentrations to meet the water quality requirement. For a lower bound on potential permit limits, EPA notes that the currently accepted limit of technology (LOT) for nitrogen removal is 3.0 mg/l.

Table 9. Delivery Factors and Loads under Permit Limits

WWTF	Design Flow (MGD)	Percent delivered to estuary	Limit assumption: 3.3	Limit assumption: 3.4	Limit assumption: 3.5
Taunton	8.4	100%	208	214	221
Somerset	4.2	100%	104	107	110
Brockton	18	89%	397	409	421
Bridgewater	1.44	96%	34	35	36
Mansfield	3.14	83%	65	67	69
Middleboro	2.16	92%	49	51	52
Smaller facilities (at 04-05 loads)			46	46	46
Total			903	929	955

Given the determination that the maximum possible limit for larger facilities is less than 4 mg/l, and that upgrades to meet the most stringent permit limits are more cost-effective at facilities with the highest flows and highest proportion of the load delivered to the estuary, EPA has concluded that a permit limit based on the LOT of 3.0 mg/l is required for the larger dischargers of nitrogen to the estuary. (Effluent limits for the smaller dischargers are calculated based on an assumption of the Taunton and Brockton facilities achieving 3.0 mg/l.)

To put this limit in context, Table 10 shows an example permitting scenario that would meet the allowable loading threshold.

Table 10. Load Allocation Scenario to Meet Load Target

WWTF	Design Flow (MGD)	Percent delivered to estuary	Potential permit limit	Load discharged (lbs/day) at 90%	Load delivered to Estuary
Brockton	18	89%	3.0	405	361
Taunton	8.4	100%	3.0	189	189
Somerset	4.2	100%	3.7	117	117
Mansfield	3.14	83%	5.0	118	98
Middleboro	2.16	92%	5.0	81	74
Bridgewater	1.44	96%	5.0	54	52
Smaller facilities (at current loads)					46
Total					937

In this particular example permit limits for the Brockton AWRF (the largest discharger), and Taunton WWTP (the second largest discharge and a direct discharger to the estuary) are based on an effluent concentration of 3.0 mg/l. Somerset WWTP (the third largest discharge and a direct discharger to the estuary) is set at 3.7 mg/l; and the remaining three facilities (Bridgewater, Mansfield and Middleborough) are set at 5.0 mg/l. Final determinations as to the permit limits on facilities other than the Brockton AWRF will be made in each individual permit issuance.

For these reasons, EPA has included a monthly average total nitrogen limit of 450 lb/day (May to October<sup>26</sup>) in the draft permit, which is a mass load calculated on the basis of a 3 mg/l concentration in the effluent, considered the current limit of technology, at the design flow of 18 mgd. As the water quality analysis is based on total loads to the estuary and is not affected by

<sup>26</sup> The May to October seasonal period is consistent with other Narragansett Bay-related nitrogen limits. See Upper Blackstone Water Pollution Abatement District, MA01002369. The Mount Hope Bay Monitoring Program did not include May and October sampling, so those months were not explicitly included in the loading analysis. However, the Narragansett Bay Fixed Site Monitoring Program extends through October and includes limited data at the end of May and supports the need for permit limits in those months. For example, in 2006 chlorophyll-a concentrations in the last week of May averaged 13 ug/l with a maximum of 25 ug/l, with an average DO at the surface sonde of less than 5.0 mg/l. In 2005, chlorophyll-a concentrations from October 1 through 5 averaged 15 ug/l, with a maximum of 45 ug/l; DO concentrations measured at the near-bottom datasonde were less than 5.0 mg/l for approximately 5% of that time. The monthly average load limit is designed to ensure that the seasonal target is met.

variations in the amount of flow from the point sources,<sup>27</sup> a mass load-only limit is therefore protective of water quality, and is consistent with 40 CFR 122.45(f). The permittee must also report total nitrogen concentration as well as concentration and load for the nitrogen parameters nitrate, nitrite and TKN. The sampling frequency is two times per week. The permit contains a compliance schedule for meeting the nitrogen limit (See Permit Section 1.F).

Consistent with the seasonal analysis, EPA has not included nitrogen limits for the timeframe of November through April because these months are not the most critical period for phytoplankton growth. As noted earlier, EPA is imposing a condition requiring the permittee to optimize nitrogen removal during the wintertime. The summer limits and the winter optimization requirements will serve to keep the annual discharge load low. In combination, the numeric limitations and the optimization requirements are designed to ensure that the discharge does not cause or contribute to violations of applicable water quality standards, including narrative water quality criterion for nutrients, in accordance with Section 301(b)(1)(C) of the CWA.

EPA also notes that while the permit limit was set based on standards in the Taunton River Estuary, the limit is also protective of water quality standards in Mount Hope Bay under Massachusetts and Rhode Island water quality standards. Mount Hope Bay receives much greater dilution by ocean water, so that the nitrogen concentrations resulting from Taunton River loadings will be lower in the Bay than the 0.45 mg/l being met in the Taunton River Estuary. While other loads to Mount Hope Bay (particularly the Fall River WWTP) will need to be addressed as well, the reduction in nitrogen loadings from the Taunton River will ensure that those discharges do not cause or contribute to nitrogen-related impairments in Mount Hope Bay.

## 7. Ammonia-Nitrogen

The draft permit also carries over the ammonia-nitrogen limits of the current permit of 1 mg/l average monthly and average weekly, and 2 mg/l maximum daily (and corresponding load limits), in the June to September period, as well as average monthly limits of 3.2 mg/l in May, 6.3 mg/l in November, and 9.5 mg/l in December to April. EPA notes that the new 3 mg/l total nitrogen limits and optimization requirements, once in effect, should be sufficient to ensure that ammonia-nitrogen concentrations are below these limits. The facility had no violations of the permit limits in the period January 2011 to December 2013. See Table 1.

## 8. Metals

### a. Copper

The limits for copper in the existing permit were calculated based on the chronic and acute criteria set forth in the 1998 *National Recommended Water Quality Criteria*, pursuant to the MA SWQS in effect when the existing permit was issued in 2004. Since that time the Commonwealth of Massachusetts has issued, and EPA has approved, site-specific water quality criteria for copper for the Salisbury Plain River that are less stringent than the prior criteria. The new site

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<sup>27</sup> For example, the lowest recorded from the Brockton AWRP is approximately 12 mgd, a difference of 6 mgd from design flow conditions; this is less than one-half of one percent of the 1600 cfs in freshwater and ocean water dilution at the location of the load analysis and would not significantly change the resulting TN concentration.

specific criteria for copper establish a chronic criterion of 18.1 ug/l(dissolved, “d”),<sup>28</sup> and an acute criterion of 25.7 ug/l(d). The draft permit contains effluent limits of 8.5 ug/l(total recoverable “tr”)(monthly average) and 10 ug/l(tr)(maximum daily). The derivation of these limits is set forth below.

In determining the appropriate effluent limitation in response to this revised standard, EPA must apply the requirements of the revised state standard, as set forth in the Mass DEP *Protocol for and Determination of Site-Specific Copper Criteria for Ambient Waters in Massachusetts*, January 2007 (the “site-specific protocol”), and the requirements of the anti-backsliding provisions of the Clean Water Act §§ 402(o) and 303(d)(4).

*Site-Specific Protocol:* In determining effluent limitations under the revised standard, the site-specific protocol allows for relaxation of permit limits to reflect the higher criteria only to the extent required to reflect the actual performance that the facility has been able to achieve. It states:

[A]s part of the site-specific criteria, all reasonable efforts to minimize the loads of metals, and copper in this case, are part of the criteria revision protocol. So, the Department on a case-by-case basis will develop permit copper limits. Each determination will be based not only on the adjusted concentration resulting from the appropriate multiplier but will reflect the demonstrated level of copper reduction routinely achievable at the facility in order to minimize copper loads and thereby reduce its accumulation in the sediment.

Thus, determination of the appropriate effluent limits under the site-specific protocol requires calculating both (i) the required effluent limits that would meet the numeric criteria (criteria-based limits) and (ii) the actual effluent concentrations achieved by the facility (performance-based limits), and selecting the more stringent of the two.

*Anti-backsliding:* The reissuance of a permit with less stringent effluent limits must meet the requirements of the Clean Water Act’s anti-backsliding provision, § 402(o), which allows relaxation of water quality based standards only if they comply with CWA § 303(d)(4), and only if the revised limit meets current effluent guidelines and will not cause a violation of water quality standards.<sup>29</sup> The Massachusetts antidegradation policy is set forth in 314 CMR § 4.04, providing, *inter alia*, “[i]n all cases existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.”

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<sup>28</sup> Water quality criteria for copper are expressed in terms of dissolved metals. However, permit limitations for copper are expressed in terms of total recoverable metals in accordance with the requirements of 40 CFR § 122.45(c). As such, conversion factors are used to develop total recoverable limits from dissolved criteria. The conversion factor reflects how the discharge of a particular metal partitions between the particulate and dissolved form after mixing with the receiving water. In the absence of site-specific data describing how a particular discharge partitions in the receiving water, a default assumption equivalent to the criteria conversion factor is used in accordance with the *Metal Translator Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (USEPA 1996 [EPA-823-B96-007]). Therefore, a conversion factor of 0.960 was used to convert between total recoverable and dissolved copper concentrations. Dissolved concentrations are denoted ug/l(d), while total recoverable concentrations are denoted ug/l(tr)

<sup>29</sup> The anti-backsliding rule also contains a number of exceptions that are not applicable here. See CWA § 402(o)(2); 40 CFR § 122.44(l).

The analysis under the site-specific protocol addresses the anti-backsliding and antidegradation requirements by relaxing the copper limits to the more stringent of the limits necessary to achieve the revised criteria, or to the limits that have historically been achieved by the facility (unless the facility has historically discharged an effluent concentration lower than the current permit limits, in which those limits are retained). Because any relaxed limits will result in attainment of the site-specific criteria and not be less stringent than the facility's current performance, the facility will not be able to scale back its efforts to reduce copper concentrations in the effluent. Therefore, the less stringent limits will not have the result of exceeding the revised criteria or worsening water quality in the receiving water, and the antidegradation requirement will be met.

As set forth above, the effluent limitations are determined by calculating both (i) the required effluent limits that would meet the numeric criteria (criteria-based limits) and (ii) the actual effluent concentrations achieved by the facility (performance-based limits), and selecting the more stringent of the two. The only exception to this procedure is if the actual effluent concentration is lower than the current (non site-specific) limits, then the current limits are retained in the permit

*Criteria-based calculation.* The criteria-based limits are calculated based on dilution under 7Q10 conditions, assuming a receiving water concentration of 8 ug/l based on the median receiving water result reported in the WET test reports:

Calculation of acute limit for copper:

Acute criteria (dissolved) = 25.7 ug/l(d)

7Q10 flow = 0.39 mgd

Design flow = 18.0 mgd

Criteria for total recoverable copper = 25.7 ug/l(d)/0.960 = 26.8 ug/l (tr)

Effluent limit = [(18 + 0.39 mgd)\*26.8 ug/l - 0.39 mgd \* 8 ug/l]/18 = 27.2 ug/l

Calculation of chronic limit for copper:

Chronic criteria (dissolved) = 18.1 ug/l(d)

7Q10 flow = 0.39 mgd

Design flow = 18.0 mgd

Criteria for total recoverable copper = 18.1 ug/l(d)/0.960 = 18.85 ug/l (tr)

Effluent limit = [(18 + 0.39 mgd)\*18.85 ug/l - 0.39 mgd \* 8 ug/l]/18 = 19.1 ug/l

*Performance-based calculation.* The level of copper removal routinely achieved by the facility (i.e., the past demonstrated performance of the facility) is determined by a statistical analysis of discharge data submitted by the facility over the three-year period from January 2011 through December 2013, using the methodology set forth in the *Technical Support Document for Water Quality-based Toxics Control*, EPA/505/2-90-001 (March 1991) (Appendix E). The average monthly and maximum daily limits are based on the 95th and 99th percentile of a lognormal distribution, based on the facility's monthly average effluent data as shown in Table 11. These calculations indicate that limits based solely on past performance would result in a monthly average limit of 8.5 ug/l(tr) and a maximum daily limit of 10 ug/l(tr).

**Table 11. Copper Performance Data and Statistical Analysis**

Month end	mg/l	ln(mg/l)
01/31/2011	4.	1.3862944
02/28/2011	5.8	1.7578579
03/31/2011	4.	1.3862944
04/30/2011	6.3	1.8405496
05/31/2011	8.	2.0794415
06/30/2011	5.8	1.7578579
07/31/2011	5.8	1.7578579
08/31/2011	6.2	1.8245493
09/30/2011	7.5	2.014903
10/31/2011	6.8	1.9169226
11/30/2011	4.6	1.5260563
12/31/2011	2.	0.6931472
01/31/2012	6.5	1.8718022
02/29/2012	6.8	1.9169226
03/31/2012	5.8	1.7578579
04/30/2012	5.	1.6094379
05/31/2012	8.2	2.1041342
06/30/2012	5.8	1.7578579
07/31/2012	6.	1.7917595
08/31/2012	6.	1.7917595
09/30/2012	6.3	1.8405496
10/31/2012	6.2	1.8245493
11/30/2012	5.8	1.7578579
12/31/2012	5.8	1.7578579
01/31/2013	5.6	1.7227666
02/28/2013	5.	1.6094379
03/31/2013	5.	1.6094379
04/30/2013	6.2	1.8245493
05/31/2013	6.2	1.8245493
06/30/2013	6.3	1.8405496
07/31/2013	6.6	1.8870696
08/31/2013	6.	1.7917595
09/30/2013	6.8	1.9169226
10/31/2013	5.8	1.7578579
11/30/2013	5.	1.6094379
12/31/2013	5.	1.6094379
Mean of ln(data)		1.74244
Std deviation		0.239225
95th percentile	<b>8.465222</b>	2.135966
99th percentile	<b>9.963005</b>	2.298879

*Resulting Effluent Limitation.* As noted above, pursuant to the site-specific protocol, effluent limits will be relaxed only to the more stringent of the criteria-based or performance-based limits. In this case the performance-based limits are more stringent with respect to both the chronic and acute criteria. The draft permit therefore includes performance-based monthly average and maximum daily permit limits, as follows:

Monthly average: 8.5 µg/l(tr)  
Maximum daily: 10 µg/l(tr)

b. Other Metals

EPA also reviewed analytical data submitted in connection with the Brockton WET Reports to determine whether the facility discharges other toxic metals. Data from samples of the effluent and receiving water for the period February 2011 through November 2013 are set forth in Table 12 (attachment), along with the relevant water quality criteria for each parameter. The facility

discharges none of these metals at concentrations above the water quality criteria, so no limits are required.

Whole Effluent Toxicity (WET) - Under Section 301(b)(1)(C) of the CWA, discharges are subject to effluent limitations based on water quality standards. The MA SWQS include the following narrative statement and requires that EPA criteria established pursuant to Section 304(a)(1) of the CWA be used as guidance for interpretation of the following narrative criteria: “All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife.”

National studies conducted by the Environmental Protection Agency have demonstrated that domestic sources contribute toxic constituents to POTWs. These constituents include metals, chlorinated solvents and aromatic hydrocarbons among others. The Region’s current policy is to include toxicity testing requirements in all municipal permits, while Section 101(a)(3) of the CWA specifically prohibits the discharge of toxic pollutants in toxic amounts.

Based on the potential for toxicity resulting from domestic sewage, in accordance with EPA national and regional policy, and in accordance with MassDEP policy, the draft permit includes acute toxicity limitations and monitoring requirements. (See *Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants*, 50 Fed. Reg. 30,784 (July 24, 1985); EPA, *Technical Support Document for Water Quality-Based Toxics Control* (September, 1991); and MassDEP, *Implementation Policy for the Control of Toxic Pollutants in Surface Waters* (February 23, 1990)). EPA Region 1 has developed a toxicity control policy which requires wastewater treatment facilities to perform toxicity bioassays on their effluents. The principal advantages of biological techniques are: (1) the effects of complex discharges of many known and unknown constituents can be measure only by biological analyses; (2) bioavailability of pollutants after discharge is best measured by toxicity testing including any synergistic effects of pollutants; and (3) pollutants for which there are inadequate chemical analytical methods or criteria can be addressed. Therefore, toxicity testing is being used in conjunction with pollutant specific control procedures to control the discharge of toxic pollutants.

Pursuant to EPA, Region I and MassDEP policy, discharges having a dilution factor less than 100:1 (1.02 for this discharge) require acute and chronic toxicity testing and an acute LC<sub>50</sub> limit of  $\geq 100\%$ . The draft permit requires the permittee to conduct four chronic and acute WET tests per year. The tests use the species, Ceriodaphnia dubia, in accordance with existing permit conditions, and are to be conducted in accordance with the EPA Region 1 Toxicity protocol found in the draft permit Attachment A for the chronic test and Attachment B for the acute test. The prior permit’s use of the single “chronic (and modified acute)” test has been revised to two separate tests, consistent with the requirement to use approved test methods.

The permit also requires toxicity of an additional two samples per year, to be taken during a period when the plant’s daily flow exceeds 30 mgd. These samples may be taken in any month when such flows occur. The facility had no violations of the WET permit limits in the period January 2011 to December 2013 for regularly scheduled sampling, but had two violations of the chronic limit in the two samples taken at flows over 30 mgd. See Table 1.

The chronic no observable effects concentration (C-NOEC) limit is calculated to be greater than

or equal to the effluent concentration in the receiving water. The inverse of the receiving water concentration (chronic dilution factor) multiplied by one hundred is used to calculate the chronic C-NOEC as a percent limit.  $(1/1.02)(100) \geq 98\%$

## **VII. INDUSTRIAL PRETREATMENT PROGRAM**

The permittee is required to administer a pretreatment program based on the authority granted under 40 CFR 122.44(j), 40 CFR Part 403 and Section 307 of the Act. The permittee's pretreatment program received EPA approval on July 31, 1982 and, as a result, appropriate pretreatment program requirements were incorporated into the previous permit, which were consistent with that approval and federal pretreatment regulations in effect when the permit was issued.

The Federal Pretreatment Regulations in 40 CFR Part 403 were amended in October 1988, in July 1990, and again in October 2005. Those amendments established new requirements for implementation of pretreatment programs. Upon reissuance of this NPDES permit, the permittee is obligated to modify its pretreatment program to be consistent with current Federal Regulations. Those activities that the permittee must address include, but are not limited to, the following: (1) develop and enforce EPA approved specific effluent limits (technically based local limits); (2) revise the local sewer-use ordinance or regulation, as appropriate, to be consistent with Federal Regulations; (3) develop an enforcement response plan; (4) implement a slug control evaluation program; (5) track significant noncompliance for industrial users; and (6) establish a definition of and track significant industrial users.

These requirements are necessary to ensure continued compliance with the POTW's NPDES permit and its sludge use or disposal practices.

In addition to the requirements described above, the draft permit requires the permittee to submit to EPA in writing, within 180 days of the permit's effective date, a description of proposed changes to permittee's pretreatment program deemed necessary to assure conformity with current federal pretreatment regulations. These requirements are included in the draft permit to ensure that the pretreatment program is consistent and up-to-date with all pretreatment requirements in effect. Lastly, the permittee must continue to submit, annually by March 1, a pretreatment report detailing the activities of the program for the twelve month period ending 60 days prior to the due date.

## **VIII. OPERATION AND MAINTENANCE OF THE SEWER SYSTEM**

EPA regulations set forth a standard condition for "Proper Operation and Maintenance" that is included in all NPDES permits. *See* 40 CFR §122.41(e). This condition is specified in Part II.B.1 (General Conditions) of the draft permit and it requires the proper operation and maintenance of all wastewater treatment systems and related facilities installed or used to achieve permit conditions.

EPA regulations also specify a standard condition to be included in all NPDES permits that specifically imposes on permittees a "duty to mitigate." *See* 40 CFR § 122.41(d). This condition is specified in Part II.B.3 of the draft permit and it requires permittees to take all reasonable steps

– which in some cases may include operations and maintenance work - to minimize or prevent any discharge in violation of the permit which has the reasonable likelihood of adversely affecting human health or the environment.

Proper operation of collection systems is critical to prevent blockages and equipment failures that would cause overflows of the collection system (sanitary sewer overflows, or SSOs), and to limit the amount of non-wastewater flow entering the collection system (inflow and infiltration or I/I<sup>30</sup>). I/I in a collection system can pose a significant environmental problem because it may displace wastewater flow and thereby cause, or contribute to causing, SSOs. Moreover, I/I could reduce the capacity and efficiency of the treatment plant and cause bypasses of secondary treatment. Therefore, reducing I/I will help to minimize any SSOs and maximize the flow receiving proper treatment at the treatment plant. MassDEP has stated that the inclusion in NPDES permits of I/I control conditions is a standard State Certification requirement under Section 401 of the CWA and 40 CFR § 124.55(b).

Therefore, specific permit conditions have been included in Part I.B. and I.C. of the draft permit. These requirements include mapping of the wastewater collection system, preparing and implementing a collection system operation and maintenance plan, reporting unauthorized discharges including SSOs, maintaining an adequate maintenance staff, performing preventative maintenance, controlling infiltration and inflow to the extent necessary to prevent SSOs and I/I related-effluent violations at the wastewater treatment plant, and maintaining alternate power where necessary. These requirements are intended to minimize the occurrence of permit violations that have a reasonable likelihood of adversely affecting human health or the environment.

Several of the requirements in the new draft permit were not included in the current permit, including collection system mapping, and preparation of a collection system operation and maintenance plan. EPA has determined that these additional requirements are necessary to ensure the proper operation and maintenance of the collection system and has included schedules for completing these requirements in the draft permit.

Because Abington and Whitman each own and operate collection systems that discharge to the Brockton AWWF, these municipalities have been included as co-permittees for the specific permit requirements discussed in the paragraph above. The historical background and legal framework underlying this co-permittee approach is set forth in Attachment C to this Fact Sheet, EPA Region 1 NPDES Permitting Approach for Publicly Owned Treatment Works that Include Municipal Satellite Sewage Collection Systems.

## **IX. SLUDGE INFORMATION AND REQUIREMENTS**

Section 405(d) of the CWA requires that EPA develop technical standards regulating the use and disposal of sewage sludge. These regulations were signed on November 25, 1992, published in the Federal Register on February 19, 1993, and became effective on March 22, 1993. Domestic

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<sup>30</sup> “Infiltration” is groundwater that enters the collection system through physical defects such as cracked pipes, or deteriorated joints. “Inflow” is extraneous flow entering the collection system through point sources such as roof leaders, yard and area drains, sump pumps, manhole covers, tide gates, and cross connections from storm water systems.

sludge, which is land applied, disposed of in a surface disposal unit or fired in a sewage sludge incinerator, is subject to Part 503 technical standards. Part 503 regulations have a self-implementing provision; however Section 405(d) of the CWA requires that sludge conditions be included in all POTW permits. Domestic sludge, which is disposed of in a municipal solid waste landfill, is in compliance with Part 503 regulations, provided that the sludge meets the quality criteria of the landfill and the landfill meets the requirements of 40 C.F.R. Part 258.

The draft permit has been conditioned to ensure that sewage sludge use and disposal practices meet the CWA Section 405(d) Technical Standards. In addition, EPA-New England has prepared a 72-page document entitled “EPA Region I NPDES Permit Sludge Compliance Guidance” for use by the permittee in determining their appropriate sludge conditions for their chosen method of sewage sludge use or disposal practices. This guidance document is available upon request from EPA Region 1 and may be found at:

<http://www.epa.gov/region1/npdes/permits/generic/sludgeguidance.pdf>. The permittee is required to submit an annual report to EPA Region 1 and MassDEP, by February 19th each year, containing the information specified in the Sludge Compliance Guidance document for their chosen method of sewage sludge use or disposal practices.

The City of Brockton owns and operates a multiple hearth incinerator. The incinerator has the following air pollution control devices: a flue gas recirculation system, a VenturiPak wet scrubbing system and an enclosed feed screw conveyor. The City generates approximately 3,830 dry metric tons of sewage sludge annually. The resulting ash (approximately 240 dry metric tons annually) is disposed of at the Brockton AWWF Ash Landfill. Disposal of ash is not regulated by Part 503.

Subpart E of the Part 503 regulations outlines the standards for the incineration of sewage sludge. The permit contains general requirements, management practices, pollutant limitations, an operational standard, monitoring frequency, record keeping and reporting requirements implementing the provisions of the regulations. The basis of each provision is detailed below.

#### Pollutant Limitations:

The sludge standards regulate seven metals. The pollutant limits in the permit are based on the requirements in §503.43.

Mercury and beryllium are regulated by the National Emission Standard for Hazardous Air Pollutants (NESHAPs) found in 40 CFR Part 61. The permit requires that the firing of sewage sludge in the facility’s incinerators does not cause the violation of the NESHAPs for mercury and beryllium. The NESHAP for beryllium applies to each incinerator. The NESHAP for mercury applies to the facility.

The allowable sludge concentrations for arsenic, cadmium, chromium, and nickel are calculated from Equation (5) in §503.43(d):

$$C = \frac{RSC \times 86,400}{DF \times (1 - CE) \times SF} \quad \text{Eq. (5)}$$

Where:

- C = Daily concentration of pollutant in sewage sludge in mg/kg of total solids (dry weight basis)
- CE = control efficiency for the incinerator - based on performance tests
- DF = dispersion factor in micrograms per cubic meter per gram per second
- RSC = risk specific concentration in micrograms per cubic meter
- SF = sewage sludge feed rate in metric tons per day (dry weight basis)

The parameters, with the exception of RSC, are site specific to the Brockton's incinerator. The RSC is derived for each pollutant based on a risk assessment.

The RSC is the allowable increase in the average daily ground level ambient air concentration for a pollutant above background levels that result from the firing of sewage sludge in an incinerator. It is equivalent to the amount of a pollutant that a person living near the incinerator can inhale with a probability of 1 in 10,000 that the person will contract cancer as a result of inhaling the pollutant. The RSC was calculated from the equation below, which is found in the *Technical Support Document for Sewage Sludge Incineration* (EPA 822/R-93-003, November 1992):

$$RSC = \frac{RL \times BW}{Q^* \times I_a} \times 10^3$$

Where:

- RL = Risk Level,  $10^{-4}$
- BW = body weight, 70 kg (154 lbs), this is the average weight of an adult male
- $Q^*$  = allowable dose of a pollutant from EPA's Integrated Risk Information System database
- $I_a$  = inhalation rate, 20 m/day, normal inhalation rate for an adult male.

The RSC calculated from this equation is intended to protect the "Highly Exposed Individual" (HEI). The HEI is a person who remains for an extended period of time, 70 years, at the point of maximum ground level pollutant concentration. The RSC values for the regulated metals are found in Tables 1 and 2 of § 503.43 and are presented below.

<u>Pollutant</u>	<u>RSC (ug/m<sup>3</sup>)</u>
Arsenic	0.023
Cadmium	0.057
Chromium	0.65*
Nickel	2.0

\*Chromium RSC based on fluidized bed with wet scrubber

The sludge feed rate, dispersion factor and control efficiency (based on performance stack test) are:

Sludge Feed Rate: 189 dry g/sec = 16.3 metric tons/day  
Dispersion factor: 11.1 ug/m<sup>3</sup>/g/sec

<u>Pollutant</u>	<u>Control Efficiency (%)</u>
Arsenic	98.5
Cadmium	98.3
Chromium	99.9
Lead	99.9
Nickel	99.3

Based on the above parameters, the concentration limits for each pollutant are calculated below using Equation (5) in §503.43(d):

<u>Pollutant</u>	<u>Limit (mg/kg)</u>
Arsenic	732
Cadmium	1,601
Chromium	310,396
Nickel	136,438

The pollutant limit for lead is calculated using equation (4) of §503.43:

$$C = \frac{0.1 \times \text{NAAQS} \times 86,400}{\text{DF} \times (1 - \text{CE}) \times \text{SF}} \quad \text{Eq. (4)}$$

Instead of using an RSC, a percentage of the National Ambient Air Quality Standard (NAAQS) for lead was used. The NAAQS for lead (1.5 ug/m<sup>3</sup>) is found in 40 CFR § 50.12. Although lead is classified as a probable human carcinogen, the Clean Air Science Advisor Committee of the Science Advisory Board recommended that the NAAQS for lead be based on the noncarcinogenic effects. Developmental neurotoxicity is considered to be the most sensitive end point for lead exposure. The calculated concentration from equation (4) shown below also protects the HEI described above.

<u>Pollutant</u>	<u>Limit (mg/kg)</u>
Lead	71,630

The limits for arsenic, cadmium, chromium, and lead are less stringent than in the 2005 permit and the limit for nickel is more stringent. EPA has determined that these newly-developed limits are in accordance with antibacksliding exceptions found at 40 CFR § 122.44(l)(i)(A) & (B)[Material and Substantial Alterations & New Information]. After the 2005 permit was issued, the incinerator underwent a significant upgrade (including the construction of a new VenturiPak wet scrubbing system, a flue gas recirculation system, and an enclosed sludge feed screw conveyor. Subsequent to that upgrade, modeling and stack testing has provided new information used herein. For both of these reasons, the limits developed above are applied in the draft permit. Monitoring data submitted by the facility in the 2011 permit reapplication indicates that the facility should not have any problem complying with these limits.

Operational Standard:

The Part 503 regulations have an operational standard for total hydrocarbons (THC). Hydrocarbons are simple organic compounds containing carbon and hydrogen. The standard is

designed to regulate organic emissions from sewage sludge incinerators. Total hydrocarbons represent a subset of organic compounds and is used in the regulation since it is impractical to attempt to monitor sludges or stack emissions for all organic compounds which may be present.

The THC value must be corrected to seven percent oxygen and zero percent moisture. The correction to seven percent oxygen is used because seven percent is the standard amount of oxygen used to reference measurements of pollutant limits expressed as concentration; it is also equivalent to 50 percent excess air (excess air is air added to a system above the amount of air needed for complete combustion to occur); and without the correction, inaccurate readings may occur because the presence of the additional oxygen may dilute the THC reading. Similarly, the correction for moisture is needed since the presence of moisture can also dilute the actual THC reading. THC is conventionally expressed in terms of a dry volumetric basis, hence the need to set the standard based on zero moisture.

On February 25, 1994, §503.40 was amended. The amendment allows facilities to monitor carbon monoxide (CO) instead of THC. A facility can monitor for CO if the facility can meet a monthly average concentration CO limit of 100 parts per million on a volumetric basis. This limit, like the THC limit, is corrected to seven percent oxygen and zero percent moisture. The City of Brockton monitors THC.

#### Management Practices:

The permit contains management practices based on §503.45. They pertain to the operation of the incinerator. The management practices include maintaining the instruments which monitor CO, oxygen and temperature; proper operation of all air pollution control devices; and notification to EPA when the continuous monitoring equipment is not operational for a period of 72 hours or more.

The permit requires notification to EPA and the state if any monitoring equipment is broken or shut down for longer than 72 hours. It also prohibits adversely affecting a threatened or endangered species or their critical habitat. There are no known threatened or endangered species within the vicinity of the incinerator. Therefore, EPA has determined that the activity will not affect a threatened or endangered species.

The monitoring frequency is based on §503.46. The permittee is required to monitor heavy metals 6 times per year. The monitoring for mercury and beryllium is at the frequency required by 40 CFR Part 61. The record keeping requirements are based on §503.47.

## **X. UNAUTHORIZED DISCHARGES**

The draft permit authorizes discharges only from the outfalls listed in Part I.A.1 of the permit, in accordance with the terms and conditions therein. Discharges of wastewater from any other point sources are not authorized by the permit and shall be reported as set forth in Part I.B. in accordance with Section D.1.e. (1) of the General Requirements (Part II) of the permit (Twenty-four hour reporting).

## **XI. ENDANGERED SPECIES ACT**

Section 7(a) of the Endangered Species Act of 1973, as amended (ESA) grants authority to and imposes requirements upon Federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and habitat of such species that has been designated as critical (a "critical habitat"). The ESA requires every Federal agency, in consultation with and with the assistance of the Secretary of Interior, to insure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat.

EPA has reviewed the federal endangered or threatened species of fish, wildlife, or plants to determine if any listed species might potentially be impacted by the re-issuance of this NPDES permit. EPA has determined that no federally-listed or proposed, threatened or endangered species or critical habitat are known to occur in the Salisbury Plain River. Furthermore, the effluent limitations and other permit requirements identified in this Fact Sheet are designed to be protective of all aquatic species, and permit limits on total nitrogen have been included to protect the downstream waters of Mount Hope Bay and the Taunton River Estuary. Therefore EPA has determined that a consultation with USFWS and NMFS is not required.

## **XII. ESSENTIAL FISH HABITAT**

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq. (1998)), EPA is required to consult with the National Marine Fisheries Services (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes, may adversely impact any essential fish habitat as: waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. § 1802 (10)). Adversely impact means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. § 600.910 (a)). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855(b) (1) (A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. The Salisbury Plain River is not covered by the EFH designation for riverine systems, and permit limits on total nitrogen have been included to protect the downstream waters of Mount Hope Bay and the Taunton River Estuary. Therefore EPA has determined that a formal EFH consultation with NMFS is not required.

## **XIII. MONITORING AND REPORTING**

The effluent monitoring requirements have been established to yield data representative of the discharge under authority of Section 308 (a) of the CWA in accordance with 40 CFR §§ 122.41 (j), 122.44 (l), and 122.48.

The Draft Permit includes new provisions related to Discharge Monitoring Report (DMR) submittals to EPA and the State. The Draft Permit requires that, no later than six months after the effective date of the permit, the permittee submit all monitoring data and other reports

required by the permit to EPA using NetDMR, unless the permittee is able to demonstrate a reasonable basis, such as technical or administrative infeasibility, that precludes the use of NetDMR for submitting DMRs and reports (“opt-out request”).

In the interim (until six months from the effective date of the permit), the permittee may either submit monitoring data and other reports to EPA in hard copy form, or report electronically using NetDMR.

NetDMR is a national web-based tool for regulated CWA permittees to submit discharge monitoring reports (DMRs) electronically via a secure Internet application to U.S. EPA through the Environmental Information Exchange Network. NetDMR allows participants to discontinue mailing in hard copy forms under 40 CFR § 122.41 and § 403.12. NetDMR is accessed from the following url: <http://www.epa.gov/netdmr>. Further information about NetDMR, including contacts for EPA Region 1, is provided on this website.

EPA currently conducts free training on the use of NetDMR, and anticipates that the availability of this training will continue to assist permittees with the transition to use of NetDMR. To participate in upcoming trainings, visit <http://www.epa.gov/netdmr> for contact information for Massachusetts.

The Draft Permit requires the permittee to report monitoring results obtained during each calendar month using NetDMR, no later than the 15th day of the month following the completed reporting period. All reports required under the permit shall be submitted to EPA as an electronic attachment to the DMR. Once a permittee begins submitting reports using NetDMR, it will no longer be required to submit hard copies of DMRs or other reports to EPA and will no longer be required to submit hard copies of DMRs to MassDEP. However, permittees must continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP.

EPA has become aware that the requirement to submit reports as electronic attachments to DMRs using NetDMR has created confusion as to report due dates, as the report due dates generally differ from the DMR due date (the 15<sup>th</sup> of each month) and NetDMR does not allow submission of a report without a concurrently submitted DMR. Therefore, to assist in electronic reporting, EPA has added language to the Final Permit (Section I.G.1.a) stating that any report required under the permit shall be considered timely so long as it is electronically submitted with the next DMR submitted by the permittee following the permit report deadline.

The Draft Permit also includes an “opt-out” request process. Permittees who believe they can not use NetDMR due to technical or administrative infeasibilities, or other logical reasons, must demonstrate the reasonable basis that precludes the use of NetDMR. These permittees must submit the justification, in writing, to EPA at least sixty (60) days prior to the date the facility would otherwise be required to begin using NetDMR. Opt-outs become effective upon the date of written approval by EPA and are valid for twelve (12) months from the date of EPA approval. The opt-outs expire at the end of this twelve (12) month period. Upon expiration, the permittee must submit DMRs and reports to EPA using NetDMR, unless the permittee submits a renewed opt-out request sixty (60) days prior to expiration of its opt-out, and such a request is approved by EPA.

Until electronic reporting using NetDMR begins, or for those permittees that receive written approval from EPA to continue to submit hard copies of DMRs, the Draft Permit requires that submittal of DMRs and other reports required by the permit continue in hard copy format. Hard copies of DMRs must be postmarked no later than the 15th day of the month following the completed reporting period.

#### **XIV. STATE PERMIT CONDITIONS**

The NPDES Permit is issued jointly by the U. S. Environmental Protection Agency and the Massachusetts Department of Environmental Protection under federal and state law, respectively. As such, all the terms and conditions of the permit are, therefore, incorporated into and constitute a discharge permit issued by the MassDEP Commissioner.

#### **XV. GENERAL CONDITIONS**

The general conditions of the permit are based primarily on the NPDES regulations 40 CFR §§122 through 125 and consist primarily of management requirements common to all permits.

#### **XVI. STATE CERTIFICATION REQUIREMENTS**

EPA may not issue a permit unless MassDEP certifies that the effluent limitations included in the permit are stringent enough to assure that the discharge will not cause the receiving water to violate State water quality standards, or waives certification. EPA has requested permit certification by the State pursuant to 40 CFR §124.53 and expects the draft permit will be certified.

#### **XVII. COMMENT PERIOD, HEARING REQUESTS, AND PROCEDURES FOR FINAL DECISIONS**

All persons, including applicants, who believe any condition of the permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period to Susan Murphy, U.S. Environmental Protection Agency, 5 Post Office Square, Suite 100 (OEP06-1), Boston, MA 02109. Any person prior to such date may submit a request in writing for a public hearing to consider the draft permit to EPA and the State Agency. Such requests shall state the nature of the issues to be raised in the hearing. A public hearing may be held after at least thirty days public notice whenever the Regional Administrator finds that response to this notice indicates significant public interest. In reaching a final decision on the draft permit the Regional Administrator will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period, and after the public hearing, if held, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and to each person who has submitted written comments or requested notice.

### **XVIII. EPA CONTACT**

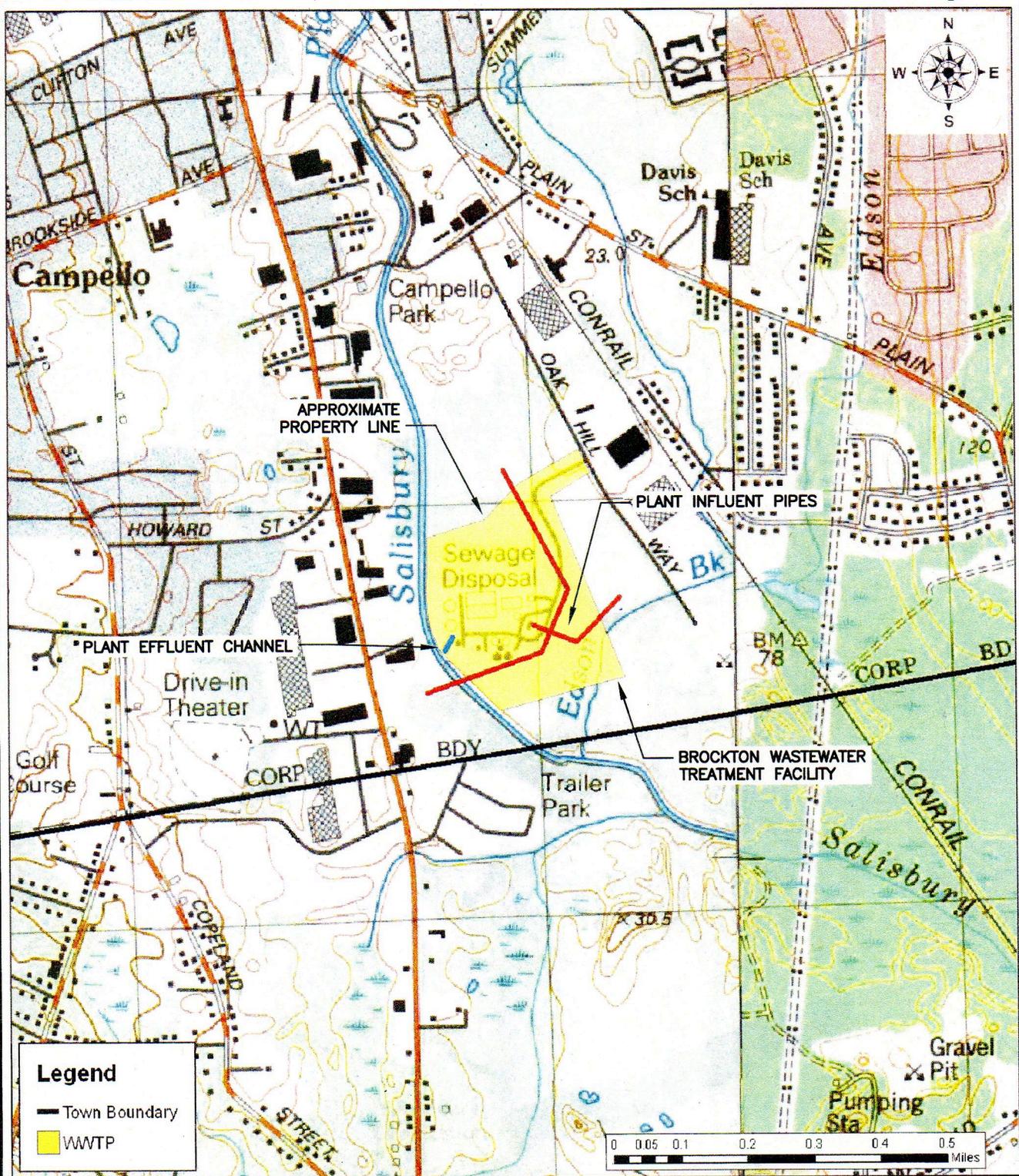
Requests for additional information or questions concerning the draft permit may be addressed Monday through Friday, between the hours of 9:00 a.m. and 5:00 p.m., to:

Susan Murphy  
U.S. Environmental Protection Agency  
5 Post Office Square, Suite 100 (OEP06-1)  
Boston, MA 02109  
Telephone: (617) 918-1534 Fax: (617) 918-0534  
Email: [murphy.susan@epa.gov](mailto:murphy.susan@epa.gov)

Claire Golden  
Massachusetts Department of Environmental Protection  
205B Lowell Street  
Wilmington, MA 01887  
Telephone: (978) 694-3244 Fax (978) 694-3498  
Email: [claire.golden@state.ma.us](mailto:claire.golden@state.ma.us)

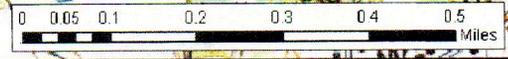
Ken Moraff, Director  
Office of Ecosystem Protection  
U.S. Environmental Protection Agency

February 2015



**Legend**

- Town Boundary
- WWTP



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 January, 2011  
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ORIGINAL SHEET - ANSI A

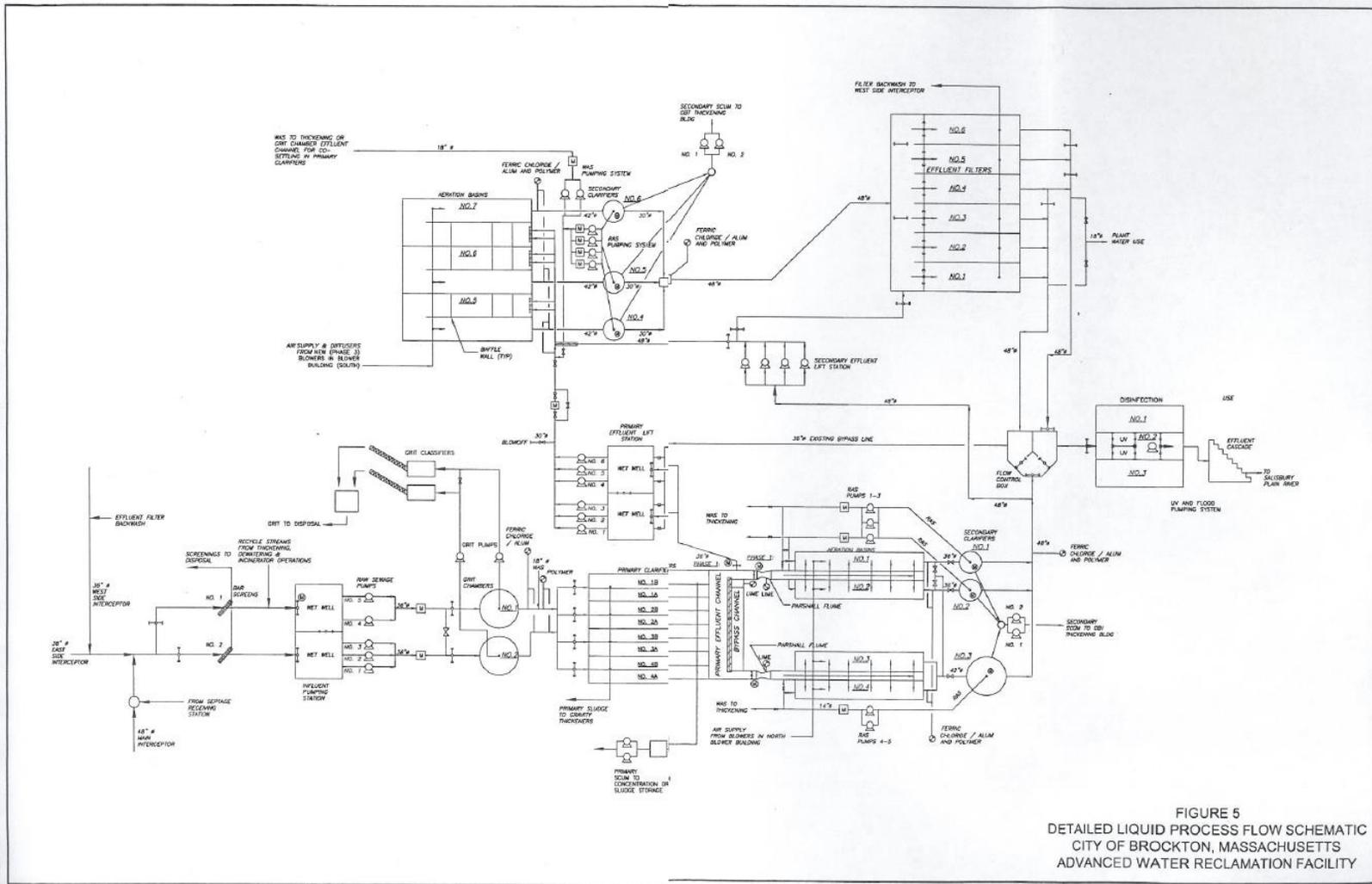


**Stantec Consulting Services Inc.**  
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 01886  
 Tel. 978.692.1913  
 Fax. 978.692.4578  
 www.stantec.com

Client/Project  
 CITY OF BROCKTON, MA  
 WWTF NPDES PERMIT RENEWAL

Figure No.  
 2.0

Title  
**SITE DETAILS**





**NPDES Permit No. MA0101010**  
**Fact Sheet Table 1**

Month	TSS (November 1 - April 30)					TSS	DO	pH			Fecal Coliform		TRC (only when used in treatment process)		Ammonia Nitrogen (June 1 to October 31)				
	Average Monthly	Maximum Daily	Average Monthly	Average Weekly	Maximum Daily	Percent Removal	Daily Min	Daily Min	Daily Max	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Average Monthly	Average Weekly	Max Daily	
	lb/day		mg/L			%	mg/L	SU			cfu/100mL		ug/L		lb/day		mg/L		
Jan-11	308	366	3	3	3	98	Test NR	6.7	7.1	Test not required		Test not required		Winter limit applies					
Feb-11	534	3140	3	4	13	97	Test NR	6.7	7.1	Test not required		Test not required		Winter limit applies					
Mar-11	451	2183	2	4	8	98	Test NR	6.6	7.2	Test not required		Test not required		Winter limit applies					
Apr-11	303	786	2	3	4	98	8.3	6.6	7.2	4	28	Test not required		Winter limit applies					
May-11	Summer limits apply					99	7.4	6.6	7.1	3	80	Test not required		May limit applies					
Jun-11	Summer limits apply					99	7	6.6	7.2	3	86	Test not required		4	6	0.04	0.05	0.06	
Jul-11	Summer limits apply					99	6.3	6.6	7	4	36	Test not required		22	86	0.24	0.69	0.99	
Aug-11	Summer limits apply					99	6.6	6.7	7.2	6	42	Test not required		5	10	0.05	0.08	0.11	
Sep-11	Summer limits apply					99	6.5	6.7	7.3	6	35	Test not required		5	9	0.05	0.07	0.09	
Oct-11	Summer limits apply					99	6.8	6.5	7.1	3	48	Test not required		15	33	0.11	0.17	0.25	
Nov-11	233	502	1	2	3	99	Test NR	6.6	7.2	Test not required		Test not required		November limit applies					
Dec-11	234	654	1	2	4	99	Test NR	6.5	7.3	Test not required		Test not required		Winter limit applies					
Jan-12	238	2121	2	3	17	99	Test NR	6.5	7.2	Test not required		Test not required		Winter limit applies					
Feb-12	138	240	1	1	2	99	Test NR	6.7	7.3	Test not required		Test not required		Winter limit applies					
Mar-12	135	294	1	1	2	99	Test NR	6.6	7.2	Test not required		Test not required		Winter limit applies					
Apr-12	119	311	1	1	3	99	Test NR	6.7	7.3	1	4	Test not required		Winter limit applies					
May-12	Summer limits apply					99	8	6.6	7.2	2	9	Test not required		May limit applies					
Jun-12	Summer limits apply					99	7.1	6.5	7.2	2	8	Test not required		7	17	0.06	0.07	0.14	
Jul-12	Summer limits apply					99	6.9	6.7	7.5	2	7	Test not required		7	9	0.07	0.1	0.1	
Aug-12	Summer limits apply					99	6.7	6.6	7.3	4	22	Test not required		8	18	0.09	0.1	0.21	
Sep-12	Summer limits apply					99	6.7	6.6	7.2	12	65	Test not required		28	67	0.33	0.47	0.8	
Oct-12	Summer limits apply					99	6.8	6.6	7.1	5	27	Test not required		17	63	0.19	0.37	0.69	
Nov-12	145	308	1	2	3	99	Test NR	6.6	7.1	Test not required		Test not required		November limit applies					
Dec-12	195	1300	2	2	8	99	Test NR	6.6	7	Test not required		Test not required		Winter limit applies					
Jan-13	204	681	2	4	5	99	Test NR	6.5	7	Test not required		Test not required		Winter limit applies					
Feb-13	564	0	2	1	18	98	Test NR	6.5	7.1	Test not required		Test not required		Winter limit applies					
Mar-13	910	0	3	9	16	97	Test NR	6.5	7.4	Test not required		Test not required		Winter limit applies					
Apr-13	188	314	2	2	3	99	Test NR	6.6	7	2	33	Test not required		Winter limit applies					
May-13	Summer limits apply					99	7.1	6.6	7.1	2	7	Test not required		May limit applies					
Jun-13	Summer limits apply					99	8.8	6.6	7.1	2	11	Test not required		9	33	0.06	0.1	0.15	
Jul-13	Summer limits apply					99	6.7	6.5	7.1	1	6	Test not required		13	58	0.13	0.24	0.59	
Aug-13	Summer limits apply					99	6.8	6.5	7.1	6	61	Test not required		33	113	0.32	1	1.2	
Sep-13	Summer limits apply					99	6.3	6.6	7.2	5	27	Test not required		14	32	0.16	0.25	0.36	
Oct-13	Summer limits apply					100	6.5	6.5	7	4	17	Test not required		14	54	0.19	0.09	0.74	
Nov-13	147	508	2	3	5	99	Test NR	6.5	6.9	Test not required		Test not required		November limit applies					
Dec-13	204	426	2	2	3	99	Test NR	6.5	7	Test not required		Test not required		Winter limit applies					
Existing Permit Limit	2250	4500	15	25	30	>85%	>6.0	6.5	8.3	200	400	0.011	0.019	150	225	1.0	1.0	1.5	
Minimum	119	0	1	1	2	97	6.3	6.5	6.9	1	4	N/A	N/A	4	6	0.04	0.05	0.06	
Maximum	910	3140	3	9	18	100	8.8	6.7	7.5	12	86	N/A	N/A	33	113	0.33	1.0	1.2	
Average	291.7	785.2	1.8	2.7	6.7	98.8	7	6.6	7.2	3.8	31.4	N/A	N/A	13.4	40.5	0.1	0.257	0.4	
Standard Deviation	203.9	857	0.7	1.9	5.5	0.6	0.7	0.1	0.1	2.5	24.7	N/A	N/A	8.7	32	0.1	0.274	0.4	
Number of Measurements	18	18	18	18	18	36	19	36	36	21	21	N/A	N/A	15	15	15	15	15	
Number of Exceedences	0	0	0	0	0	0	0	0	0	0	0	N/A	N/A	0	0	0	0	0	

Month	Ammonia Nitrogen (May)		Ammonia Nitrogen (November)		Ammonia Nitrogen (Dec 1 to April 30)		Total Kjeldahl Nitrogen				Total NO2/NO3				Total Phosphorus				Copper	Ceriodaphnia dubia		Ceriodaphnia dubia (During bypass)	
	Average Weekly	Max Daily	Average Weekly	Max Daily	Average Weekly	Max Daily	Average Monthly	Maximum Daily	Average Monthly	Max Daily	Average Monthly	Maximum Daily	Average Monthly	Max Daily	Monthly Average	Maximum Daily	60 Day Rolling Avg	Maximum Daily	Maximum Daily	Acute	Chronic	Acute	Chronic
	mg/L		mg/L		mg/L		lb/day		mg/l		lb/day		mg/l		lb/day		mg/L			%		%	
Jan-11	Winter limit applies				1.69	4.2	220	381	2.2	3.9	316	357	3.1	3.7	9	29	0.15	0.28	4	Test Not Required		Test Not Required	
Feb-11	Winter limit applies				0.81	5.9	1095	2355	2.7	7.2	610	882	4	5.7	22	137	0.1	0.5	5.8	100	100	Test Not Required	
Mar-11	Winter limit applies				2.55	7	861	2135	3.3	6.8	298	455	1.8	3.1	22	107	0.13	0.6	4	Test Not Required		100	25
Apr-11	Winter limit applies				0.22	0.52	161	185	1.4	1.7	523	707	4.2	5.2	14.12	22.03	0.12	0.15	6.3	Test Not Required		Test Not Required	
May-11	0.12	0.18	May limit applies				168	218	1.6	2.1	373	400	3.6	4.1	20.63	34.06	0.15	0.34	8	100	100	Test Not Required	
Jun-11	Summer limit applies				81	83	0.9	0.9	381	409	4.2	4.4	11.62	24.54	0.16	0.25	5.8	Test Not Required		Test Not Required			
Jul-11	Summer limit applies				93	95	1.2	1.2	358	372	4.5	4.9	17.1	39.97	0.17	0.41	5.8	Test Not Required		Test Not Required			
Aug-11	Summer limit applies				108	117	1.2	1.3	348	370	3.9	4.1	13.28	37.83	0.17	0.42	6.2	100	100	Test Not Required			
Sep-11	Summer limit applies				216	301	2.1	2.9	453	458	4.3	4.4	13.36	24.44	0.17	0.18	7.5	Test Not Required		Test Not Required			
Oct-11	Summer limit applies				169	192	1.2	1.3	484	493	3.5	3.6	23.14	46.85	0.13	0.24	6.8	Test Not Required		Test Not Required			
Nov-11	Nov limit applies		0.05	0.34	Nov limit applies		135	184	0.9	1	625	636	4.3	5.2	22	31	0.15	0.19	4.6	100	100	Test Not Required	
Dec-11	Winter limit applies				0.04	0.12	203	309	1.3	2	862	904	5.5	5.6	25	43	0.15	0.21	2	Test Not Required		Test Not Required	
Jan-12	Winter limit applies				0.1	0.23	154	156	1.3	1.3	587	668	4.7	5.3	25	45	0.17	0.36	6.5	Test Not Required		Test Not Required	
Feb-12	Winter limit applies				0.11	0.23	140	154	1.2	1.2	459	486	3.8	4.3	13	17	0.17	0.14	6.8	100	100	Test Not Required	
Mar-12	Winter limit applies				0.12	0.18	164	208	1.3	1.7	528	633	4.1	4.7	18	27	0.15	0.24	5.8	Test Not Required		Test Not Required	
Apr-12	Winter limit applies				0.1	0.27	162	202	1.7	2.1	281	287	2.9	2.9	16.92	32.72	0.16	0.33	5	Test Not Required		Test Not Required	
May-12	0.13	0.38	May limit applies				123	125	1.2	1.2	353	401	3.3	3.5	16.28	23.44	0.16	0.19	8.2	100	100	Test Not Required	
Jun-12	Summer limit applies				179	218	1.4	1.8	429	434	3.3	3.5	21.53	34.75	0.16	0.31	5.8	Test Not Required		Test Not Required			
Jul-12	Summer limit applies				101	116	1.1	1.2	278	346	3.1	4.1	11.28	29.76	0.16	0.32	6	Test Not Required		Test Not Required			
Aug-12	Summer limit applies				108	111	1.3	1.4	313	324	3.6	4.1	13.04	63.01	0.16	0.34	6	100	100	Test Not Required			
Sep-12	Summer limit applies				89	161	1	1.8	403	405	4.7	4.9	14.36	20.68	0.15	0.24	6.3	Test Not Required		Test Not Required			
Oct-12	Summer limit applies				130	137	1.5	1.6	501	538	5.8	6.3	11.62	17.19	0.15	0.19	6.2	Test Not Required		Test Not Required			
Nov-12	Nov limit applies		0.13	0.7	Nov limit applies		141	167	1.3	1.3	570	755	5.1	5.9	17	35	0.16	0.28	5.8	100	100	Test Not Required	
Dec-12	Winter limit applies				0.16	0.68	135	141	1.4	1.5	385	443	3.8	4.2	20	43	0.16	0.34	5.8	Test Not Required		Test Not Required	
Jan-13	Winter limit applies				0.4	1.4	169	229	1.4	1.5	334	417	2.8	2.8	16	24	0.16	0.19	5.6	Test Not Required		Test Not Required	
Feb-13	Winter limit applies				1.14	4.7	275	358	2.1	2.6	331	349	2.6	2.9	46	432	0.17	1.14	5	100	100	Test Not Required	
Mar-13	Winter limit applies				1.59	2.8	660	877	2.4	2.7	746	975	2.7	3	42	243	0.19	0.76	5	Test Not Required		100	6.25
Apr-13	Winter limit applies				0.51	2	351	439	2.5	2.9	354	368	2.5	2.8	16.44	24.68	0.18	0.23	6.2	Test Not Required		Test Not Required	
May-13	0.08	0.4	May limit applies				130	137	1.3	1.3	361	416	3.6	3.9	16.71	29.75	0.15	0.28	6.2	100	100	Test Not Required	
Jun-13	Summer limit applies				141	163	1	3.7	566	761	3.7	3.7	37.93	420.34	0.19	1.2	6.3	Test Not Required		Test Not Required			
Jul-13	Summer limit applies				131	137	1.2	1.3	389	412	3.4	3.5	18.76	47.63	0.19	0.44	6.6	Test Not Required		Test Not Required			
Aug-13	Summer limit applies				161	192	1.6	1.7	363	397	3.7	3.8	13.29	38.89	0.18	0.22	6	100	98	Test Not Required			
Sep-13	Summer limit applies				173	234	1.9	2.6	271	332	2.9	3.5	7.82	21.72	0.15	0.29	6.8	Test Not Required		Test Not Required			
Oct-13	Summer limit applies				89	94	1.2	1.3	271	279	3.7	3.7	17.66	46.69	0.17	0.6	5.8	Test Not Required		Test Not Required			
Nov-13	Nov limit applies		0.36	0.61	Nov limit applies		111	130	1.5	1.7	230	233	3	3.1	8	17	0.17	0.17	5	100	100	Test Not Required	
Dec-13	Winter limit applies				0.27	0.82	207	271	2.1	2.7	2.53	283	2.6	2.8	13	26	0.15	0.2	5	Test Not Required		Test Not Required	
Existing Permit Limit	3.2	Report	6.3	Report	9.5	Report	Report	Report	Report	Report	Report	Report	Report	Report	Report	Report	0.2	Report	20*	100	>98	100	>98
Minimum	0.08	0.18	0.05	0.34	0.04	0.12	81	83	0.9	0.9	2.53	233	1.8	2.8	7.82	17	0.1	0.14	2	100	98	100	6.25
Maximum	0.13	0.4	0.36	0.7	2.55	7	1095	2355	3.3	7.2	862	975	5.8	6.3	46	432	0.19	1.2	8.2	100	100	100	25
Average	0.1	0.3	0.2	0.6	0.7	2.1	214.8	325.3	1.6	2.1	414.9	482.9	3.7	4.1	18.5	64.9	0.16	0.35	5.8	100	99.8	100	15.6
Standard Deviation	0	0.1	0.2	0.2	0.8	2.3	214.3	493.3	0.5	1.4	157.1	188	0.9	1	8.5	98.1	0.02	0.24	1.1	0	0.6	0	13.3
Number of Measurements	3	3	3	3	15	15	36	36	36	36	36	36	36	36	36	36	36	36	36	12	12	2	2
Number of Exceedences	0	N/A	0	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	0	0	0	0	2

\*Limit is changed due to an administrative order, original permit limits are 5.3 ug/L monthly average and 7.4 ug/L daily max.

	Effluent Analytical Data (ug/l)							Receiving Water Analytical Data (ug/l)						
	Hardness	Al	Cd <sup>1</sup>	Cu	Ni	Pb <sup>1</sup>	Zn	Hardness	Al	Cd <sup>1</sup>	Cu	Ni	Pb <sup>1</sup>	Zn
2/15/2011	150	ND-20	ND-0.5	4	ND-2	ND-0.5	23							
3/1/2011	170	50	ND-0.5	8	2	0.7	17							
5/10/2011	150	ND-20	ND-0.5	4	ND-2	ND-0.5	21	71	53	ND-0.5	9	2	2	16
8/9/2011	170	ND-20	ND-0.5	4	2	ND-0.5	19	53	84	ND-0.5	12	2	4	21
11/15/2011	140	ND-20	ND-0.5	9	2	ND-0.5	13	58	40	ND-0.5	7	2	2	16
2/12/2012	140	ND-20	ND-0.5	4	ND-2	ND-0.5	19	66	47	ND-0.5	3	ND-2	2	20
5/13/2012	140	ND-20	ND-0.5	6	2	ND-0.5	18	58	50	ND-0.5	8	ND-2	2	14
8/12/2012	110	ND-20	ND-0.5	6	2	ND-0.5	22	53	62	ND-0.5	9	3	4	23
11/11/2012	110	44	ND-0.5	10	4	ND-0.5	37	58	41	ND-0.5	7	2	2	17
2/10/2013	170	ND-20	ND-0.5	4	ND-2	ND-0.5	18	75	25	ND-0.5	7	ND-2	2	29
5/11/2013	150	ND-20	ND-0.5	19	2	ND-0.5	25	69	53	ND-0.5	16	ND-2	ND-0.5	25
8/11/2013	140	ND-20	ND-0.5	5	ND-2	ND-0.5	17	49	140	ND-0.5	6	ND-2	7	18
11/9/2013	140	ND-20	ND-0.5	5	2	ND-0.5	25	71	39	ND-0.5	11	ND-2	3	30
Median	140	47	ND-0.5	5	2	0.7	19	58	50	ND-0.5	8.0	2.0	2.0	20.0
Maximum		50	ND-0.5	19	4	0.7	37							
95th percentile <sup>2</sup>		39	ND-0.5	17	3	0.6	31							
Chronic Criterion <sup>3</sup>		87	0.34	18.1	69	4.81	158							
Acute Criterion <sup>3</sup>		750	2.97	25.7	617	123.3	158							

<sup>1</sup> Non-detects noted as " ND- [minimum detection level]"

<sup>2</sup> Percentiles calculated from a lognormal distribution with mean and standard deviation derived from monitoring data

<sup>3</sup> Expressed in Total Recoverable Metals for consistency with monitoring data. Criteria for Cd, Ni, Pb and Zn are hardness dependent and calculated using the formulas set forth in the National Recommended Water Quality Criteria 2002 (EPA 2002) at a hardness of 138, based on the median hardness of effluent and receiving water combined proportional to design flow and 7Q10 flow.

To estimate the TN load to the Taunton River Estuary, the USGS LOADEST computer modeling program was used. This program develops a number of regression equations correlating constituent concentration and streamflow based on an input calibration file listing corresponding data points of these two variables. For each regression equation, three different models are used to estimate the average summer load based on the summer flow record. The first, Adjusted Maximum Likelihood Estimation (AMLE), and the second, Maximum Likelihood Estimation (MLE) are applicable when the calibration model errors, or “residuals,” are normally distributed. Normality is determined by the Turnbull-Weiss test. These two estimations will be the same unless there are any censored data points, in which case the AMLE estimate is more accurate. The third model, Least Absolute Deviation (LAD), is used for non-normally distributed data.

The average summer TN load to the Taunton River at Weir Village, as well as to the four tributaries downstream from this point, were modeled by LOADEST using nitrogen concentration data from the Mount Hope Bay Monitoring Program and 2004 and 2005 daily streamflow data either measured by USGS gages, or adjusted proportionally based on drainage area. For days on which more than one concentration was measured, the average concentration was used in the LOADEST calibration file. Days on which the streamflow was 0 cfs were excluded from the dataset.

For all load estimations the best regression equation was automatically selected by the program based on the Akaike Information Criteria (AIC) value. In calculating the summer loads, the regression equation was selected based on the full year of monitoring data (i.e., the equation used to calculate the summer 2004 loads was selected based on a calibration dataset of the entire year 2004 monitoring data).

As described earlier, LOADEST gives load estimations based on three different models. If the calibration residuals were distributed normally, the Maximum Likelihood Estimation (MLE) was chosen. Otherwise, the Least Absolute Deviation (LAD) estimation was chosen. The calibration residuals were considered normal if the p-value of the Turnbull Weiss test was greater than 0.05.

<b>Taunton River at Weir Village</b>	
Year	Load Est. (lb/d)
2004	2659
2005	2289

<b>Assonet River</b>	
Year	Load Est. (lb/d)
2004	49
2005	51

<b>Three Mile River</b>	
Year	Load Est. (lb/d)
2004	547
2005	403

<b>Quequechan River</b>	
Year	Load Est. (lb/d)
2004	85
2005	112

<b>Segreganset River</b>	
Year	Load Est. (lb/d)
2004	35
2005	34

<b>Sum of Loads (lb/d)</b>	
2004	3375
2005	2889

### Nitrogen Attenuation

As a result of chemical and biological processes, not all of the nitrogen discharged from each point source reaches the estuary. To determine the delivered nitrogen load, attenuation from each point source was calculated. The governing equation is:

$$L_f = L_i * e^{-kt} ; \text{ where}$$

$L_f$  = the delivered load;  
 $L_i$  = discharged load;  
 $k$  = attenuation coefficient; and  
 $t$  = travel time in days.

Attenuation calculations have been estimated in a number of studies for smaller order streams but generally do not reflect the effluent-dominated stream conditions encountered downstream of the Brockton AWRF (DF (dilution factor) = 1.02) and, to a lesser extent, the Bridgewater (DF 2.2), Mansfield (DF 2.2) and Middleboro (DF 1.9) WWTPs. For example, attenuation coefficients for small streams are given by the NE SPARROW models. Moore et al., *Estimation of Total Nitrogen and Phosphorus in New England Streams Using Statistically Referenced Regression Models*, USGS SIR-2004-5012. The NE SPARROW model indicates that no attenuation would be expected in the Taunton River mainstem, but that the tributaries (with flows  $\leq 100$ cfs) are given an attenuation coefficient of  $0.77 \text{ day}^{-1}$ .

For the Brockton AWRF, attenuation calculations based on regional regression equations were determined to be insufficient. Using the above analysis with SPARROW regression coefficients, the calculated attenuation of the Brockton AWRF discharge under summer flow conditions is predicted to be approximately 30%. EPA determined that this figure was unreliable for the following reasons:

(1) Use of a 30% attenuation factor for Brockton's load to allocate the total loads at Weir Village from the LOADEST analysis resulted in an implausibly large nonpoint source load per square mile compared to the other tributaries. This would indicate that the point source component of the load is being understated; the likeliest explanation for that is that attenuation of Brockton's load is overstated.<sup>1</sup>

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<sup>1</sup> To explain further, monitoring of the Taunton River at Weir Village indicates an average summer load for 2004-05 of 2,474 lbs/day. If the Brockton discharge of 1,303 lbs/day is assumed to be reduced by 30% through attenuation, then 912 lbs/day of the load at Weir Village is due to Brockton. Other WWTPs contribute 330 lbs/day, leaving 1,232 lbs/day attributable to nonpoint sources. Given the drainage area above Weir Village of 358 square miles, this gives an estimated summer nonpoint source loading of 3.4 lbs/day/sq.mi. This is significantly greater than the areal nonpoint source loading found at any other monitoring site in the Mount Hope Bay Monitoring Program, including the Quequechan River (which drains the City of Fall River) as well as the Ten Mile, Assonet and Segreganset Rivers.

(2) Nitrogen data collected by CDM for the Brockton AWRF receiving water study, although not collected for the purposes of attenuation calculations, do not appear to be consistent with significant in-stream attenuation.<sup>2</sup>

(3) The extremely effluent-dominated conditions downstream of the Brockton AWRF discharge are likely outside of the range of conditions used in developing the SPARROW regional regression equations.<sup>3,4</sup>

Because of the large impact of Brockton's discharge on the loading analysis, EPA determined that an improved attenuation estimate was necessary for this analysis, and therefore conducted a monitoring study including sampling and streamflow measurements in the summer of 2012, in order to determine an attenuation rate for Brockton's discharge.

The Matfield River Monitoring Study utilized a Lagrangian sampling program modelled on USGS, *Lagrangian Sampling of Wastewater Treatment Plant Effluent in Boulder Creek, Colorado, and Fourmile Creek, Iowa*, Open File Report 2011-1054 (2011), based on following the same "packet" of water downstream from the AWRF and sampling downstream based on calculated time of travel from the AWRF. Samples were taken at one upstream and four downstream locations on the Salisbury Plain and Matfield Rivers, as well as the two major tributaries (Beaver Brook and Meadow Brook) and the AWRF discharge, and streamflow was measured at three downstream locations. Sampling locations are shown on Figure B-1.

The furthest downstream station (MATF08) was located at the former USGS streamgage site on the Matfield River at Elmwood (USGS 01106500). Time of travel to this site was based on 15-minute streamflow data provided by USGS for summer months prior to discontinuance of data collection at the streamgage in October 2009. These show a clear pattern of influence from the Brockton AWRF's diurnal discharge variation. Figure B-2 shows two 24-hour streamflow records from September 2009 at relatively low (chart A)

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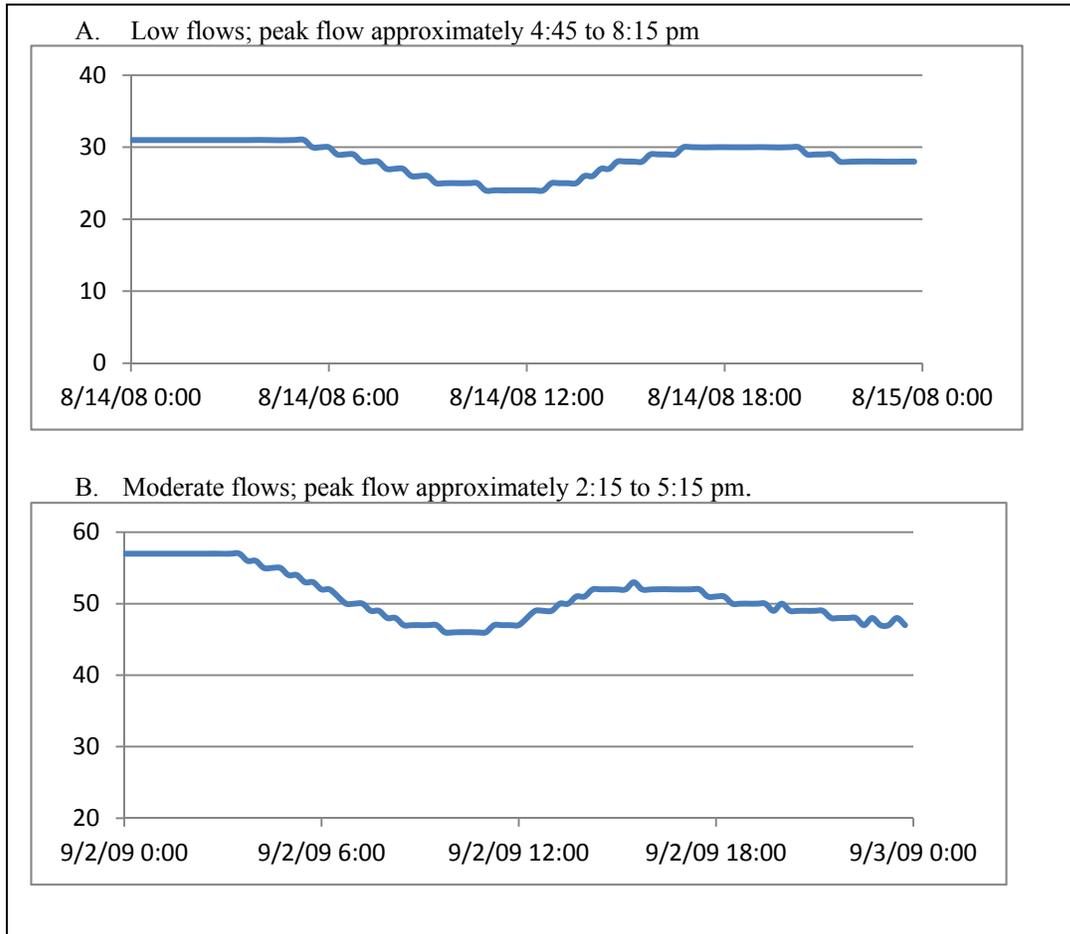
<sup>2</sup> For example, total nitrogen concentrations at the site of the discontinued USGS gage on the Matfield (CDM's station BR1-08) were within 5% of the concentrations found over 4 miles upstream on the Salisbury Plain River (CDM Station BR1-03), indicating on a qualitative level that little attenuation is occurring once the additional dilution resulting from the confluence of Beaver Brook, Meadow Brook and other minor tributaries and baseflow is accounted for.

<sup>3</sup> Furthermore, the SPARROW regression equations themselves indicate that more wastewater load is passing through the system than would be indicated by the discharge loads and attenuation coefficient. For the predictor variable 'municipal wastewater facilities' the regression coefficient is 1.11, so that the regression model predicts 11% more in-stream load from WWTPs than is actually discharged. That is, direct application of the SPARROW model would require that Brockton's load be inflated by 11% before applying the attenuation factor in order to calculate Brockton's contribution to the delivered flow.

<sup>4</sup> Available literature also indicates the potential for significant reduction in attenuation rates under high nitrogen concentrations. See Alexander et al, Dynamic modeling of nitrogen losses in river networks unravels the coupled effects of hydrological and biogeochemical processes, *Biogeochemistry* 93:91-116 (2009).

and moderate (chart B) flows. These show a distinct diurnal flow pattern, consistent with wastewater discharges, and a delayed and more spread out pattern under lower flow conditions, consistent with lower stream velocities under those conditions. The time of travel for individual days was determined by comparison of the daily streamflow pattern with the Brockton AWRf discharge data from the facility's SCADA system (measurements approximately every 3 minutes; an example is shown at Figure B-3). Time of travel to the intermediate sites was assumed to be proportional to time of travel to MATF08, based on the distance in river miles to each site.

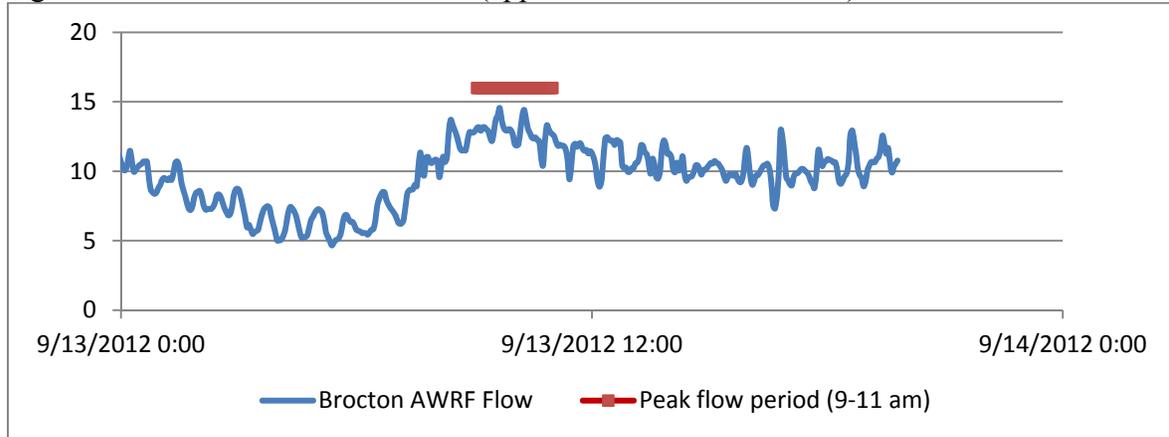
Figure B-2. USGS 01106500, Matfield River at Elmwood, 15-minute flow data



As can be seen from the Brockton AWRf SCADA data, there is considerable short term variability in the AWRf discharge rate. As explained by the facility, this is due to the interaction of the various pump operations related to facility discharge and is inherent in the operation of the facility. While this variability will tend to dissipate as the plume moves downstream (see smoother pattern in 15-min data from the USGS gage downstream), there is potential for initial load calculations, and thus the attenuation factor, to vary on the order of 5-8% in the short term (on the order of 3 minutes). A time of travel analysis is not expected to be sufficiently precise to capture the exact packet of

discharge within the sub-3 minute variability of the discharge. Therefore the analysis focused on following the peak period of Brockton's flows, approximately 9 to 11 a.m. While this provides a lower level of precision than would be ideal, it is sufficient that attenuation on the order of 30% (as predicted using regional regression models) would be apparent.

Figure B-3. Brockton AWRF Flows (approx. 3-min SCADA data)



Monitoring data from sampling stations on the Salisbury Plain and Matfield River are shown in Table B-1. On two of the sampling dates, instream total nitrogen concentrations increase slightly as sampling moves downstream, inconsistent with significant attenuation of nitrogen under those flow conditions (these are the two lowest flow dates). These increases could indicate instream release of nitrogen under low flow conditions. In contrast, in the August sampling a significant reduction in total nitrogen concentration occurred between sites 5 and 8. In general, the reach between sites 5 and 8 saw the most variability, with both load increases and one day of significant load decrease recorded between the two sites. This is likely due to the extensive wetland system the river passes through between these two stations, which appear to provide potential for sizeable release as well as uptake of nitrogen discharges. EPA notes that results showing widely variation attenuation rates under different stream conditions are consistent with the available literature (see, e.g. Smith et al., Nitrogen attenuation in the Connecticut River, northeastern USA; a comparison of mass balance and N<sub>2</sub> production modeling approaches, *Biogeochemistry* 87, 311-323 (2008) (differing attenuation in April (zero in both reaches) from August (zero in southern reach, 18% in northern reach)); Vanderburg et al., Field Evaluation of Mixing Length and Attenuation of Nutrients and Fecal Coliform in a Wastewater Effluent Plume, *Environmental Monitoring and Assessment* (2005) 107: 45-57 (2005) ("Nitrate attenuation is markedly different between the two sampling events.")).

Table B-1

Station	Distance Downstream from AWRF (ft)	6/18/2012		7/9/2012		8/13/2012		9/13/2012	
		Flow (cfs)	TN (mg/l)						
SALP01	-200	--	1.67	--	2.13	--	1.67	--	1.53
AWRF	0	25.2	4.22	18.3	4.32	22.1	4.82	19.9	4.00
SALP03	6644	37.4	3.26	26.0	3.21	42.2	3.32	25.2	3.43
MATF05	17288	42.1	2.79	26.8	3.22	55.3	2.82	25.8	3.51
MATF08 <sup>1</sup>	28742	46.0	3.09	27.7	3.40	63.0	1.64	26.7	3.82

<sup>1</sup> Flow at MATF08 determined from USGS staff gage and most recent shifted rating curve for June, August and September sampling dates. Direct streamflow measurements on 7/9/12 and early morning on 9/13/12 used to confirm shifted rating curve, which is considered highly provisional by USGS since discontinuance of site as active USGS streamgage.

Load reduction percentages were calculated for each sampling station on the Salisbury Plain/Matfield Rivers for each monitoring data and are shown in Table B-2. In general load reductions are on the order of a few percent and, given the uncertainty in the analysis, are consistent with either zero attenuation or a low level of attenuation in the system on all sampling dates but August 13 (when significant attenuation is shown). These calculations indicate that, averaged over the summer, there is attenuation of nitrogen taking place downstream of the AWRF discharge. Average attenuation over the summer for the three reaches were combined to determine a cumulative attenuation percentage from the AWRF to Station MATF08 of 7%. This corresponds to an attenuation coefficient  $k$  of  $0.28 \text{ day}^{-1}$ .

An alternative approach to estimating attenuation from these data was also applied as a qualitative check on this analysis, using chloride concentrations to assess relative changes in TN concentrations using the approach of Vanderburg et al. (2005). This approach uses chloride concentration to determine dilution of the nitrogen discharge, then compares TN predicted based purely on dilution to the measured concentration to determine whether attenuation of nitrogen has occurred. Results using the approach are generally consistent with the above analysis, with no attenuation shown on sampling dates other than August 13.<sup>5</sup>

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<sup>5</sup> The chlorides analysis was not used to assess attenuation upstream of site 3 due to the nearly identical chloride concentration of the discharge and upstream flow, which prevents dilution analysis based on chloride concentration.



The calculated value of k (0.28 day<sup>-1</sup>) was used to determine the delivery factor for the Brockton AWRP and for the Bridgewater, Mansfield and Middleborough WWTPs that also discharge to effluent-dominated streams. For the small facilities discharging to tributaries the New England SPARROW attenuation coefficient was applied. Travel time from each point source to the Taunton River, was calculated using river distance and a calculated average summer velocity,<sup>6</sup> Table B-3 shows the river distance, average velocity, travel time and percent load delivered for each facility.

Table B-3

Facility	River distance on tributary (ft)	Average velocity (fps)	Travel Time (days)	Percent of load delivered
Oak Point	9,613	0.67	0.17	88
MCI Bridgewater	7,665	0.67	0.13	90
Brockton	44,135	1.23	0.42	89
Bridgewater	13,015	1.04	0.14	96
Dighton-Rehoboth Schools	53,385	0.79	0.78	55
Mansfield	62,503	1.1	0.66	83
Middleboro	27,608	1.05	0.30	92
Wheaton College	81,449	1.1	0.86	52
East Bridgewater H.S.	22,976	0.99	0.27	81

EPA notes that the results of this field work confirm the complex nature of nitrogen cycling in the Salisbury Plain and Matfield River, and that continued work developing a water quality model of the Salisbury Plain and Matfield Rivers as contemplated by MassDEP and USGS would assist in informing this analysis and any future TMDL

<sup>6</sup> Annual average velocities by reach were obtained from the National Hydrography Dataset (NHDPlus), and were used to calculate the average summer velocity based on the following relationship from Jobson, H.E., 1996, *Prediction of traveltime and longitudinal dispersion in rivers and streams*: U.S. Geological Survey Water-Resources Investigations Report 96-4013 (equation 12).

$$V_p = 0.094 + 0.0143 \times (D'_a)^{0.919} \times (Q'_a)^{-0.469} \times S^{0.159} \times \frac{Q}{D_a}$$

Where  $Q'_a = Q/Qa$   
 Q = summer average flow  
 Qa = annual average flow  
 Da = Drainage area

$$D'_a = \frac{D_a^{1.25} \times \sqrt{S}}{Q_a}$$

The NHDPlus average annual velocities were calculated using the Jobson equation where Q=Qa. The Jobson equation can be used to derive a relationship between summer average and annual average velocity:

$$V_{summer} = 0.094 + (V_{annual} - 0.094) * (Q/Qa)^{0.531}$$

This equation was used to calculate average summer flows for each reach in NHDPlus.

analysis, particularly with respect to attenuation under differing loads as upgrades are implemented. However, at this time no modeling effort is ongoing, and the attenuation analysis performed by EPA is the best available information upon which to develop this permit limit. EPA also notes that the permit limit for the Taunton facility of 3.0 mg/l would remain the same under a wide range of assumptions regarding attenuation of the Brockton discharge. For example, the Fact Sheet notes that, using the 7% attenuation figure, if a uniform permit limit were applied to all facilities in the watershed it would have to be less than 3.5 mg/l. For comparison, if it were assumed that there is zero attenuation of Brockton's discharge, the resulting uniform permit limit would be only slightly higher (approximately 3.7). On the other hand, if the attenuation factor was doubled (approximately 21% attenuation), a permit limit between 3.1 and 3.2 mg/l would need to be applied. (Required permit limits are more stringent if greater attenuation is assumed. This is because the attenuation factor is used in calculating how much of the measured load is from nonpoint sources; a higher attenuation rate means more load is attributed to the (more difficult to control) nonpoint sources, so that greater reduction from point sources is needed to meet the same total load target). As discussed in the Fact Sheet, since the highest possible permit limit is less than 4, and the Taunton WWTP is the second largest discharge and is a direct discharger to the estuary, a permit limit of 3.0 mg/l would still be applied.

## **EPA REGION 1 NPDES PERMITTING APPROACH FOR PUBLICLY OWNED TREATMENT WORKS THAT INCLUDE MUNICIPAL SATELLITE SEWAGE COLLECTION SYSTEMS**

This interpretative statement provides an explanation to the public of EPA Region 1's interpretation of the Clean Water Act ("CWA" or "Act") and implementing regulations, and advises the public of relevant policy considerations, regarding the applicability of the National Pollutant Discharge Elimination System ("NPDES") program to publicly owned treatment works ("POTWs") that are composed of municipal satellite sewage collection systems owned by one entity and treatment plants owned by another ("regionally integrated POTWs"). When issuing NPDES permits to these types of sanitary sewer systems, it is EPA Region 1's practice to directly regulate, as necessary, the owners/operators of the municipal satellite collection systems through a co-permitting structure. This interpretative statement is intended to explain, generally, the basis for this practice. In determining whether to include municipal satellite collection systems as co-permittees in any particular circumstances, Region 1's decision will be made by applying the law and regulations to the specific facts of the case before the Region.

EPA has set out a national policy goal for the nation's sanitary sewer systems to adhere to strict design and operational standards:

"Proper [operation and maintenance] of the nation's sewers is integral to ensuring that wastewater is collected, transported, and treated at POTWs; and to reducing the volume and frequency of ...[sanitary sewer overflow] discharges. Municipal owners and operators of sewer systems and wastewater treatment facilities need to manage their assets effectively and implement new controls, where necessary, as this infrastructure continues to age. Innovative responses from all levels of government and consumers are needed to close the gap."<sup>1</sup>

Because ownership/operation of a regionally integrated POTW is sometimes divided among multiple parties, the owner/operator of the treatment plant many times lacks the means to implement comprehensive, system-wide operation and maintenance ("O & M") procedures. Failure to properly implement O & M measures in a POTW can cause, among other things, excessive extraneous flow (*i.e.*, inflow and infiltration) to enter, strain and occasionally overload treatment system capacity. This failure not only impedes EPA's national policy goal concerning preservation of the nation's wastewater infrastructure assets, but also frustrates achievement of the water quality- and technology-based requirements of CWA § 301 to the extent it results in sanitary sewer overflows and degraded treatment plant performance, with adverse impacts on human health and the environment.

In light of these policy objectives and legal requirements, it is Region 1's permitting practice to subject all portions of the POTW to NPDES requirements in order to ensure that the treatment system as a whole is properly operated and maintained and that human health and water quality impacts resulting from excessive extraneous flow are minimized. The approach of addressing O&M concerns in a regionally integrated treatment works by adding municipal satellite

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<sup>1</sup> See *Report to Congress: Impacts and Control of CSOs and SSOs* (EPA 833-R-04-001) (2004), at p. 10-2. See also "1989 National CSO Control Strategy," 54 Fed. Reg. 37371 (September 8, 1989).

collection systems as co-permittees is consistent with the definition of “publicly owned treatment works,” which by definition includes sewage collection systems. Under this approach, the POTW in its entirety will be subject to NPDES regulation as a point source discharger under the Act. Region 1’s general practice will be to impose permitting requirements applicable to the POTW treatment plant along with a more limited set of conditions applicable to the connected municipal satellite collection systems.

The factual and legal basis for the Region’s position is set forth in greater detail in *Attachment A*.

## Attachment A

### ANALYSIS SUPPORTING EPA REGION 1 NPDES PERMITTING APPROACH FOR PUBLICLY OWNED TREATMENT WORKS THAT INCLUDE MUNICIPAL SATELLITE SEWAGE COLLECTION SYSTEMS

- Exhibit A* List of POTW permits that include municipal satellite collection systems as co-permittees
- Exhibit B* Analysis of extraneous flow trends and SSO reporting for representative systems
- Exhibit C* Form of Regional Administrator’s waiver of permit application requirements for municipal satellite collection systems

#### Introduction

On May 28, 2010, the U.S. EPA Environmental Appeals Board (“Board”) issued a decision remanding to the Region certain NPDES permit provisions that included and regulated satellite collection systems as co-permittees. *See In re Upper Blackstone Water Pollution Abatement District*, NPDES Appeal Nos. 08-11 to 08-18 & 09-06, 14 E.A.D. \_\_ (Order Denying Review in Part and Remanding in Part, EAB, May 28, 2010).<sup>2</sup> While the Board “did not pass judgment” on the Region’s position that its NPDES jurisdiction encompassed the entire POTW and not only the treatment plant, it held that “where the Region has abandoned its historical practice of limiting the permit only to the legal entity owning and operating the wastewater treatment plant, the Region had not sufficiently articulated in the record of this proceeding the statutory, regulatory, and factual bases for expanding the scope of NPDES authority beyond the treatment plant owner/operator to separately owned/operated collection systems that do not discharge directly to waters of the United States, but instead that discharge to the treatment plant.” *Id.*, slip op. at 2, 18. In the event the Region decided to include and regulate municipal satellite collection systems as co-permittees in a future permit, the Board posed several questions for the Region to address in the analysis supporting its decision:

- (1) In the case of a regionally integrated POTW composed of municipal satellite collection systems owned by different entities and a treatment plant owned by another, is the scope of NPDES authority limited to owners/operators of the POTW treatment plant, or does the authority extend to owners/operators of the municipal satellite collection systems that convey wastewater to the POTW treatment plant?
- (2) If the latter, how far up the collection system does NPDES jurisdiction reach, *i.e.*, where does the “collection system” end and the “user” begin?

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<sup>2</sup> The decision is available on the Board’s website via the following link:  
[http://yosemite.epa.gov/oa/EAB\\_Web\\_Docket.nsf/30b93f139d3788908525706c005185b4/34e841c87f346d94852577360068976f!OpenDocument](http://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/30b93f139d3788908525706c005185b4/34e841c87f346d94852577360068976f!OpenDocument).

- (3) Do municipal satellite collection systems “discharge [ ] a pollutant” within the meaning of the statute and regulations?
- (4) Are municipal satellite collection systems “indirect dischargers” and thus excluded from NPDES permitting requirements?
- (5) Is the Region’s rationale for regulating municipal satellite collection systems as co-permittees consistent with the references to “municipality” in the regulatory definition of POTW, and the definition’s statement that “[t]he term also means the municipality...which has jurisdiction over the Indirect Discharges to and the discharges from such a treatment works”?
- (6) Is the Region’s rationale consistent with the permit application and signatory requirements under NPDES regulations?

See *Blackstone, slip op.* at 18, 20, n. 17.

This regional interpretative statement is, in part, a response to the Board’s decision. It details the legal and policy bases for regulating publicly owned treatment works (“POTWs”) that include municipal satellite collection systems through a co-permittee structure. Region 1’s analysis is divided into five sections. First, the Region provides context for the co-permitting approach by briefly describing the health and environmental impacts associated with poorly maintained sanitary sewer systems. Second, the Region outlines its evolving permitting practice regarding regionally integrated POTWs, particularly its attempts to ensure that such entity’s municipal satellite collection systems are properly maintained and operated. Third, the Region explains the legal authority to include municipal satellite collection systems as co-permittees when permitting regionally integrated POTWs. In this section, the Region answers the questions posed by the Board in the order presented above. Fourth, the Region sets forth the basis for the specific conditions to which the municipal satellite collection systems will be subject as co-permittees. Finally, the Region discusses other considerations informing its decision to employ a co-permittee structure when permitting regionally integrated POTWs.

## I. Background

A sanitary sewer system (SSS) is a wastewater collection system owned by a state or municipality that conveys domestic, industrial and commercial wastewater (and limited amounts of infiltrated groundwater and some storm water runoff ) to a POTW.<sup>3</sup> See 40 C.F.R. § 35.2005(b)(37) (defining “sanitary sewer”). The purpose of these systems is to transport wastewater uninterrupted from its source to a treatment facility. Developed areas that are served by sanitary sewers often also have a separate storm sewer system (*e.g.*, storm drains) that collects and conveys runoff, street wash waters and drainage and discharges them directly to a receiving

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<sup>3</sup> See generally Report to Congress: Impacts and Control of CSOs and SSOs (EPA 833-R-04-001) (2004), from which EPA Region 1 has drawn this background material.

water (*i.e.*, without treatment at a POTW). While sanitary sewers are not designed to collect large amounts of runoff from precipitation events or provide widespread drainage, they typically are built with some allowance for higher flows that occur during periods of high groundwater and storm events. They are thus able to handle minor and controllable amounts of extraneous flow (*i.e.*, inflow and infiltration, or I/I) that enter the system. Inflow generally refers to water other than wastewater—typically precipitation like rain or snowmelt—that enters a sewer system through a direct connection to the sewer. Infiltration generally refers to other water that enters a sewer system from the ground, for example through defects in the sewer.

Municipal sanitary sewer collection systems can consist of a widespread network of pipes and associated components (*e.g.*, pump stations). These systems provide wastewater collection service to the community in which they are located. In some situations, the municipality that owns the collector sewers may not provide treatment of wastewater, but only conveys its wastewater to a collection system that is owned and operated by a different municipal entity (such as a regional sewer district). This is known as a satellite community. A “satellite” community is a sewage collection system owner/operator that does not have ownership of the treatment facility and the wastewater outfall but rather the responsibility to collect and convey the community’s wastewater to a POTW treatment plant for treatment. *See* 75 Fed. Reg. 30395, 30400 (June 1, 2010).

Municipal sanitary sewer collection systems play a critical role in protecting human health and the environment. Proper operation and maintenance of sanitary sewer collection systems is integral to ensuring that wastewater is collected, transported, and treated at POTW treatment plants. Through effective operation and maintenance, collection system operators can maintain the capacity of the collection system; reduce the occurrence of temporary problem situations such as blockages; protect the structural integrity and capacity of the system; anticipate potential problems and take preventive measures; and indirectly improve treatment plant performance by minimizing I/I-related hydraulic overloading.

Despite their critical role in the nation’s infrastructure, many collection systems exhibit poor performance and are subjected to flows that exceed system capacity. Untreated or partially treated overflows from a sanitary sewer system are termed “sanitary sewer overflows” (SSOs). SSOs include releases from sanitary sewers that reach waters of the United States as well as those that back up into buildings and flow out of manholes into city streets.

There are many underlying reasons for the poor performance of collection systems. Much of the nation’s sanitary sewer infrastructure is old, and aging infrastructure has deteriorated with time. Communities also sometimes fail to provide capacity to accommodate increased sewage delivery and treatment demand from increasing populations. Furthermore, institutional arrangements relating to the operation of sewers can pose barriers to coordinated action, because many municipal sanitary sewer collection systems are not entirely owned or operated by a single municipal entity.

The performance and efficiency of municipal sanitary sewer collection systems influence the performance of sewage treatment plants. When the structural integrity of a municipal sanitary sewer collection system deteriorates, large quantities of infiltration (including rainfall-induced

infiltration) and inflow can enter the collection system, causing it to overflow. These extraneous flows are among the most serious and widespread operational challenges confronting treatment works.<sup>4</sup>

Infiltration can be long-term seepage of water into a sewer system from the water table. In some systems, however, the flow characteristics of infiltration can resemble those of inflow, *i.e.*, there is a rapid increase in flow during and immediately after a rainfall event, due, for example, to rapidly rising groundwater. This phenomenon is sometimes referred to as rainfall-induced infiltration.

Sanitary sewer systems can also overflow during periods of normal dry weather flows. Many sewer system failures are attributable to natural aging processes or poor operation and maintenance. Examples include years of wear and tear on system equipment such as pumps, lift stations, check valves, and other moveable parts that can lead to mechanical or electrical failure; freeze/thaw cycles, groundwater flow, and subsurface seismic activity that can result in pipe movement, warping, brittleness, misalignment, and breakage; and deterioration of pipes and joints due to root intrusion or other blockages.

Inflow and infiltration impacts are often regional in nature. Satellite collection systems in the communities farthest from the POTW treatment plant can cause sanitary sewer overflows (“SSOs”) in communities between them and the treatment plant by using up capacity in the interceptors. This can cause SSOs in the interceptors themselves or in the municipal sanitary sewers that lead to them. The implication of this is that corrective solutions often must also be regional in scope to be effective.

The health and environmental risks attributed to SSOs vary depending on a number of factors including location and season (potential for public exposure), frequency, volume, the amount and type of pollutants present in the discharge, and the uses, conditions, and characteristics of the receiving waters. The most immediate health risks associated with SSOs to waters and other areas with a potential for human contact are associated with exposure to bacteria, viruses, and other pathogens.

Human health impacts occur when people become ill due to contact with water or ingestion of water or shellfish that have been contaminated by SSO discharges. In addition, sanitary sewer systems can back up into buildings, including private residences. These discharges provide a direct pathway for human contact with untreated wastewater. Exposure to land-based SSOs typically occurs through the skin via direct contact. The resulting diseases are often similar to those associated with exposure through drinking water and swimming (*e.g.*, gastroenteritis), but may also include illness caused by inhaling microbial pathogens. In addition to pathogens, raw sewage may contain metals, synthetic chemicals, nutrients, pesticides, and oils, which also can be detrimental to the health of humans and wildlife.

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<sup>4</sup> In a 1989 Water Pollution Control Federation survey, 1,003 POTWs identified facility performance problems. Infiltration and inflow was the most frequently cited problem, with 85 percent of the facilities reporting I/I as a problem. I/I was cited as a major problem by 41 percent of the facilities (32 percent as a periodic problem).

## II. Region 1 Past Practice of Permitting POTWs that Include Municipal Satellite Collection Systems

Region 1's practice in permitting regionally integrated POTWs has developed in tandem with its increasing focus on addressing I/I in sewer collection systems, in response to the concerns outlined above. Up to the early 1990s, POTW permits issued by Region 1 generally did not include specific requirements for collection systems. When I/I and the related issue of SSOs became a focus of concern both nationally and within the region in the mid-1990s, Region 1 began adding general requirements to POTW permits that required the permittees to "eliminate excessive infiltration and inflow" and provide an annual "summary report" of activities to reduce I/I. As the Region gathered more information and gained more experience in assessing these reports and activities, it began to include more detailed requirements and reporting provisions in these permits.

MassDEP also engaged in a parallel effort to address I/I, culminating in 2001 with the issuance of MassDEP Policy No. BRP01-1, "Interim Infiltration and Inflow Policy." Among other provisions, this policy established a set of standard NPDES permit conditions for POTWs that included development of an I/I control plan (including funding sources, identification and prioritization of problem areas, and public education programs) and detailed annual reporting requirements (including mapping, reporting of expenditures and I/I flow calculations). Since September 2001, these requirements have been the basis for the standard operation and maintenance conditions related to I/I.

Regional treatment plants presented special issues as I/I requirements became more specific, as it is generally the member communities, rather than the regional sewer district, that own the collection systems that are the primary source of I/I. Before the focus on I/I, POTW permits did not contain specific requirements related to the collection system component of POTWs. Therefore, when issuing NPDES permits to authorize discharges from regionally integrated treatment POTWs, Region 1 had generally only included the legal entity owning and/or operating the regionally centralized wastewater treatment plant as the permittee. As the permit conditions were focused on the treatment plant and its effluent discharge, a permit issued only to the owner or operator of the treatment plant was sufficient to ensure that permit conditions could be fully implemented and that EPA had authority to enforce the permit requirements.

In implementing the I/I conditions, Region 1 initially sought to maintain the same structure, placing the responsibility on the regional sewer district to require I/I activities by the contributing systems and to collect the necessary information from those systems for submittal to EPA. MassDEP's 2001 Interim I/I Policy reflected this approach, containing a condition for regional systems:

((FOR REGIONAL FACILITIES ONLY)) The permittee shall require, through appropriate agreements, that all member communities develop and implement infiltration and inflow control plans sufficient to ensure that high flows do not cause or contribute to a violation of the permittee's effluent limitations, or cause overflows from the permittee's collection system.

As existing NPDES permittees, the POTW treatment plants were an obvious locus of regulation. The Region assumed the plants would be in a position to leverage preexisting legal and/or contractual relationships with the satellite collection systems they serve to perform a coordinating function, and that utilizing this existing structure would be more efficient than establishing a new system of direct reporting to EPA by the collection system owners. The Region also believed that the owner/operator of the POTW treatment plant would have an incentive to reduce flow from contributing satellite systems because doing so would improve treatment plant performance and reduce operation costs. While relying on this cooperative approach, however, Region 1 also asserted that it had the authority to require that POTW collection systems be included as NPDES permittees and that it would do so if it proved necessary. Indeed, in 2001 Region 1 acceded to Massachusetts Water Resources Authority's ("MWRA") request to include as co-permittees the contributing systems to the MWRA Clinton wastewater treatment plant ("WWTP") based on evidence provided by MWRA that its relationship with those communities would not permit it to run an effective I/I reduction program for these collection systems. Region 1 also put municipal satellite collection systems on notice that they would be directly regulated through legally enforceable permit requirements if I/I reductions were not pursued or achieved.

In time, the Region realized that its failure to assert direct jurisdiction over municipal satellite dischargers was becoming untenable in the face of mounting evidence that cooperative (or in some cases non-existent) efforts on the part of the POTW treatment plant and associated satellites were failing to comprehensively address the problem of extraneous flow entering the POTW. The ability and/or willingness of regional sewer districts to attain meaningful I/I efforts in their member communities varied widely. The indirect structure of the requirements also tended to make it difficult for EPA to enforce the implementation of meaningful I/I reduction programs.

It became evident to Region 1 that a POTW's ability to comply with CWA requirements depended on successful operation and maintenance of not only the treatment plant but also the collection system. For example, the absence of effective I/I reduction and operation/maintenance programs was impeding the Region's ability to prevent or mitigate the human health and water quality impacts associated with SSOs. Additionally, these excess flows stressed POTW treatment plants from a hydraulic capacity and performance standpoint, adversely impacting effluent quality. *See Exhibit B* (Analysis of extraneous flow trends and SSO reporting for representative systems). Addressing these issues in regional systems was essential, as these include most of the largest systems in terms of flow, population served and area covered.

The Region's practice of imposing NPDES permit conditions on the municipal collection systems in addition to the treatment plant owner/operator represents a necessary and logical progression in its continuing effort to effectively address the serious problem of I/I in sewer collection systems.<sup>5</sup> In light of its past permitting experience and the need to effectively address

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<sup>5</sup> Although the Region has in the past issued NPDES permits only to the legal entities owning and operating the wastewater treatment plant (*i.e.*, only a portion of the "treatment works"), the Region's reframing of permits to include municipal satellite collection systems does not represent a break or reversal from its historical legal position. Region 1 has never taken the legal position that the satellite collection systems are beyond the reach of the CWA and the NPDES permitting program. Rather, the Region as a matter of discretion had merely never determined it

the problem of extraneous flow on a system-wide basis, Region 1 decided that it was necessary to refashion permits issued to regionally integrated POTWs to include all owners/operators of the treatment works (*i.e.*, the regional centralized POTW treatment plant and the municipal satellite collection systems).<sup>6</sup> Specifically, Region 1 determined that the satellite systems should be subject as co-permittees to a limited set of O&M-related conditions on permits issued for discharges from regionally integrated treatment works. These conditions pertain only to the portions of the POTW collection system that the satellites own. This ensures maintenance and pollution control programs are implemented with respect to all portions of the POTW. Accordingly, since 2005, Region 1 has generally included municipal satellite collection systems as co-permittees for limited purposes while it required the owner/operator of the treatment plant, as the primary permittee, to comply with the full array of NPDES requirements, including secondary treatment and water-quality based effluent limitations. The Region has identified 25 permits issued by the Region to POTWs in New Hampshire and Massachusetts that include municipal satellite collection systems as co-permittees. *See Exhibit A.* The 25 permits include a total of 55 satellite collection systems as co-permittees.

### III. Legal Authority

The Region's prior and now superseded practice of limiting the permit only to the legal entity owning and/or operating the wastewater treatment plant had never been announced as a regional policy or interpretation. Similarly, the Region's practice of imposing NPDES permit conditions on the municipal collection systems in addition to the treatment plant owner/operator has also never been expressly announced as a uniform, region-wide policy or interpretation. Upon consideration of the Board's decision, described above, Region 1 has decided to supply a clearer, more detailed explanation regarding its use of a co-permittee structure when issuing NPDES permits to regionally integrated POTWs. In this section, the Region addresses the questions posed by the Board in the *Upper Blackstone* decision referenced above.

*(1) In the case of a regionally integrated POTW composed of municipal satellite collection systems owned by different entities and a treatment plant owned by another, is the scope of*

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necessary to exercise its statutory authority to directly reach these facilities in order to carry out its NPDES permitting obligations under the Act.

Although the Region adopted a co-permittee structure to deal I/I problems in the municipal satellite collection systems, that decision does nothing to foreclose a permitting authority from opting for alternative permitting approaches that are consistent with applicable law. Each permitting authority has the discretion to determine which permitting approach best achieves the requirements of the Act based on the facts and circumstances before it. Upon determining that direct regulation of a satellite collection system via an NPDES permit is warranted, a permitting authority has the discretion to make the owner or operator of the collection system a co-permittee, or to cover it through an individual or general permit. Nothing in EPA regulations precludes the issuance of a separate permit to an entity that is part of the larger system being regulated. As in the pretreatment program, there are many ways to ensure that upstream collection systems are adequately contributing to the successful implementation of a POTW's permit requirements.

<sup>6</sup> EPA has "considerable flexibility in framing the permit to achieve a desired reduction in pollutant discharges." *Natural Resources Defense Council, Inc. v. Costle*, 568 F.2d 1369, 1380 (D.C.Cir.1977). ("[T]his ambitious statute is not hospitable to the concept that the appropriate response to a difficult pollution problem is not to try at all.").

*NPDES authority limited to owners/operators of the POTW treatment plant, or does the authority extend to owners/operators of the municipal satellite collection systems that convey wastewater to the POTW treatment plant?*

The scope of NPDES authority extends beyond the owners/operators of the POTW treatment plant to include the owners/operators of the municipal satellite collection systems conveying wastewater to the treatment plant for the reasons discussed below.

The CWA prohibits the “discharge of any pollutant by any person” from any point source to waters of the United States, except, *inter alia*, in compliance with an NPDES permit issued by EPA or an authorized state pursuant to Section 402 of the CWA. CWA § 301, 402(a)(1); 40 C.F.R. § 122.1(b).

“Publicly owned treatment works” are facilities that, when they discharge, are subject to the NPDES program. Statutorily, POTWs as a class must meet performance-based effluent limitations based on available wastewater treatment technology. *See* CWA § 402(a)(1) (“[t]he Administrator may...issue a permit for the discharge of any pollutant...upon condition that such discharge will meet (A) all applicable requirements under [section 301]...”); § 301(b)(1)(B) (“In order to carry out the objective of this chapter there shall be achieved...for publicly owned treatment works in existence on July 1, 1977...effluent limitations based upon secondary treatment[.]”); *see also* 40 C.F.R. pt 133. In addition to secondary treatment requirements, POTWs are also subject to water quality-based effluent limits if necessary to achieve applicable state water quality standards. *See* CWA § 301(b)(1)(C). *See also* 40 C.F.R. § 122.44(a)(1) (“...each NPDES permit shall include...[t]echnology-based effluent limitations based on: effluent limitations and standards published under section 301 of the Act”) and (d)(1) (same for water quality standards and state requirements). NPDES regulations similarly identify the “POTW” as the entity subject to regulation. *See* 40 C.F.R. § 122.21(a) (requiring “new and existing POTWs” to submit information required in 122.21(j),” which in turn requires “all POTWs,” among others, to provide permit application information).

The CWA and its implementing regulations broadly define “POTW” to include not only wastewater treatment plants but also the sewer systems and associated equipment that collect wastewater and convey it to the treatment plants. When a municipal satellite collection system conveys wastewater to the POTW treatment plant, the scope of NPDES authority extends to both the owner/operators of the treatment facility and the municipal satellite collection system, because the POTW is discharging pollutants.

Under section 212 of the Act,

“(2)(A) The term ‘treatment works’ means any devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature to implement section 1281 of this title, or necessary to recycle or reuse water at the most economical cost over the estimated life of the works, including intercepting sewers, outfall sewers, *sewage collection systems* [emphasis added], pumping, power, and other equipment, and their appurtenances; extensions, improvements, remodeling, additions, and alterations thereof; elements essential to provide a reliable recycled supply such as

standby treatment units and clear well facilities; and any works, including site acquisition of the land that will be an integral part of the treatment process (including land used for the storage of treated wastewater in land treatment systems prior to land application) or is used for ultimate disposal of residues resulting from such treatment.

(B) In addition to the definition contained in subparagraph (A) of this paragraph, ‘treatment works’ means any other method or system for preventing, abating, reducing, storing, treating, separating, or disposing of municipal waste, including storm water runoff, or industrial waste, including waste in combined storm water and *sanitary sewer systems* [emphasis added]. Any application for construction grants which includes wholly or in part such methods or systems shall, in accordance with guidelines published by the Administrator pursuant to subparagraph (C) of this paragraph, contain adequate data and analysis demonstrating such proposal to be, over the life of such works, the most cost efficient alternative to comply with sections 1311 or 1312 of this title, or the requirements of section 1281 of this title.”

EPA has defined POTW as follows:

“The term *Publicly Owned Treatment Works* or *POTW* [emphasis in original]...includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances only if they convey wastewater to a POTW Treatment Plant. The term also means the municipality as defined in section 502(4) of the Act, which has jurisdiction over the Indirect Discharges to and the discharges from such a treatment works.”

See 40 C.F.R. §§ 403.3(q) and 122.2.

Thus, under the CWA and its implementing regulations, wastewater treatment plants and the sewer systems and associated equipment that collect wastewater and convey it to the treatment plants fall within the broad definition of “POTW.”

The statutory and regulatory definitions plainly encompass both the POTW treatment plant and municipal satellite collection systems conveying wastewater to the POTW treatment plant even if the treatment plant and the satellite collection system have different owners. Municipal satellite collection systems indisputably fall within the definition of a POTW. First, they are “sewage collection systems” under section 212(A) and “sanitary sewer systems” under section 212(B). Second, they convey wastewater to a POTW treatment plant for treatment under 40 C.F.R. § 403.3(q)). The preamble to the rule establishing the regulatory definition of POTW supports the reading that the treatment plant comprises only one portion of the POTW. See 44 Fed. Reg. 62260, 62261 (Oct. 29, 1979).<sup>7</sup> Consistent with Region 1’s interpretation, courts have similarly

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<sup>7</sup> “A new provision...defining the term ‘POTW Treatment Plant’ has been added to avoid an ambiguity that now exists whenever a reference is made to a POTW (publicly owned treatment works). ...[T]he existing regulation defines a POTW to include both the treatment plant and the sewer pipes and other conveyances leading to it. As a result, it is unclear whether a particular reference is to the pipes, the treatment plant, or both. The term “POTW

taken a broad reading of the terms treatment works and POTW.<sup>8</sup> Finally, EPA has long recognized that a POTW can be composed of different parts, and that sometimes direct control is required under a permit for all parts of the POTW system, not just the POTW treatment plant segment. *See Multijurisdictional Pretreatment Programs Guidance Manual*, Office of Water (4203) EPA 833-B-94-005 (June 1994) at 19. (“If the contributing jurisdiction owns or operates the collection system within its boundaries, then it is a co-owner or operator of the POTW. As such, it can be included on the POTW’s NPDES permit and be required to develop a pretreatment program. Contributing jurisdictions should be made co-permittees where circumstances or experience indicate that it is necessary to ensure adequate pretreatment program implementation.”). The Region’s interpretation articulated here is consistent with the precepts of the pretreatment program, which pertains to the same regulated entity, i.e., the POTW.<sup>9</sup>

Thus, under the statutory and regulatory definitions, a satellite collection system owned by one municipality that transports municipal sewage to another portion of the POTW owned by another municipality can be classified as part of a single integrated POTW system discharging to waters of the U.S.

(2) *If the latter, how far up the collection system does NPDES jurisdiction reach, i.e., where does the “collection system” end and the “user” begin?*

NPDES jurisdiction extends beyond the treatment plant to the outer boundary of the municipally-owned sewage collection systems, that is, to the outer bound of those sewers whose purpose is to transport wastewater for others to a POTW treatment plant for treatment, as explained below.

As discussed in response to Question 1 above, the term “treatment works” is defined to include “sewage collection systems.” CWA § 212. In order to identify the extent of the sewage collection system for purposes of co-permittee regulation—*i.e.*, to identify the boundary between the portions of the collection system that are subject to NPDES requirements and those that are not—Region 1 is relying on EPA’s regulatory interpretation of the term “sewage collection system.” In relevant part, EPA regulations define “sewage collection system” at 40 C.F.R. § 35.905 as:

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treatment plant” will be used to designate that portion of the municipal system which is actually designed to provide treatment to the wastes received by the municipal system.”

<sup>8</sup> *See, e.g., United States v. Borowski*, 977 F.2d 27, 30 n.5 (1st Cir. 1992) (“We read this language [POTW definition] to refer to such sewers, pipes and other conveyances that are publicly owned. Here, for example, the City of Burlington’s sewer is included in the definition because it conveys waste water to the Massachusetts Water Resource Authority’s treatment works.”); *Shanty Town Assoc. v. Env’tl. Prot. Agency*, 843 F.2d 782, 785 (4th Cir. 1988) (“As defined in the statute, a ‘treatment work’ need not be a building or facility, but can be any device, system, or other method for treating, recycling, reclaiming, preventing, or reducing liquid municipal sewage and industrial waste, including storm water runoff.”) (citation omitted); *Comm. for Consideration Jones Fall Sewage System v. Train*, 375 F. Supp. 1148, 1150-51 (D. Md. 1974) (holding that NPDES wastewater discharge permit coverage for a wastewater treatment plant also encompasses the associated sanitary sewer system and pump stations under § 1292 definition of “treatment work”).

<sup>9</sup> The fact that EPA has endorsed a co-permittee approach in addressing pretreatment issues in situations where the downstream treatment plant was unable to adequately regulate industrial users to the collection system in another jurisdiction reinforces the approach taken here.

“... each, and all, of the common lateral sewers, within a publicly owned treatment system, which are primarily installed to receive waste waters directly from facilities which convey waste water from individual structures or from private property and which include service connection “Y” fittings designed for connection with those facilities. The facilities which convey waste water from individual structures, from private property to the public lateral sewer, or its equivalent, are specifically excluded from the definition....”

Put otherwise, a municipal satellite collection system is subject to NPDES jurisdiction under the Region’s approach insofar as it transports wastewater for others to a POTW treatment plant for treatment. This test (i.e., common sewer installed to receive and carry waste water from others) allows Region 1 to draw a principled, predictable and readily ascertainable boundary between the POTW’s collection system and the users. This test would exclude, for example, single user branch drainpipes that collect and transport wastewater from plumbing fixtures in a commercial building or public school to the common lateral sewer, just as service connections from private residential structures to lateral sewers are excluded. This type of infrastructure would not be considered part of the collection system, because it is not designed to receive and carry wastewaters from other users. Rather, it is designed to transport its users’ wastewater to such a common collection system at a point further down the sanitary sewer system.

EPA’s reliance on the definition of “sewage collection system” from the construction grants regulations for interpretative guidance is reasonable because these regulations at 40 C.F.R. Part 35, subpart E pertain to grants specifically for POTWs, the entity that is the subject of this NPDES policy. Additionally, the term “sewage collection systems” expressly appears in the definition of treatment works under section 212 of the Act as noted above.

*(3) Do municipal satellite collection systems “discharge [] a pollutant” within the meaning of the statute and regulations?*

Yes, the collection system “discharges a pollutant” because it adds pollutants to waters of the U.S. from a point source. This position is consistent with the definition of “discharge of a pollutant” at 40 C.F.R. § 122.<sup>10</sup> The fact that a collection system may be located in the upper reaches of the POTW and not necessarily near the ultimate discharge point at the treatment plant, or that its contribution may be commingled with other wastewater flows prior to the discharge point, is not material to the question of whether it “discharges” a pollutant and consequently may be subject to conditions of an NPDES permit issued for discharges from the POTW.<sup>11</sup> 40 C.F.R. § 122.2 defines “discharge of a pollutant” as follows:

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<sup>10</sup> This position differs from that taken by the Region in the *Upper Blackstone* litigation. There, the Region stated that the treatment plant was the discharging entity for regulatory purposes. The Region has clarified this view upon further consideration of the statute, EPA’s own regulations and case law and determined that a municipal satellite collection system in a POTW is a discharging entity for regulatory purposes.

<sup>11</sup> As explained more fully below, non-domestic contributors of pollutants to the collection system and treatment plant do not require NPDES permits because they are regulated through the pretreatment program under Section 307 of the CWA and are specifically excluded from needing an NPDES permit. 40 C.F.R. § 122.3(c).

“Discharge of a pollutant means:

- (a) Any addition of any ‘pollutant’ or combination of pollutants to ‘waters of the United States’ from any ‘point source,’ or
- (b) Any addition of any pollutant or combination of pollutants to the waters of the ‘contiguous zone’ or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation.

This definition includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works. This term does not include an addition of pollutants by any ‘indirect discharger.’”

POTW treatment plants as well as the municipal satellite collection systems that comprise portions of the larger POTW and that transport flow to the POTW treatment plant clearly add pollutants or combinations of pollutants to waters of the U.S. and to waters of the “contiguous zone” and are thus captured under sections (a) and (b) of this definition.<sup>12</sup>

*(4) Are municipal satellite collection systems “indirect dischargers” and thus excluded from NPDES permitting requirements?*

No, municipal satellite collection systems that convey wastewater from domestic sources to another portion of the POTW for treatment are not “indirect dischargers” to the POTW.

Section 307(b) of the Act requires EPA to establish regulatory pretreatment requirements to prevent the “introduction of pollutants into treatment works” that interfere, pass through or are otherwise incompatible with such works. Section 307 is implemented through the General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. Part 403) and categorical pretreatment standards (40 C.F.R. Parts 405-471). Section 403.3(i) defines “indirect discharger” as “any non-domestic” source that introduces pollutants into a POTW and is regulated under pretreatment standards pursuant to CWA § 307(b)-(d). The source of an indirect discharge is termed an “industrial user.” *Id.* at § 403.3(j). Under regulations governing the

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<sup>12</sup> Some municipal satellite collection systems have argued that the addition of pollutants to waters of the United States from pipes, sewers or other conveyances that go to a *treatment plant* are not a “discharge of a pollutant” under 40 C.F.R. § 122.2. This is erroneous. Only one category of such discharges is excluded: indirect discharges. For the reasons explained below in section 4, the satellite system discharges at issue here are not indirect discharges. It is correct that the discharge of wastewater that does not go to the treatment works is included as a discharge under the definition. However, interpreting the *inclusion* of such discharges under the definition as categorically *excluding* the conveyance of other discharges that do go to the treatment works is not a reasonable reading of the regulation. This argument is also flawed in that it incorrectly equates “treatment works,” the term used in the definition above, with “treatment plant.” To interpret “treatment works” as it appears in the regulatory definition of “discharge of a pollutant” as consisting of only the POTW treatment plant would be inconsistent with the definition of “treatment works” at 40 C.F.R. § 403.3(q), which expressly includes the collection system. *See also* § 403.3(r) (defining “POTW Treatment Plant” as “*that portion* [emphasis added] of the POTW which is designed to provide treatment (including recycling and reclamation) of municipal sewage and industrial waste.”)

NPDES permitting program, the term “indirect discharger” is defined as “a non-domestic discharger introducing ‘pollutants’ to a ‘publicly owned treatment works.’” 40 C.F.R. § 122.2. Indirect dischargers are excluded from NPDES permit requirements at 40 C.F.R. § 122.3(c), which provides, “The following discharges do not require an NPDES permit: . . . The introduction of sewage, industrial wastes or other pollutants into publicly owned treatment works by indirect dischargers.”

Municipal satellite collection satellite systems are not indirect dischargers as that term is defined under part 122 or 403 regulations. Unlike indirect dischargers, municipal satellite collection systems are not a non-domestic discharger “introducing pollutants” to POTWs as defined in 40 C.F.R. § 122.2. Instead, they themselves fall within the definition of POTW, whose components consist of the municipal satellite collection system owned and operated by one POTW and a treatment system owned and operated by another POTW. Additionally, they are not a non-domestic *source* regulated under section 307(b) that introduces pollutants into a POTW within the meaning of § 403.3(i). Rather, they are part of the POTW and collect and convey municipal sewage from industrial, commercial and domestic users of the POTW.

The Region’s determination that municipal satellite collection systems are not indirect dischargers is, additionally, consistent with the regulatory history of the term indirect discharger. The 1979 revision of the part 122 regulations defined “indirect discharger” as “a non-municipal, non-domestic discharger introducing pollutants to a publicly owned treatment works, which introduction does not constitute a ‘discharge of pollutants’ . . .” *See* National Pollutant Discharge Elimination System, 44 Fed. Reg. 32854, 32901 (June 7, 1979). The term “non-municipal” was removed in the Consolidated Permit Regulations, 45 Fed. Reg. 33290, 33421 (May 19, 1980) (defining “indirect discharger” as “a nondomestic discharger. . .”). Although the change was not explained in detail, the substantive intent behind this provision remained the same. EPA characterized the revision as “minor wording changes.” 45 Fed. Reg. at 33346 (Table VII: “Relationship of June 7[, 1979] Part 122 to Today’s Regulations”). The central point again is that under any past or present regulatory incarnation, municipal satellite collection systems, as POTWs, are not within the definition of “indirect discharger,” which is limited to non-domestic sources subject to section 307(b) that introduce pollutants to POTWs.

*(5) How is the Region’s rationale consistent with the references to “municipality” in the regulatory definition of POTW found at 40 C.F.R. § 403.3(q), and the definition’s statement that “[t]he term also means the municipality....which has jurisdiction over the Indirect Discharges to and the discharges from such a treatment works?”*

There is no inconsistency between the Region’s view that municipally-owned satellite collection systems fall within the definition of POTW, and the references to municipality in 40 C.F.R. § 403.3(q), including the final sentence of the regulatory definition of POTW in the pretreatment regulations.

The Region’s co-permitting rationale is consistent with the first part of the pretreatment program’s regulatory definition of POTW, because the Region is only asserting NPDES jurisdiction over satellite collection systems that are owned by a “State or municipality (as defined by section 502(4) of the Act).” The term “municipality” as defined in CWA § 502(4)

“means a city, town, borough, county, parish, district, association, or other public body created by or pursuant to State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes...” Thus, in order to qualify under this definition, a wastewater collection system need only be “owned by a State or municipality.” There is no requirement that the constituent components of a regionally integrated POTW, *i.e.*, the collection system and regional centralized POTW treatment plant, be owned by the same State or municipal entity.

Furthermore, there is no inconsistency between the Region’s view that a satellite collection system is part of a POTW, and the final sentence of the regulatory definition of POTW in the pretreatment regulations. As noted above, the sentence provides that “POTW” may “also” mean a municipality which has jurisdiction over indirect discharges to and discharges from the treatment works. This is not a limitation because of the use of the word “also” (contrast this with the “only if” language in the preceding sentence of the regulatory definition).

*(6) How does the Region’s rationale comport with the permit application and signatory requirements under NPDES regulations?*

“Any person who discharges or proposes to discharge pollutants”... must comply with permit application requirements set forth in 40 C.F.R. § 122.21 (“Application for a Permit”), including the duty to apply in subsection 122.21(a). It is the operator’s duty to obtain a permit. *See* 40 C.F.R. § 122.21(b). An operator of a sewage collection system in a regionally integrated treatment works is operating a portion of the POTW and thus can be asked to submit a separate permit application pursuant to § 122.21(a) (requiring applicants for “new and existing POTWs” to submit information required in 122.21(j),” which in turn requires “all POTWs,” among others, to provide permit application information). In the Region’s experience, however, sufficient information about the collection system can be obtained from the treatment plant operator’s permit application. The NPDES permit application for POTWs solicits information concerning portions of the POTW beyond the treatment plant itself, including the collection system used by the treatment works. *See* 40 C.F.R. § 122.21(j)(1). Where this information is not sufficient for writing permit conditions that apply to a separately owned municipal satellite system, EPA can request that the satellite system to submit an application with the information required in 122.21(j), or alternatively use its authority under CWA section 308 to solicit the necessary information. Because Region 1 believes that it will typically receive information sufficient for NPDES permitting purposes from the POTW treatment plant operator’s application, the Region will formalize its historical practice by issuing written waivers to exempt municipal satellite collection systems from permit application and signatory requirements in accordance with 40 C.F.R. § 122.21(j).<sup>13</sup> To the extent the Region requires additional information, it intends to use its information collection authority under CWA § 308.

#### IV. Basis for the Specific Conditions to which the Municipal Satellite Collection Systems are Subject as Co-permittees

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<sup>13</sup> EPA may waive applications for municipal satellite collection systems, when requiring such applications may result in duplicative or immaterial information. The Regional Administrator (“RA”) may waive any requirement of this paragraph if he or she has access to substantially identical information. 40 C.F.R. § 122.21(j). *See generally*, 64 Fed. Reg. 42440 (August 4, 1999). The RA may also waive any application requirement that is not of material concern for a specific permit. *Id.*

Section 402(a) of the CWA is the legal authority for extending NPDES conditions to all portions of the municipally-owned treatment works to ensure proper operation and maintenance and to reduce the quantity of extraneous flow into the POTW. This section of the Act authorizes EPA to issue a permit for the “discharge of pollutants” and to prescribe permit conditions as necessary to carry out the provisions of the CWA, including Section 301 of the Act. Among other things, Section 301 requires POTWs to meet performance-based requirements based on secondary treatment technology, as well as any more stringent requirements of State law or regulation, including water quality standards. *See* CWA § 301(b)(1)(B),(C).

The Region imposes requirements on co-permittees when it determines that they are necessary to assure continued achievement of effluent limits based on secondary treatment requirements and state water quality standards in accordance with sections 301 and 402 of the Act, and to prevent unauthorized discharges of sewage from downstream collection systems. With respect to achieving effluent limits, the inclusion of the satellite systems as co-permittees may be necessary when high levels of I/I dilute the strength of influent wastewater and increase the hydraulic load on treatment plants, which can reduce treatment efficiency (*e.g.*, result in violations of technology-based percent removal limitations for BOD and TSS due to less concentrated influent, or violation of other technology-based or water quality-based effluent limitations due to reduction in treatment efficiency). Excess flows from an upstream collection system can also lead to bypassing a portion of the treatment process, or in extreme situations make biological treatment facilities inoperable (*e.g.*, wash out the biological organisms that treat the waste).

By preventing excess flows, the co-permittee requirements will also reduce water quality standards violations that result from SSOs by lessening their frequency and extent. *See Exhibit B* (Analysis of extraneous flow trends and SSO reporting for representative systems). SSOs that reach waters of the U.S. are discharges in violation of section 301(a) of the CWA to the extent not authorized by an NPDES permit.

Imposing standard permit conditions on the satellite communities may be necessary to give full effect to some of the standard permit conditions applicable to all NPDES permits at 40 C.F.R. § 122.41 . To illustrate, NPDES permitting regulations require standard conditions that “apply to all NPDES permits,” pursuant to 40 C.F.R. § 122.41, including a duty to mitigate and to properly operate and maintain “all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of the permit.” *Id.* at § 122.41(d), (e). If the owner or operator of a downstream POTW treatment plant is unable, due to legal constraints for example, or unwilling to ensure that upstream collection systems are implementing requirements concerning the collection system, such as I/I requirements, making the upstream POTW collection system subject to its own permit requirements may be the only or best available option to give full effect to these permit obligations.

## V. Conclusion

For all the reasons above, Region 1 has determined that it is reasonable to, as necessary, directly regulate municipal satellite collection systems as co-permittees when issuing NPDES permits for discharges from regionally integrated treatment works.

**Exhibit A**

<b>Name</b>	<b>Issue Date</b>
Massachusetts Water Resources Authority – Clinton (NPDES Permit No. MA0100404)	September 27, 2000
City of Brockton (NPDES Permit No. MA0101010)	May 11, 2005
City of Marlborough (NPDES Permit No. MA0100480)	May 26, 2005
Westborough Wastewater Treatment Plant (NPDES Permit No. MA0100412)	May 20, 2005
Lowell Regional Wastewater Utilities (NPDES Permit No. MA0100633)	September 1, 2005
Town of Webster Sewer Department (NPDES Permit No. MA0100439)	March 24, 2006
Town of South Hadley, Board of Selectmen (NPDES Permit No. MA0100455)	June 12, 2006
City of Leominster (NPDES Permit No. MA0100617)	September 28, 2006
Hoosac Water Quality District (NPDES Permit No. MA0100510)	September 28, 2006
Board of Public Works, North Attleborough (NPDES Permit No. MA0101036)	January 4, 2007
Town of Sunapee (NPDES Permit No. 0100544)	February 21, 2007
Lynn Water and Sewer Commission (NPDES Permit No. MA0100552)	March 3, 2007
City of Concord (NPDES Permit No. NH0100331)	June 29, 2007
City of Keene (NPDES Permit No. NH0100790)	August 24, 2007
Town of Hampton (NPDES No. NH0100625)	August 28, 2007
Town of Merrimack, NH (NPDES No. NH0100161)	September 25, 2007
City of Haverhill (NPDES Permit No. MA0101621)	December 5, 2007
Greater Lawrence Sanitary District (NPDES Permit No. MA0100447)	August 11, 2005
City of Pittsfield, Department of Public Works (NPDES No. MA0101681)	August 22, 2008

City of Manchester (NPDES No. NH0100447)	September 25, 2008
City of New Bedford (NPDES Permit No. MA0100781)	September 28, 2008
Winnepesaukee River Basin Program Wastewater Treatment Plant (NPDES Permit No. NH0100960)	June 19, 2009
City of Westfield (NPDES Permit No. MA0101800)	September 30, 2009
Hull Permanent Sewer Commission (NPDES Permit No. MA0101231)	September 1, 2009
Gardner Department of Public Works (NPDES Permit No. MA0100994)	September 30, 2009

## Exhibit B

### **Analysis of extraneous flow trends and SSO reporting for representative systems**

#### **I. Representative POTWS**

The **South Essex Sewer District (SESD)** is a regional POTW with a treatment plant in Salem, Massachusetts. The SESD serves a total population of 174,931 in six communities: Beverly, Danvers, Marblehead, Middleton, Peabody and Salem. The **Charles River Pollution Control District (CRPCD)** is a regional POTW with a treatment plant in Medway, Massachusetts. The CRPCD serves a total population of approximately 28,000 in four communities: Bellingham, Franklin, Medway and Millis. The CRPCD has been operating since 2001 under a permit that places requirements on the treatment plant to implement I/I reduction programs with the satellite collection systems, while SESD's existing permit does not include specific I/I requirements related to the satellite collection systems, in contrast to Region 1's current practice of including the satellite collection systems as co-permittees.

#### **II. Comparison of flows to standards for nonexcessive infiltration and I/I**

Flow data from the facilities' discharge monitoring reports (DMRs) are shown in comparison to the EPA standard for nonexcessive infiltration/inflow (I/I) of 275 gpcd wet weather flow and the EPA standard for nonexcessive infiltration of 120 gallons per capita per day (gpcd) dry weather flow; the standards are multiplied by population served for comparison with total flow from the facility. See *I/I Analysis and Project Certification*, EPA Ecol. Pub. 97-03 (1985); 40 CFR 35.2005(b)(28) and (29).

Figures 1 and 2 show the daily maximum flows (the highest flow recorded in a particular month) for the CRPCD and SESD, respectively, along with monthly precipitation data from nearby weather stations. Both facilities experience wet weather flows far exceeding the standard for nonexcessive I/I, particularly in wet months, indicating that these facilities are receiving high levels of inflow and wet weather infiltration.

Figure 1. CRPCD Daily Maximum Flow Compared to Nonexcessive I/I Standard

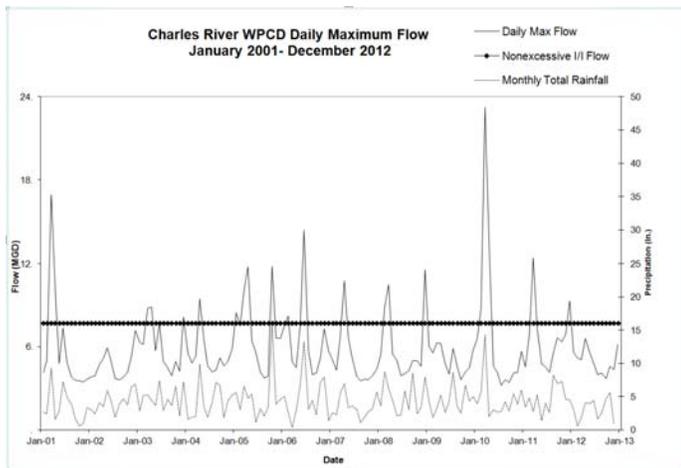
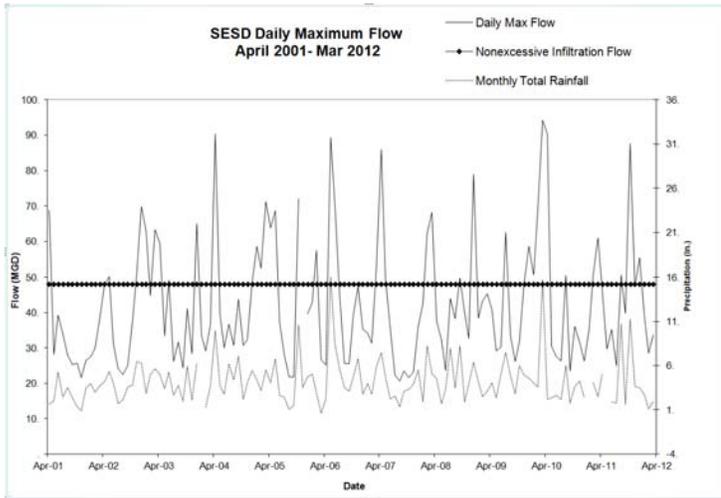


Figure 2. SESD Daily Maximum Flow Compared to Nonexcessive I/I Standard



Figures 3 and 4 shows the average flows for the CRPCD and SESD, which exceed the nonexcessive infiltration standard for all but the driest months. This indicates that these systems experience high levels of groundwater infiltration into the system even during dry weather.

Figure 3. CRPCD 12 Month Average Flow Compared to Nonexcessive Infiltration Standard

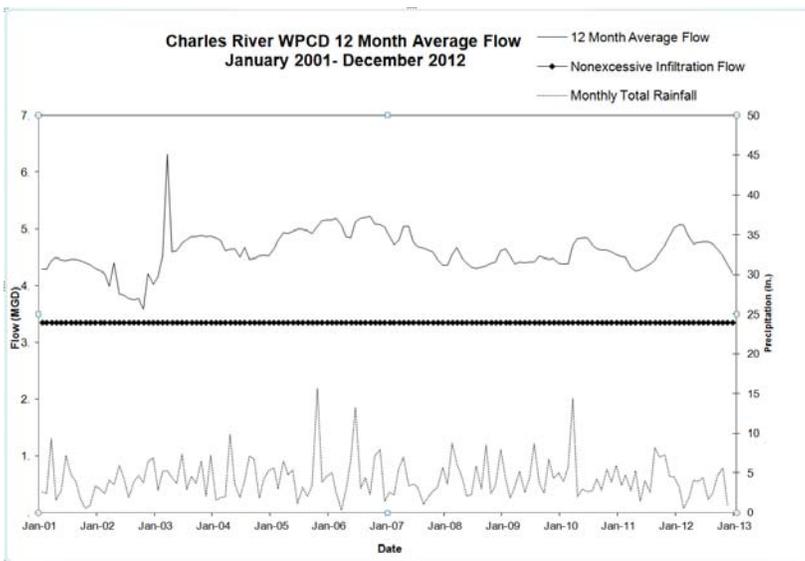
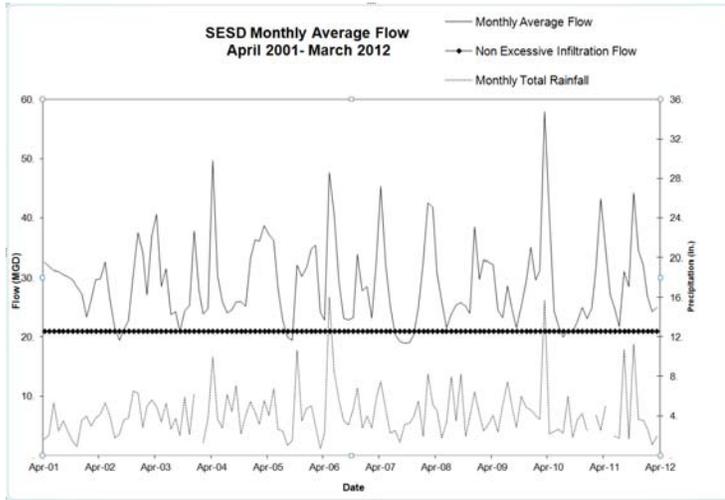


Figure 4. SESD Monthly Average Flow Compared to Nonexcessive Infiltration Standard

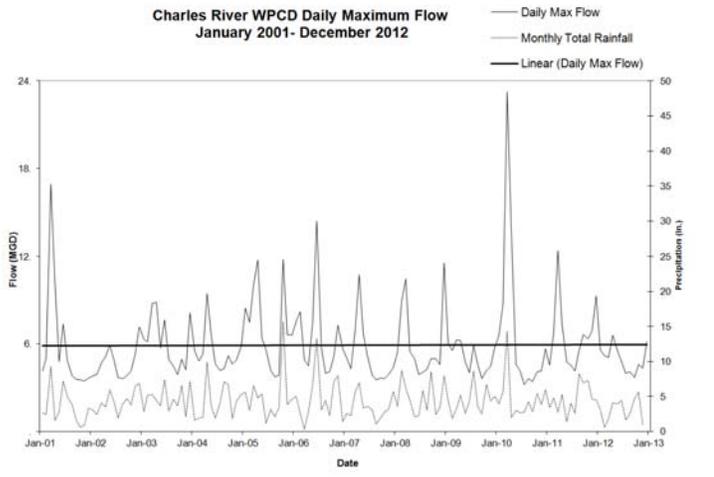


## II. Flow Trends

Successful I/I reduction programs should result in decreases in wet weather flows to the treatment plant over the long term. Figures 5 and 6 show the trend in maximum daily flows since 2001. The maximum daily flow reflects the highest wet weather flow for each month. Charts are shown for both the reported maximum daily flow and for a one year rolling average of the maximum daily flow (provided to reduce the impact of seasonality on the regression results). The linear regressions indicates a weak trend over this time period of increasing maximum daily flow; while most of the variability from year to year is due to changes in precipitation, the trends are generally inconsistent with reduction in maximum daily flow over this time period. This indicates that I/I has not been reduced in either system.

Figure 5. CRPCD Daily Maximum Flow Trends

a. Reported Daily Maximum Flows



b. One Year Rolling Average of Daily Maximum Flows

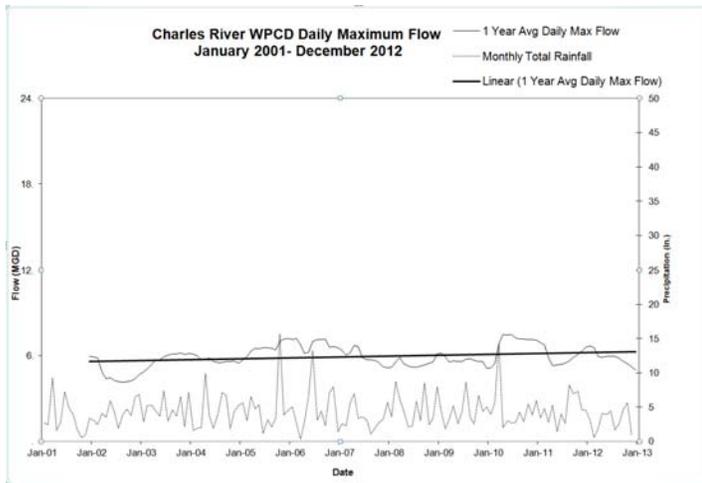
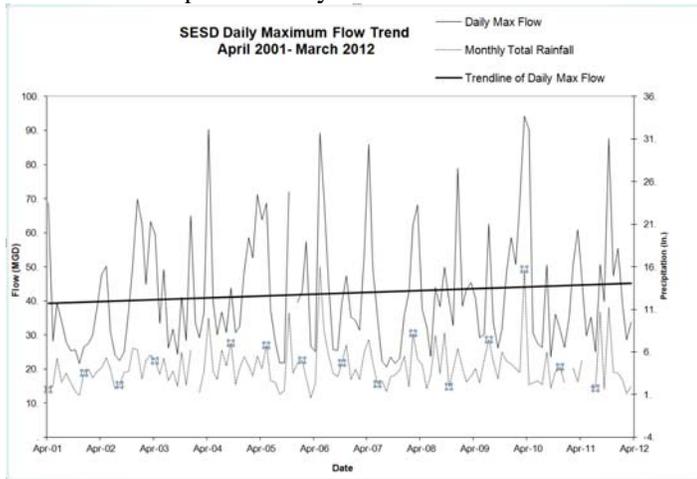
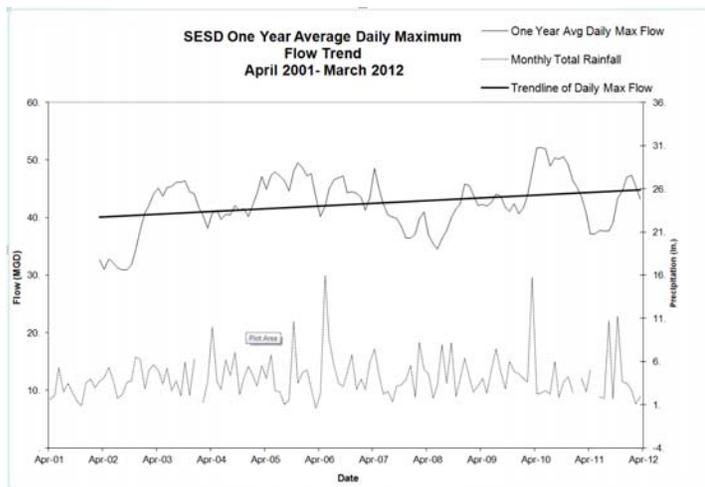


Figure 6. SESD Daily Maximum Flow Trend

a. Reported Daily Maximum Flows



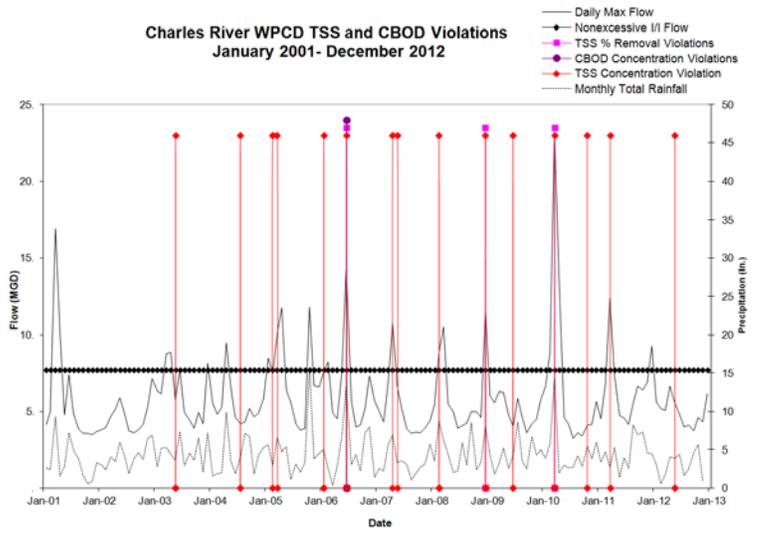
b. One Year Rolling Average of Daily Maximum Flows



III. Violations Associated with Wet Weather Flows

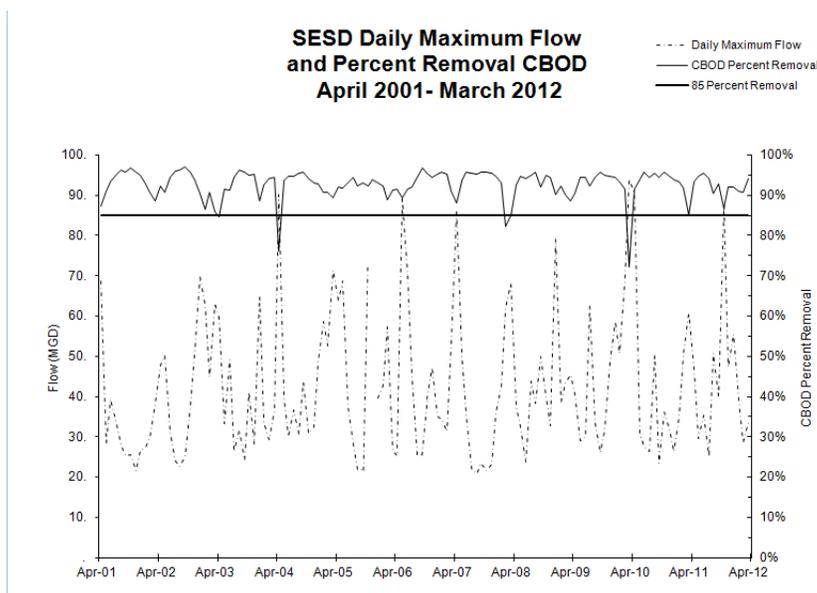
The CRPCD has experienced permit violations that appear to be related to I/I, based on their occurrence during wet weather months when excessive I/I standards are exceeded. Figure 7 shows violations of CRPCD's effluent limits for CBOD (concentration) and TSS (concentration and percent removal). Thirteen of the nineteen violations occurred during months when daily maximum flows exceeded the EPA standard.

Figure 7. CRPCD CBOD and TSS Effluent Limit Violations



In addition, SESD has been unable to achieve the secondary treatment requirement of 85% CBOD removal, also related to I/I. Figure 8 shows SESD’s results for removal of CBOD, in percentage, as compared to maximum daily flow. SESD had three months where CBOD removal fell below 85%, all during months with high maximum daily flows. While SESD’s current permit requires 85% removal in dry weather, so that these excursions did not constitute permit violations, SESD’s proposed draft permit does not limit this requirement to dry weather. Relief from the 85% removal requirement is allowed only when the treatment plant receives flows from CSOs or if it receives less concentrated influent wastewater from separate sewers that is not the result of excessive I/I (including not exceeding the 275 gpcpd nonexcessive I/I standard). 40 CFR § 133.103(a) and (d).

Figure 8. SESD CBOD Percent Removal



#### IV. SSO Reporting

In addition, both of these regional POTWs have experienced SSOs within the municipal satellite collection systems. In the SESD system, Beverly, Danvers, Marblehead and Peabody have reported SSOs between 2006 and 2008, based on data provided by MassDEP. In the CRPCD system, Bellingham reported SSOs in its system between 2006 and 2009.

## Exhibit C

### Form of Regional Administrator's or Authorized Delegate's Waiver of Permit Application Requirements for Municipal Satellite Collection Systems



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
REGION 1  
1 CONGRESS STREET, SUITE 1100  
BOSTON, MASSACHUSETTS 02114-2023

#### **Re: Waiver of Permit Application and Signatory Requirements for [Municipal Satellite Sewage Collection System]**

Dear \_\_\_\_\_:

Under NPDES regulations, all POTWs must submit permit application information set forth in 40 C.F.R. § 122.21(j) unless otherwise directed. Where the Region has “access to substantially identical information,” the Regional Administrator [or Authorized Delegate] may waive permit application requirements for new and existing POTWs. *Id.* Pursuant to my authority under this regulation, I am waiving NPDES permit application and signatory requirements applicable to the above-named municipal satellite collection systems.

Although EPA has the authority to require municipal satellite collection systems to submit individual permit applications, in this case I find that requiring a single permit application executed by the regional POTW treatment plant owner/operator will deliver “substantially identical information,” and will be more efficient, than requiring separate applications from each municipal satellite collection system owner/operator. Municipal satellite collection system owners/operators are expected to consult and coordinate with the regional POTW treatment plant operators to ensure that any information provided to EPA about their respective entities is accurate and complete. In the event that EPA requires additional information, it may use its information collection authority under CWA § 308. 33 U.S.C. § 1318.

This notice reflects my determination based on the specific facts and circumstances in this case. It is not intended to bind the agency in future determinations where a separate permit for municipal satellites would not be duplicative or immaterial.

If you have any questions or would like to discuss this decision, please contact [EPA Contact] at [Contact Info].

Sincerely,

Regional Administrator

MASSACHUSETTS DEPARTMENT OF  
ENVIRONMENTAL PROTECTION  
COMMONWEALTH OF MASSACHUSETTS  
1 WINTER STREET  
BOSTON, MASSACHUSETTS 02108

UNITED STATES ENVIRONMENTAL  
PROTECTION AGENCY – REGION 1  
OFFICE OF ECOSYSTEM PROTECTION  
5 POST OFFICE SQUARE  
BOSTON, MASSACHUSETTS 02109

**JOINT PUBLIC COMMENT PERIOD AND PUBLIC NOTICE OF A PUBLIC HEARING PERTAINING TO THE ISSUANCE OF DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE INTO WATERS OF THE UNITED STATES UNDER SECTIONS 301 AND 402 OF THE CLEAN WATER ACT, AS AMENDED, AND SECTIONS 27 AND 43 OF THE MASSACHUSETTS CLEAN WATERS ACT, AS AMENDED, AND REQUEST FOR STATE CERTIFICATION UNDER SECTION 401 OF THE CLEAN WATER ACT.**

DATE OF NOTICE: February 20, 2015

PERMIT NUMBER: **MA0101010**

PUBLIC NOTICE NUMBER: MA-008-15

NAME AND MAILING ADDRESS OF APPLICANT:

City of Brockton  
City Hall, 45 School Street  
Brockton, Massachusetts 02401

NAME AND ADDRESS OF THE FACILITY WHERE DISCHARGE OCCURS:

Brockton Advanced Water Reclamation Facility  
303 Oak Hill Way  
Brockton, Massachusetts 02401

NAMES AND ADDRESSES OF COPERMITTEES:

Town of Abington  
Sewer Department  
350 Summer Street  
Abington, MA 02351

Town of Whitman  
Department of Public Works  
100 Essex Street, P.O. Box 454  
Whitman, MA 02382

RECEIVING WATER: Salisbury Plain River (Class B)

The U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) have cooperated in the development of a draft permit for the Brockton AWWRF, which discharges treated domestic and industrial wastewater. Sludge from this facility is incinerated on-site. The effluent limits and permit conditions imposed have been drafted to assure compliance with the Clean Water Act, 33 U.S.C. sections 1251 et seq., the

Massachusetts Clean Waters Act, G.L. c. 21, §§ 26-53, 314 CMR 3.00, and State Surface Water Quality Standards at 314 CMR 4.00. EPA has requested that the State certify this draft permit pursuant to Section 401 of the Clean Water Act and expects that the draft permit will be certified.

INFORMATION ABOUT THE DRAFT PERMIT:

The draft permit and explanatory fact sheet may be obtained at no cost at [http://www.epa.gov/region1/npdes/draft\\_permits\\_listing\\_ma.html](http://www.epa.gov/region1/npdes/draft_permits_listing_ma.html) or by contacting:

Susan Murphy  
U.S. Environmental Protection Agency – Region 1  
5 Post Office Square, Suite 100 (OEP06-1)  
Boston, MA 02109-3912  
Telephone: (617) 918-1534

The administrative record containing all documents relating to this draft permit including all data submitted by the applicant may be inspected at the EPA Boston office mentioned above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except holidays.

PUBLIC HEARING:

The Regional Administrator has determined, pursuant to 40 C.F.R. Section 124.12, upon request by the applicant, that a significant degree of public interest exists in this proposed permit that a public hearing should be held to consider this draft permit.

A public hearing and meeting (information session) will be held on the following date and time.

DATE: Tuesday, March 24, 2015

Or, SNOW DATE: Tuesday, March 31, 2015

MEETING TIME: 6:30pm – 7:15pm

HEARING TIME: 7:30 pm

LOCATION: West Middle School  
Auditorium  
271 West Street  
Brockton, MA 02301

In accordance with 40 CFR Section 124.12, the following is a summary of the procedures that shall be followed at the public hearing:

- a. The Presiding Officer shall have the authority to open and conclude hearing and to maintain order; and

- b. Any person appearing at such hearing may submit oral or written statements and data concerning the draft permit.

All persons, including applicants, who believe any condition of this draft permit is inappropriate, must raise all issues and submit all available arguments and all supporting material for their arguments in full by April 20, 2015, to the address listed above. In reaching a final decision on this draft permit, the Regional Administrator will respond to all significant comments and make the responses available to the public at EPA's Boston office.

**FINAL PERMIT DECISION:**

Following the close of the comment period and after a public hearing, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice.

DAVID FERRIS, DIRECTOR  
MASSACHUSETTS WASTEWATER  
MANAGEMENT PROGRAM  
MASSACHUSETTS DEPARTMENT OF  
ENVIRONMENTAL PROTECTION

KEN MORAFF, DIRECTOR  
OFFICE OF ECOSYSTEM PROTECTION  
EPA-REGION 1