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),

Board of Water and Sewer Commissioners
Town of Bridgewater Academy Building
Bridgewater, MA 02134

is authorized to discharge from the facility located at

Bridgewater Wastewater Treatment Facility
100 Morris Avenue
Bridgewater, Massachusetts 02134

to receiving water named

Town River (Taunton River Basin MA62-13)

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

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 December 30, 2003.

This permit consists of **Part I (**19 pages including effluent limitations and monitoring requirements); **Attachment A** (USEPA Region 1 Freshwater Acute Toxicity Test Procedure and Protocol, February 2011, 8 pages); **Attachment B** (USEPA Region 1 Freshwater Chronic Toxicity Test Procedure and Protocol, February March 2013, 7 pages); and **Part II (**25 pages including NPDES Part II Standard Conditions).

Signed this 30th day of September, 2016

/S/SIGNATURE ON FILE
_____
Ken Moraff, Director
Office of Ecosystem Protection
Environmental Protection Agency
Boston, MA

/S/SIGNATURE ON FILE
_____
David R. Ferris, Director
Massachusetts Wastewater Management Program
Department of Environmental Protection
Commonwealth of Massachusetts
Boston, MA

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 Town River. Such discharges shall be limited and monitored as specified below.

EFFLUENT CHARACTERISTICS	**EFFLUENT LIMITATIONS**					**MONITORING REQUIREMENTS[3]**	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
FLOW[2]	*********	*********	1.44 mgd	*********	Report mgd	CONTINUOUS	RECORDER
FLOW[2]	*********	*********	Report mgd	*********	*********	CONTINUOUS	RECORDER
BOD_5 [4]	240 lb/day	360 lb/day	20 mg/l	30 mg/l	Report mg/l	2/WEEK	24-HOUR COMPOSITE[5]
TSS [4]	240 lb/day	360 lb/day	20 mg/l	30 mg/l	Report mg/l	2/WEEK	24-HOUR COMPOSITE[5]
pH RANGE[1]	6.5 - 8.3 S.U. (SEE PERMIT PARAGRAPH I.A.1.b.)					1/Day	GRAB
ESCHERICHIA COLI [1,6] (April 1 – October 31)	*********	**********	126 cfu/100 ml	*********	409 cfu/100 ml	2/WEEK	GRAB
TOTAL RESIDUAL CHLORINE[1,6,7]	*********	**********	24 ug/l	*********	42 ug/l	1/DAY	GRAB
TOTAL COPPER[8]	*********	*********	35 ug/l	*********	46 ug/l	1/MONTH	24-HOUR COMPOSITE[5]
TOTAL PHOSPHORUS[9] (April 1 – October 31)	*********	*********	200 ug/l	*********	Report mg/l	1/WEEK	24-HOUR COMPOSITE[5]
TOTAL PHOSPHORUS[9] (November 1 –March 31)	*********	*********	Report mg/l	*********	Report mg/l	1/MONTH	GRAB
DISSOLVED OXYGEN (April 1-October 31)	NOT LESS THAN 6.0 mg/l					1/DAY	GRAB

Sampling Location: after chlorination

CONTINUED FROM PREVIOUS PAGE

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 Town River. Such discharges shall be limited and monitored as specified below.

EFFLUENT CHARACTERISTICS	EFFLUENT LIMITS					MONITORING REQUIREMENTS [3]	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
AMMONIA-NITROGEN (April 1 - October 31)	36 lb/day	*********	3 mg/l	*********	*********	3/WEEK	24-HOUR COMPOSITE[5]
AMMONIA-NITROGEN (November 1 - March 31)	Report lb/day	*********	Report mg/l	*********	Report mg/l	1/MONTH	24-HOUR COMPOSITE[5]
TOTAL NITROGEN[9] (May 1 – October 31) TOTAL NITRATE NITROGEN TOTAL NITRITE NITROGEN TOTAL KJELDAHL NITROGEN	60 lbs/day Report lbs/day Report lbs/day Report lbs/day	 *********	Report mg/l Report mg/l Report mg/l Report mg/l	 *********	 Report mg/l	 2/WEEK	 24-HOUR COMPOSITE[5]
TOTAL NITROGEN[9,12] (November 1 – April 30) TOTAL NITRATE NITROGEN TOTAL NITRITE NITROGEN TOTAL KJELDAHL ITROGEN	Report lbs/day Report lbs/day Report lbs/day Report lbs/day	 *********	Report mg/l Report mg/l Report mg/l Report mg/l	 *********	 Report mg/l	 1/MONTH	 24-HOUR COMPOSITE[5]
WHOLE EFFLUENT TOXICITY[13,14,15,16]	Acute $LC_{50} \geq 100\%$ Chronic C-NOEC $\geq 45\%$					4/YEAR	24-HOUR COMPOSITE[5]

Sampling Location: after chlorination

CONTINUED FROM PREVIOUS PAGE

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 Town River. Such discharges shall be limited and monitored as specified below.							
Hardness[16]	********	*********	*********	*********	Report mg/l	4/YEAR	24-HOUR COMPOSITE[5]
Ammonia Nitrogen as N[17]	********	*********	*********	*********	Report mg/l	4/YEAR	24-HOUR COMPOSITE[5]
Total Recoverable Aluminum[17]	********	*********	*********	*********	Report mg/l	4/YEAR	24-HOUR COMPOSITE[5]
Total Recoverable Cadmium[17]	********	*********	*********	*********	Report mg/l	4/YEAR	24-HOUR COMPOSITE[5]
Total Recoverable Copper[17]	********	*********	*********	*********	Report mg/l	4/YEAR	24-HOUR COMPOSITE[5]
Total Recoverable Nickel[17]	********	*********	*********	*********	Report mg/l	4/YEAR	24-HOUR COMPOSITE[5]
Total Recoverable Lead[17]	********	*********	*********	*********	Report mg/l	4/YEAR	24-HOUR COMPOSITE[5]
Total Recoverable Zinc[17]	********	*********	*********	*********	Report mg/l	4/YEAR	24-HOUR COMPOSITE[5]

Sampling Location: after chlorination

B.1. (continued). During the period beginning on the effective date and lasting through expiration, the permittee shall conduct ambient sampling from May 1 through October 1. The monitoring and reporting requirements are specified below.

AMBIENT CHARACTERISTICS	**AMBIENT REPORTING**					**MONITORING REQUIRMENTS[3]**	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
pH RANGE[10]	*********	*********	Report	*********	*********	1/MONTH	GRAB
DISSOLVED OXYGEN[10] (May1-October 31)	Report	********	Report	*********	*********	1/MONTH	GRAB
TOTAL PHOSPHORUS[11] (May 1 – October 31)	*********	*********	Report mg/l	*********	Report mg/l	1/MONTH	GRAB
TOTAL NITROGEN[11] (May 1 – October 31)	Report lbs/day		Report mg/l			1/MONTH	GRAB
TOTAL NITRATE NITROGEN	Report lbs/day		Report mg/l	*********	*********		
TOTAL NITRITE NITROGEN	Report lbs/day	*********	Report mg/l				
TOTAL KJELDAHL NITROGEN	Report lbs/day		Report mg/l				

Footnotes:

1. Required for State Certification.

2. Report annual average, monthly average, and the maximum daily flow. The limit is an annual average, which shall be reported as a 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. 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.

4. Sampling required for influent and effluent.

5. 24-hour composite samples 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.

6. The monthly average limit for Escherichia coli (E.coli) is expressed as a geometric mean. E. coli monitoring shall be conducted concurrently with a total residual chlorine (TRC) sample.

7. TRC monitoring is required whenever chlorine is added to the treatment process (i.e. 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 TRC 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. Sample results of 20 ug/l or less shall be reported as zero on the discharge monitoring report.

   Chlorination and dechlorination systems shall include an alarm system for indicating system interruptions or malfunctions. Any interruption or malfunction of the chlorine dosing system that may have resulted in levels of chlorine that were inadequate for achieving effective disinfection, or interruptions or malfunctions of the dechlorination system that may have resulted in excessive levels of chlorine in the final effluent shall be reported with the monthly DMRs. The report shall include the date and time of the interruption or malfunction, the nature of the problem, and the estimated amount of time that the reduced levels of chlorine or dechlorination chemicals occurred.

8. 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 of 3 ug/l or less shall be reported as zero on the Discharge Monitoring Report.

9. The permittee shall comply with the 200 ug/l total phosphorus limit, the 60 lbs/day total nitrogen limit and the optimization requirement of footnote 12 in accordance with the schedule contained in Section G below.

   The total nitrogen, in effective from May 1– October 31 of each year, shall be reported as a seasonal rolling average. The first value for the seasonal average will be reported after an entire May – October period has elapsed following the effective date of the permit (results do not have to be from the same year). For example, if the permit becomes effective on December 1, 2016, the permittee will calculate the first seasonal average from samples collected during the months of May through October 2017, and report this average on the October 2017 DMR. For each subsequent month that the seasonal limit is in effect, the seasonal average shall be calculated using samples from that month and the previous five months that the limit was in effect.

   The permittee shall comply with the 60 lbs/day total nitrogen limit in accordance with the schedule described in Section H below. Upon the effective date of the permit, and until the date specified in Section G for completion of the treatment plant upgrade, monitoring for total nitrogen shall be conducted once per week.

10. A monthly grab sample recorded for dissolve oxygen (DO) and pH at Hayward Street in the early morning (before 8:00 a.m.) and in the late afternoon (after 3:00 p.m.) Samples shall be taken from mid-stream on the same week and day of each month. Individual sample results, including the corresponding river flow from the USGS gage in Bridgewater, shall be reported on a separate sheet of paper and submitted with the November DMR report. If the river cannot be reasonably accessed at the mouth than the sample shall be taken at the nearest accessible point upstream of the mouth.

11. From May through October, the permittee will conduct monthly ambient sampling for total phosphorus and total nitrogen (ammonia + organic nitrogen + nitrite + nitrate) immediately upstream of the discharge and at the mouth of the Town River. The sample collected at the mouth of the Town River will be upstream of the confluence with the Matfield River. Samples shall be taken from mid-stream on the same week and day of each month. An EPA approved analytical method that achieves the lowest possible quantification level shall be used. Individual sample results, including the corresponding river flow from the USGS gage in Bridgewater, shall be reported on a separate sheet of paper and submitted with the November DMR report. If the river cannot be reasonably accessed at the mouth than the sample shall be taken at the nearest accessible point upstream of the mouth.

12. The permittee shall operate the treatment facility to reduce the discharge of total nitrogen during the months of November through April to the maximum extent practicable while maintaining compliance with all other permit conditions. All available treatment equipment in place at the facility shall be operated by the permittee unless equal or better performance can be achieved by the permittee in a reduced operational mode. The addition of a carbon source that may be necessary in order to meet the total nitrogen limit during the months of May through October is not required during the months of November through April.

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.

Test Dates Second Week in	**Submit Results By:**	**Test Species**	**Acute Limit LC_{50}**	**Chronic Limit C-NOEC**
February May August November	March 31 June 30 September 30 December 31	Ceriodaphnia dubia (daphnid)	≥ 100%	≥ 45%

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_{50} 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 **45**% or greater" limit is defined as a sample which is composed of **45**% (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 **Attachments A and B**. 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 **Attachments A and B**.

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 **Attachments A and B**. 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 permittee shall minimize the use of chlorine while maintaining adequate bacterial control.

g. The results of sampling for any parameter done in accordance with EPA approved methods above its required frequency must also be reported.

h. 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.

C. 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.

D. 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

   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 D.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 D.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 D.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 [1.15 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[1] it owns and operates.

E. SLUDGE CONDITIONS

1. The permittee shall comply with all existing federal and state laws and regulations that apply to sewage sludge use and disposal practices, including EPA regulations promulgated at 40 CFR Part 503, which prescribe "Standards for the Use or Disposal of Sewage Sludge" pursuant to Section 405(d) of the CWA, 33 U.S.C. § 1345(d).

2. If both state and federal requirements apply to the permittee's sludge use and/or disposal practices, the permittee shall comply with the more stringent of the applicable requirements.

3. The requirements and technical standards of 40 CFR Part 503 apply to the following sludge use or disposal practices.

   a. Land application - the use of sewage sludge to condition or fertilize the soil

   b. Surface disposal - the placement of sewage sludge in a sludge only landfill

   c. Sewage sludge incineration in a sludge only incinerator

4. The requirements of 40 CFR Part 503 do not apply to facilities which dispose of sludge in a municipal solid waste landfill. 40 CFR § 503.4. These requirements also do not apply to facilities which do not use or dispose of sewage sludge during the life of the permit but rather treat the sludge (e.g. lagoons, reed beds), or are otherwise excluded under 40 CFR § 503.6.

5. The 40 CFR. Part 503 requirements including the following elements:

   - General requirements
   - Pollutant limitations
   - Operational Standards (pathogen reduction requirements and vector attraction reduction requirements)
   - Management practices
   - Record keeping
   - Monitoring
   - Reporting

   Which of the 40 C.F.R. Part 503 requirements apply to the permittee will depend upon the use or disposal practice followed and upon the quality of material produced by a facility. The EPA Region 1 Guidance document, "EPA Region 1 - NPDES Permit Sludge Compliance Guidance" (November 4, 1999), may be used by the permittee to assist it in determining the applicable requirements.[2]

[1] As defined at 40 CFR §122.2, which references the definition at 40 CFR §403.3
[2] This guidance document is available upon request from EPA Region 1 and may also be found at: http://www.epa.gov/region1/npdes/permits/generic/sludgeguidance.pdf

6. The sludge shall be monitored for pollutant concentrations (all Part 503 methods) and pathogen reduction and vector attraction reduction (land application and surface disposal) at the following frequency. This frequency is based upon the volume of sewage sludge generated at the facility in dry metric tons per year:

less than 290	1/ year
290 to less than 1,500	1 /quarter
1,500 to less than 15,000	6 /year
15,000 +	1 /month

Sampling of the sewage sludge shall use the procedures detailed in 40 CFR § 503.8.

7. Under 40 CFR § 503.9(r), the permittee is a "person who prepares sewage sludge" because it "is … the person who generates sewage sludge during the treatment of domestic sewage in a treatment works …." If the permittee contracts with *another* "person who prepares sewage sludge" under 40 CFR § 503.9(r) – i.e., with "a person who derives a material from sewage sludge" – for use or disposal of the sludge, then compliance with Part 503 requirements is the responsibility of the contractor engaged for that purpose. If the permittee does not engage a "person who prepares sewage sludge," as defined in 40 CFR § 503.9(r), for use or disposal, then the permittee remains responsible to ensure that the applicable requirements in Part 503 are met. 40 CFR § 503.7. If the ultimate use or disposal method is land application, the permittee is responsible for providing the person receiving the sludge with notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

8. The permittee shall submit an annual report containing the information specified in the 40 CFR Part 503 requirements (§ 503.18 (land application), § 503.28 (surface disposal), or § 503.48 (incineration)) by **February 19** (*see also* "EPA Region 1 - NPDES Permit Sludge Compliance Guidance"). Reports shall be submitted to the address contained in the reporting section of the permit. If the permittee engages a contractor or contractors for sludge preparation and ultimate use or disposal, the annual report need contain only the following information:

   a. Name and address of contractor(s) responsible for sludge preparation, use or disposal
   b. Quantity of sludge (in dry metric tons) from the POTW that is transferred to the sludge contractor(s), and the method(s) by which the contractor will prepare and use or dispose of the sewage sludge.

F. 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 and the Use of NetDMR

Beginning the effective date of the permit the permittee must submit its monthly monitoring

data in discharge monitoring reports (DMRs) to EPA and MassDEP no later than the 15th day of the month following the completed reporting period. **For a period of six months from the effective date of the permit**, the permittee may submit its monthly monitoring data in discharge monitoring reports (DMRs) to EPA and MassDEP either in hard copy form, as described in Part I.E.5, or in DMRs electronically submitted using NetDMR. NetDMR is a web-based tool that allows permittees to electronically submit DMRs and other required reports via a secure internet connection. NetDMR is accessed from: http://www.epa.gov/netdmr. **Beginning no later than six months after the effective date of the permit**, the permittee shall begin reporting monthly monitoring data using NetDMR, unless, in accordance with Part I.E.7, the facility is able to demonstrate a reasonable basis, such as technical or administrative infeasibility, that precludes the use of NetDMR for submitting DMRs. The permittee must continue to use the NetDMR after the permittee begins to do so. When a permittee begins submitting reports using NetDMR, it will no longer be required to submit hard copies of DMRs to EPA or MassDEP.

2. Submittal of Reports as NetDMR Attachments

After the permittee begins submitting DMR reports to EPA electronically using NetDMR, the permittee shall electronically submit all reports to EPA as NetDMR attachments rather than as hard copies, unless otherwise specified in this permit. Permittees shall continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP. (See Part I.E.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 15th 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 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. Reports and DMRs submitted prior to the use of NetDMR

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

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

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.E.3, I.E.4, and I.E.5 also shall be submitted to the State at the following addresses:

MassDEP – Southeast Region
Bureau of Water Resources
20 Riverside Drive
Lakeville, MA 02347

Copies of toxicity tests only shall be submitted to:

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

7. Submittal of NetDMR Opt-Out Requests

NetDMR opt-out requests must be submitted in writing to EPA for written approval at least sixty (60) days prior to the date a facility would be required under this permit to begin using NetDMR. This demonstration shall be valid for twelve (12) months from the date of EPA approval and shall thereupon expire. At such time, DMRs and reports shall be submitted electronically to EPA unless the permittee submits a renewed opt-out request and such request be approved by EPA. All opt-out requests should be sent to the following addresses:

Attn: NetDMR Coordinator
U.S. Environmental Protection Agency, Water Technical Unit
5 Post Office Square, Suite 100 (OES04-4)
Boston, MA 02109-3912

And

Massachusetts Department of Environmental Protection
Surface Water Discharge Permit Program
627 Main Street, 2nd Floor
Worcester, Massachusetts 01608

8. 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-New England and to MassDEP. This includes verbal reports and notifications notification 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
617-918-1850

G. COMPLIANCE SCHEDULE

In order to comply with the new permit limits for total nitrogen and total phosphorus, the permittee shall take the following actions:

1. Within one year of the effective date of the permit, the Permittee shall submit to EPA and MassDEP a status report relative to the planning and design of the facilities necessary to achieve the total nitrogen and total phosphorus 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 total nitrogen and total phosphorus permit limits.

3. Within three years of the effective date of the permit, the Permittee shall initiate construction of the facility improvements required to achieve the total nitrogen and total phosphorus 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 total nitrogen and total phosphorus permit limits.

5. Within fifty-four (54) months of the effective date of the permit, the Permittee shall complete construction of the facility improvements required to achieve the total nitrogen and total phosphorus permit limits.

6. The permit limits of 60 lbs/day total nitrogen and 200 ug/l total phosphorus shall go into effect sixty (60) months from the effective date of the permit. Until such date the existing permit limit of 1.0 mg/l total phosphorus shall remain in effect.

7. The permittee shall notify EPA and MassDEP of its compliance or noncompliance with the requirements of this part in writing no later than 14 days after each interim or final date of compliance.

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.

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

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[1]

1.	Test type	Static, non-renewal
2.	Temperature (^{o}C)	20 $\pm$ 1^{o}C or 25 $\pm$ 1^{o}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 Selenastrum to newly released organisms while holding prior to initiating test
12.	Aeration	None
13.	Dilution water[2]	Receiving water, other surface water, synthetic water adjusted to the hardness and alkalinity of the receiving water (prepared using either Millipore Milli-Q^{R} 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	$\geq$ 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

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[1]

1.	Test Type	Static, non-renewal
2.	Temperature (^{o}C)	20 $\pm$ 1 ^{o} C or 25 $\pm$ 1^{o}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[2]	Receiving water, other surface water, synthetic water adjusted to the hardness and alkalinity of the receiving water (prepared using either Millipore Milli-Q^{R} 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	$\geq$ 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

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.

Parameter	Effluent	Receiving Water	ML (mg/l)
Hardness[1]	x	x	0.5
Total Residual Chlorine (TRC)[2, 3]	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:

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
3. 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.

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^{o} 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. ≥3 standard deviations for IC25 values and ≥ 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.

Parameter	Effluent	Receiving Water	ML (mg/l)
Hardness[1, 4]	x	x	0.5
Total Residual Chlorine (TRC)[2, 3, 4]	x		0.02
Alkalinity[4]	x	x	2.0
pH[4]	x	x	--
Specific Conductance[4]	x	x	--
Total Solids[6]	x		--
Total Dissolved Solids[6]	x		--
Ammonia[4]	x	x	0.1
Total Organic Carbon[6]	x	x	0.5
Total Metals[5]			
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 that 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

NPDES PART II STANDARD CONDITIONS
(January, 2007)

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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.

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.

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.

(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

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

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

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.

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.

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.

(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

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

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).

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.

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.

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.

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.

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,

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.

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 1×10^{-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.

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 or 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.

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.

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_2	Total residual chlorine
TRC	Total residual chlorine which is a combination of free available chlorine (FAC, see below) and combined chlorine (chloramines, etc.)

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^3/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_3-N	Ammonia nitrogen as nitrogen
NO_3-N	Nitrate as nitrogen
NO_2-N	Nitrite as nitrogen
NO_3-NO_2	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

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_{50}	LC_{50} is the concentration of a sample that causes mortality of 50% of the test population at a specific time of observation. The LC_{50} = 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
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BOSTON, MASSACHUSETTS 02109-3912

FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES PURSUANT TO THE CLEAN WATER ACT (CWA)

NPDES PERMIT NUMBER: **MA0100641**

PUBLIC NOTICE START AND END DATES: **July 11, 2014-September 8, 2014**

NAME AND MAILING ADDRESS OF APPLICANT:

Board of Water and Sewer Commissioners
Town of Bridgewater Academy Building
Bridgewater, MA 02134

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Bridgewater Wastewater Treatment Facility (WWTF)
Morris Avenue
Bridgewater, Massachusetts 02134

RECEIVING WATER(S): **Town River (Taunton Watershed (MA62-13))**

RECEIVING WATER CLASSIFICATION(S): **Class B (Warm Water Fishery)**

Table of Contents

Attachments

I. Proposed Action, Type of Facility, and Discharge Location

The above named applicant has requested that the U.S. Environmental Protection Agency (EPA) reissue its NPDES permit to discharge from Outfall 001 into the Town River. The facility is an advanced wastewater treatment plant engaged in the collection and treatment of sanitary wastewater.

The existing NPDES permit was issued on December 30, 2003 with an effective date of March 1, 2004 and expired on March 1, 2009. As of March 2, 2009, the expired permit (hereinafter referred to as the "current permit") was administratively extended because the applicant filed a complete application for permit reissuance as required by 40 Code of Federal Regulations (CFR) §122.6. The facility location is shown on Figure 1 of this fact sheet (attached).

II. Description of Discharge

A quantitative description of the discharge in terms of significant effluent parameters based on recent effluent monitoring data may be found in Table 1 of this fact sheet (attached). Figure 2 of the fact sheet (attached) is a flow process diagram of the facility.

III. Receiving Water Description

The Bridgewater WWTF discharges to the Town River Segment MA62-13. Segment MA62-13 runs from the WWTF to the confluence with the Matfield River forming the Taunton River, a length of 2.4 miles.

The Town River has been designated as a Class B water, warm water fishery. The Massachusetts Surface Water Quality Standards (MA SQWS), 314 Code of Massachusetts Regulations (CMR) 4.05(3) (b) states that Class B waters are designated as 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 (MA SWQS) at 314 CMR 4.02 as waters in which the maximum mean temperature over a seven day period 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 Massachusetts 2012 Integrated List of Waters lists this segment of the Town River as Category 3, "no uses assessed."[1] The Taunton River segment just downstream is listed as Category 2, "attaining some uses, other uses not assessed" based on attainment of the "Fish, other Aquatic Life, and Wildlife" use. *Id.* The Taunton River ultimately discharges into Mount Hope Bay, which is located partially in Rhode Island and is listed by both Massachusetts and

[1] Massachusetts Year 2012 Integrated List of Waters, Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 303(d) and 305(b) of the Clean Water Act, Massachusetts Department of Environmental Protection (MassDEP), Division of Watershed Management

Rhode Island as impaired due to nitrogen. The estuarine segments of the Taunton River are also impaired, with dissolved oxygen and pathogen impairments for segments 62-03 and -04.

IV. Limitations and Conditions

The effluent limitations and all other requirements described in Part VII of this Fact Sheet may be found in the draft permit.

V. Permit Basis: Statutory and Regulatory Authority

Congress enacted the Clean Water Act (CWA) "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." CWA § 101(a). To achieve this objective, the CWA makes it unlawful for any person to discharge any pollutant into the waters of the United States from any point source, except as authorized by specified permitting sections of the CWA, one of which is Section 402. *See* CWA §§ 301(a), 402(a).

Section 402(a) established one of the CWA's principal permitting programs, the National Pollutant Elimination System (NPDES). Under this section of the CWA, EPA may "issue a permit for the discharge of any pollutant, or combination of pollutants" in accordance with certain conditions. *See* CWA § 402(a). NPDES permits generally contain discharge limitations and establish related monitoring and reporting requirements. *See* CWA § 402(a)(1)-(2).

Section 301 of the CWA provides for two types of effluent limitations to be included in NPDES permits: "technology-based" limitations and "water quality-based" limitations. *See* §§ 301, 304(b); 40 CFR §§ 122, 125, 131. Technology-based treatment requirements represent the minimum level of control that must be imposed under Sections 402 and 301(b) of the CWA. For publicly owned treatment works (POTWs), technology-based requirements are effluent limits based on secondary treatment as defined in 40 CFR 133.102.

EPA regulations require NPDES permits to contain effluent limits more stringent than technology-based limits where necessary to maintain or achieve federal or state water quality standards. Under Section 301(b)(1)(C) of the CWA, discharges are subject to effluent limitations based on water quality standards. The MA SWQS, 314 CMR 4.00, establish 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. *See* 314 CMR 3.11(3). EPA is required to obtain certification from the state in which the discharge is located that all water quality standards or other applicable requirements of state law, in accordance with Section 301(b)(1)(C) of the CWA, are satisfied, unless the state waives certification.

Section 401(a)(2) of the CWA and 40 CFR § 122.44(d)(4) require EPA to condition NPDES permits in a manner that will ensure compliance with the applicable water quality standards of a "downstream affected state," in this case Rhode Island. The Rhode Island Water Quality Regulations (RI WQR) also establish designated uses of the State's waters, criteria to protect

those uses, and an antidegradation provision to ensure that existing uses and high quality waters are protected and maintained.

In addition, a permit may not be renewed, reissued or modified with less stringent limitations or conditions than those contained in the previous permit unless in compliance with the anti-backsliding requirements of CWA Section 402(o) and 40 CFR §122.44(l). States are also required to develop antidegradation policies pursuant to 40 CFR § 131.12. No lowering of water quality is allowed, except in accordance with the antidegradation policy.

VI. Facility Information

The Bridgewater WWTF serves a population of approximately 16,500, all within the town of Bridgewater. Approximately one-third of the town by area is sewered. The WWTF has no significant industrial users and treats approximately 20,000 gallons per day of septage.

The facility is a Rotating Biological Contactor (RBC) plant that was last upgraded in 1987. A flow diagram of the facility is shown in Figure 2. Influent passes through a comminutor to an aerated grit chamber where ferric chloride is added for phosphorus removal. The flow is then split between two primary clarifiers (except in summer when one clarifier is taken offline for maintenance), then pumped to a train of fourteen RBC units in four stages (six units in the first stage, then four, then two, then two). Flow is then by gravity to two secondary clarifiers, then to an aerated chlorine contact chamber with sodium hypochlorite disinfection and dechlorination by sulfur dioxide. Flow is measured after secondary clarification, and all samples are taken after dechlorination. Effluent is discharged from a 20-inch diameter outfall pipe at the bottom of the Town River (see Figure 1 for location). Sludge is dewatered on two belt filter presses and then composted; the product is a Type I biosolid suitable for land application.

VII. Derivation of Effluent Limits under the Federal CWA and the Commonwealth of Massachusetts Water Quality Standards

A. FLOW

The 12-month rolling average flow limitation of 1.44 MGD in the existing permit has been maintained in the draft permit. This is the design effluent wastewater flow of the facility found in Form 2A, Part A, Section a.6. of the permit application. Sewage treatment plant discharge is encompassed within the definition of "pollutant" and is subject to regulation under the Act. The CWA defines "pollutant" to mean, *inter alia*, "municipal . . . waste[]" and "sewage…discharged into water." 33 U.S.C. § 1362(6).

EPA may use design flow to both determine the necessity for effluent limitations in the permit that comply with the Act, and to calculate the limits themselves. EPA practice is to use design flow as a reasonable and important worst-case condition in EPA's reasonable potential and water quality based effluent limitations (WQBELs) calculations to ensure compliance with water quality standards under Section 301(b)(1)(C). Should the discharge flow exceed the flow assumed in these calculations, the instream dilution would decrease and the calculated effluent limits would not be protective of WQS. Further, pollutants that did not have the reasonable

potential to exceed WQS at the lower discharge flow may have reasonable potential at a higher flow due to the decreased dilution. In order to ensure that the assumptions underlying the Region's reasonable potential analyses and derivation of permit effluent limitations remain sound for the duration of the permit, the Region may ensure its "worst-case" effluent wastewater flow assumption through imposition of a permit condition for flow. Thus, the flow limit is a component of WQBELs because the WQBELs are premised on a maximum level of flow. In addition, the flow limit is necessary to ensure that other pollutants remain at levels that do not have a reasonable potential to exceed water quality standands.

Using a facility's design flow in the derivation of pollutant effluent limitations, including conditions to limit wastewater effluent flow, is fully consistent with, and anticipated by NPDES permit regulations. 40 C.F.R. § 122.45(b)(1) provides, "permit effluent limitations…shall be calculated based on design flow." POTW permit applications are required to include the design flow of the treatment facility. *Id.* § 122.21(j)(1)(vi).

Similarly, EPA's reasonable potential regulations require EPA to consider "where appropriate, the dilution of the effluent in the receiving water," 40 C.F.R. § 122.44(d)(1)(ii), which is a function of *both* the wastewater effluent flow and receiving water flow. EPA guidance directs that this "reasonable potential" analysis be based on "worst-case" conditions. EPA accordingly is authorized to carry out its reasonable potential calculations by presuming that a plant is operating at its design flow when assessing reasonable potential.

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). A condition on the discharge designed to protect EPA's WQBEL and reasonable potential calculations is encompassed by the references to "condition" and "limitations" in 402 and 301 and implementing regulations, as they are designed to assure compliance with applicable water quality regulations, including antidegradation. 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.

In addition, as provided in Part II.B.1 of this permit and 40 C.F.R. § 122.41(e), the permittee is required to properly operate and maintain all facilities and systems of treatment and control. Operating the facilities wastewater treatment systems as designed includes operating within the facility's design effluent flow. Thus, the permit's effluent flow limitation is necessary to ensure proper facility operation, which in turn is a requirement applicable to all NPDES permits. *See* 40 C.F.R. § 122.41.

The draft permit requires continuous flow measurement, and also requires reporting of the average monthly and maximum daily flows.

7Q10 Data and Dilution Factor

Water quality-based limitations are established with the use of a calculated available dilution. 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.

The United States Geological Survey (USGS) Gazetteer of Hydrologic Characteristics for the Taunton River Basin (WRI Report 84-4283) lists a 7 day low flow with a recurrence interval of 10-years (7Q10) for the Town River at State Route 18 in Bridgewater (Gage Station No. 01107100) of 2.7 cfs with a drainage area of 55.6 square miles (mi^2), based on measurements in 1966-67. This location is just upstream of the discharge; the drainage area of the Town River at the point of the Bridgewater WWTF is approximately 55.9 square miles.[2] Therefore, the 7Q10 just upstream of the WWTF will be equal to 2.7 x 55.9 / 55.6 or 2.71 cfs. Dilution is calculated as follows:

Qe = Bridgewater WWTF Design Flow: 1.44 mgd = 2.23 cfs

Receiving stream – Town River

Qs = 7 day 10 year low flow (7Q10): 2.71 cfs

Dilution Factor = $(Q_s + Q_e) / Q_e$ = (2.71 + 2.23) / 2.23 = 2.2

This is the same dilution factor used in the current permit.

B. CONVENTIONAL POLLUTANTS

Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS)
The BOD and TSS concentration limits in the draft permit are the same as the limits in the existing permit and are based on a waste load allocation (WLA). These limits are more stringent than those required by the secondary treatment requirements of 40 CFR Part 133. The draft permit also contains percent removal requirements of 85% based on secondary treatment requirements. The monitoring frequency is maintained at two times per week.

There have been no violations of the monthly average BOD and TSS limits during the period of January 2011 to December 2013, with a long term average of 8.0 and 10.1 mg/l, respectively. See Table 1. The BOD and TSS removal percentages have averaged 97% and 98% respectively, with no violations during this time period.

Settleable solids
The existing permit requires daily monitoring for settleable solids and requires reporting of the

[2] Drainage area calculated using USGS Stream Stats for Massachusetts, http://water.usgs.gov/osw/streamstats/massachusetts.html. EPA notes that while the data on which the 7Q10 is based is quite old (two years of data from 1966-67), there is no more recent streamflow data for the Town River on which to base a 7Q10 calculation. For comparison, the USGS StreamStats regression-based prediction for 7Q10 at this location is 1.7 cfs with a 90% confidence interval of 0.28 to 9.63 cfs. As the 7Q10 calculated for the Gazetteer is well within this confidence interval and remains the best available site specific information, this value continues to be used in this permit. EPA welcomes any additional information the facility may wish to provide with respect to this calculation.

weekly average and maximum daily values for each month. EPA has not established a secondary treatment standard for settleable solids and there is no applicable water quality criteria; levels of settleable solids provide a measure of operational control for the facility. As this is an operational measure, EPA as a matter of policy no longer includes monitoring and reporting of settleable solids in NPDES permits. The draft permit eliminates this requirement.

pH

The draft permit includes pH limitations based on MA SWQS, 314 CMR 4.00, and are at least as stringent as pH limitations set forth at 40 C.F.R. §133.102(c). The MA SWQS require that Class B waters shall be in a range of 6.5 through 8.3 standard units. MassDEP generally requires a permit range of 6.5 to 8.3 s.u. as a condition of state certification. The monitoring frequency remains the same at once (1) per day. There were no violations of the pH limit in the period January 2011 to December 2013.

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 2011 to 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 90th 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 two times per week.

C. NON-CONVENTIONAL POLLUTANTS

EPA is required to limit any pollutant or pollutant parameter that is or may be discharged at a level that causes, has reasonable potential to cause, or contributes to an excursion above any water quality criterion. 40 C.F.R. § 122.44(d).

Total Phosphorus

The existing total phosphorus permit limit of 1.0 mg/l average monthly is reduced in the draft permit to 200 ug/l in order to meet the Gold Book target of 100 ug/l to prevent eutrophication in the receiving water.

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 Town 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.

EPA is not aware of any assessments of eutrophication indicators or conditions downstream of the Bridgewater WWTF. To determine whether the current discharge concentration of 1 mg/l is sufficient to ensure that water quality standards are met, and 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 Bridgewater WWTF 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 Town 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.[3] EPA is not aware of evidence that any of these factors are reducing eutrophic response in the Town River downstream of the discharge; although the Town River is described as tea-colored in its upper reaches due to the organic inputs from the Hockmock swamp area,[4] the color impacts are less pronounced in this portion of the Town River and there is no evidence that color is reducing plant growth in this area.

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 0.02 mg/l. While EPA has located no available data for the Town River, sampling in the Wading and Rumford Rivers upstream of treatment plant discharges indicated a range of 0.011 to 0.037 mg/l TP, with a median of 0.020 mg/l, as reported in MassDEP, *Taunton River Watershed 2001 Water Quality Assessment Report – Appendix B, OWM/DWM Water Quality Monitoring Data, Taunton River Watershed 1996* at B4. These data are from 1996, but similar results were reported from (more limited) sampling in 2006 (two samples from Wading River of 0.014 and 0.015 mg/l; one sample from Rumford River of 0.022 mg/l). (MassDEP, personal communication). EPA encourages the facility to provide more site-specific sampling data if available. The mass balance calculation is as follows:

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

C_d = Effluent concentration
Q_d = Design flow of facility = 2.23 cfs
C_s = Median concentration in the Town River upstream of discharge = 0.02 mg/l
Q_s = 7Q10 streamflow in the Town River upstream of discharge = 2.71 cfs
C_r = Receiving water concentration downstream
Q_r = Flow in receiving water downstream = $Q_s + Q_d$

At the current permit limit of 1.0 mg/l, the projected receiving water concentration would be:

$$C_r = \underline{(C_d * Q_d + C_s * Q_s)} = \underline{[(1.0 \text{ mg/l} * 2.23 \text{ cfs} + 0.02 \text{ mg/l} * 2.27 \text{ cfs}]} = 0.46 \text{ mg/l}$$

[3] 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.

[4] Doherty, Katherine M., *Town River – 2003 Shoreline Survey Report & Action Recommendations* (Draft 2003).

Q_r (2.23 + 2.71 cfs)

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:

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

$$\text{Limit} = \frac{[0.1 \text{ mg/l} * (2.23 + 2.71 \text{ cfs}) - 0.02 \text{ mg/l} * 2.71 \text{ cfs}]}{2.23 \text{ cfs}} = 0.20 \text{ mg/l}$$

This permit limit is also consistent with MassDEP's interpretation of "highest and best practicable treatment" under 314 CMR 4.05(5)(c). The draft permit also includes a load limit of 1.7 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).

Ammonia-Nitrogen

The draft permit continues the existing permit's warm weather (April 1 through October 31) average monthly concentration limit for ammonia-nitrogen of 3.0 mg/l, based on a MassDEP Wasteload Allocation to protect DO in the receiving water.

There were no violations of the warm weather limit between January 2011 to December 2013 (see Table 1). The average value for the warm weather monthly average concentration was 1.5 mg/l. Monthly average ammonia-nitrogen values for the warm weather (April through October) ranged between 0.3 and 2.9 mg/l.

EPA also considered whether the existing limit is sufficient to ensure that the discharge does not cause or contribute to ammonia toxicity. High levels of ammonia in the water column can be toxic to fish by making it more difficult for fish to excrete this chemical via passive diffusion from gill tissues. Ammonia toxicity varies with pH and temperature. Ammonia can also lower dissolved oxygen levels by conversion to nitrate/nitrate, which consumes oxygen.

EPA's analysis indicates that the discharge does not have reasonable potential to cause or contribute to a violation of the water quality criteria for ammonia with the current permit limit in effect. The water quality criteria for ammonia are pH and temperature dependent, with the most stringent criteria at higher pH and temperatures. Using the highest pH and temperature measured upstream of the facility (7.2 s.u and 28.9 °C) the chronic criteria for fish (early life stages present) is 2.13 mg/l as a 30-day average concentration. EPA, *1999 Update of Ambient Water Quality Criteria for Ammonia* at 83, 87. Because this is a 30-day average criteria dilution is appropriately calculated using a 30Q10 receiving water flow. 30Q10 flow estimates are not available for the Town River based on the USGS Gazeteer information used for 7Q10 flows as a full streamgage record is not available; however even at the lower 7Q10 flow the expected concentration in the receiving water with the discharge at design flow and the permit limit would be (3 (permit limit) / 2.2 (dilution factor) =) 1.36 mg/l, so there is no reasonable potential to

exceed the chronic water quality criteria. The acute criterion is significantly higher (19.7 mg/l with salmonid species present, 29.5 mg/l with salmonids absent, *id.* at 86) so the permit limit is protective of the acute criteria as well.

In the winter (November to March) the permit limit is not in effect; the applicable water quality criteria is calculated using a lower temperature (16° C) for conditions when early life stages are not present for a chronic criterion of 4.90 mg/l. *Id.* at 88. While winter 30Q10 data also is not readily available due to the lack of a full streamgage record, the winter 30Q10 is conservatively estimated to be at least three times the 7Q10 value, based on a ratio of the monthly mean flow for the lowest winter and summer months in the Wading River. USGS, *Gazeteer of Hydrological Characteristics of Streams in Massachusetts-Taunton River Watershed*. This would provide a winter dilution of 6.6, corresponding to an allowable effluent concentration of (6.6*4.9 mg/l =) 32.3 mg/l. The facility's winter effluent concentration has averaged 5.6 mg/l in the 2011-13 period, with a maximum of 23 mg/l and a calculated 95th percentile concentration of 21 mg/l. Therefore there is no reasonable potential to cause an exceedance of the water quality criteria in the winter, and the existing permit limit and season is sufficiently protective.

Total Nitrogen

The draft permit includes a monthly average total nitrogen limit of 5.0 mg/l total nitrogen, and a mass limit of 60 lbs/day based on the concentration limit and the design flow of the treatment facility, 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 seasonally-applied 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 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 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 eighteen miles. (GeoSyntec, 2006). The Town River combines with the Matfield River 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 3 shows the progression of nutrient impacts on a waterbody.

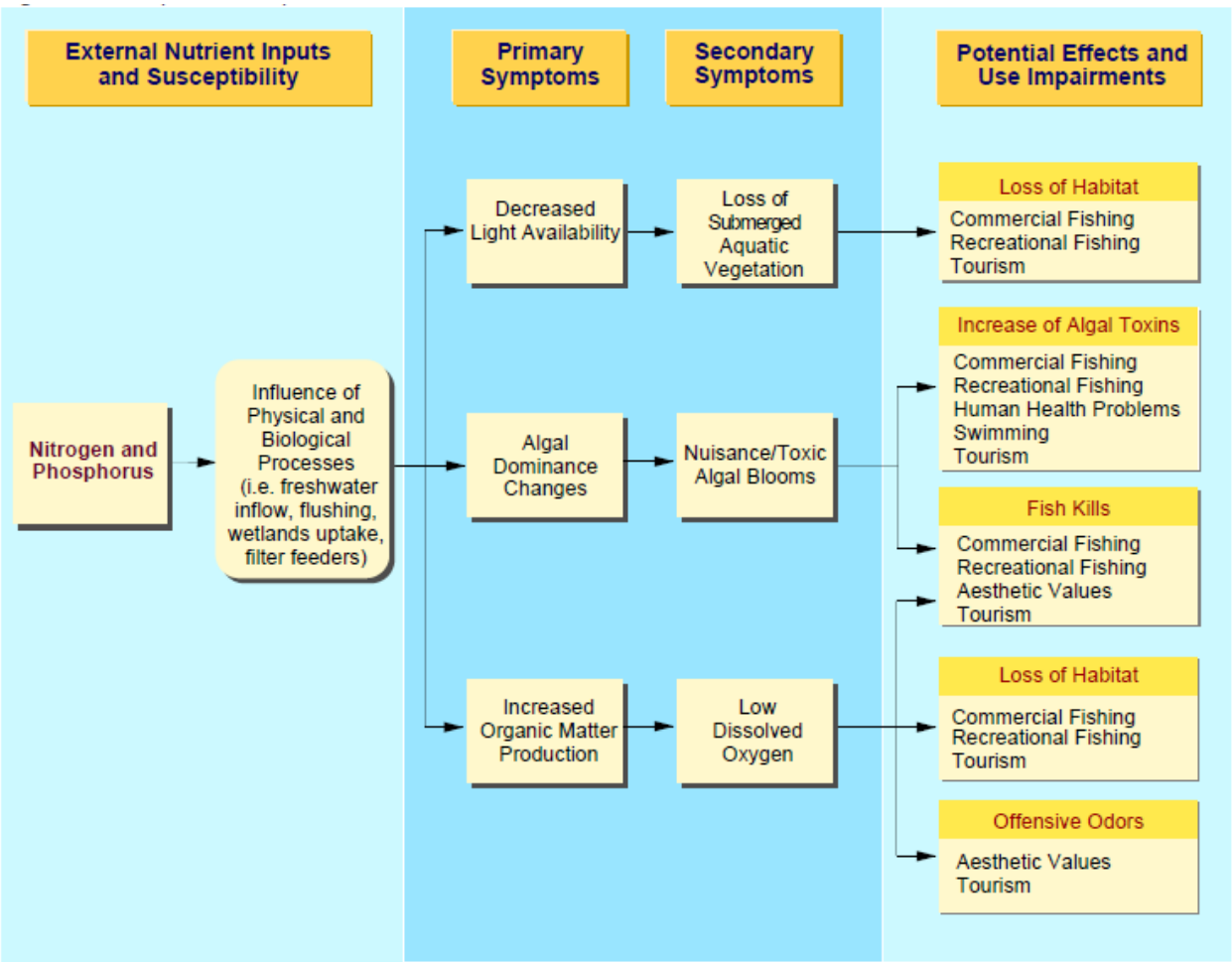

Figure 3. Nutrient enrichment model. Source: Bricker, 1999 as cited in EPA, 2001.

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 CWA 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).

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/SMAST 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[5], and narrative criteria for nutrients[6] and

[5] Rule 8.D.3. Table 3. For waters with a seasonal pynocline, no less than 4.8 mg/l above the seasonal pynocline; below the seasonal pynocline 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

aesthetics.[7] 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.

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

A three-year water quality monitoring study was conducted by the School for Marine Science and Technology at UMass-Dartmouth (SMAST) and involved monthly sampling at 22 sites across Mount Hope Bay and the Taunton River Estuary from 2004 to 2006 (see Figure 4). 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 20th percentile

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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).

[6] 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.

[7] 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.

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.[8] Table 2, reproduced from SMAST, *Summary of Water Quality Monitoring Program for the Mount Hope Bay Embayment System (2004 – 2006)* at 24 (August 16, 2007).

Table 2. Mount Hope Bay Monitoring Program results as reported in SMAST, 2007.

Table 5. Summary of average levels of primary nutrient related water quality parameters measured in the summers of 2004, 2005 and 2006 in Mount Hope Bay by SMAST Coastal Systems staff.

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

[8] 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 4. Mount Hope Bay Monitoring Program estuarine stations.

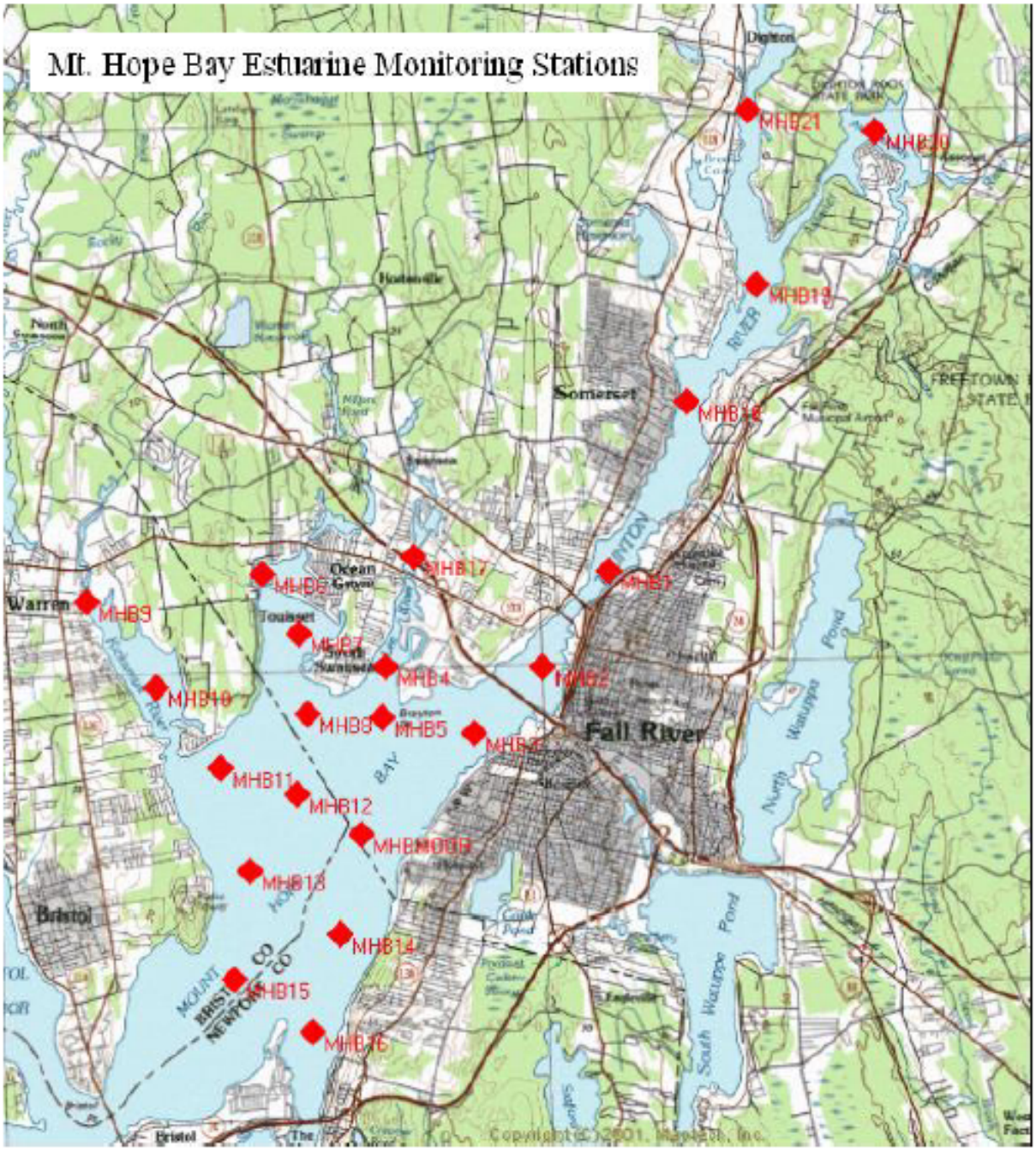

Table 3 below shows the results of the SMAST monitoring for each of the three years of the monitoring program, with the Taunton River stations highlighted. Minimum measured DO concentrations in each year were below 5.0 mg/l at all the Taunton River stations in 2004 and 2006, and a majority of those stations 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 3. 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.

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 (≤ 10 at all stations other than MHB21, the uppermost Taunton River station).

Table 3. SMAST Monitoring Data Summarized by Year. Taunton River stations highlighted.

			2004				2005				2006			
Station	Location	State	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 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^{-1}) and maintained high levels throughout most of its reach (>0.6 mg N L^{-1}). 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^{-1}). 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 (Figure 6).
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> . . .
>
> 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.[9]

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). 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 2011. 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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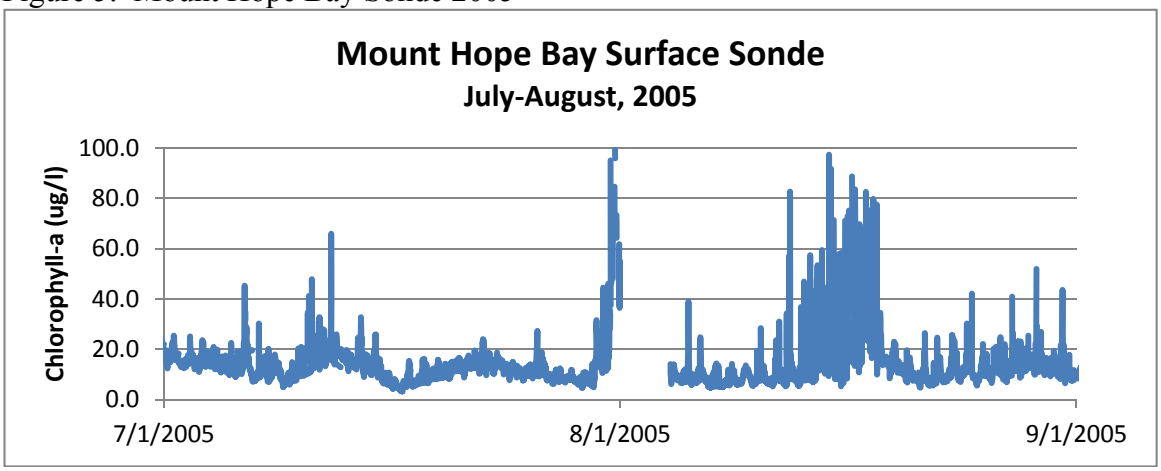
[9] EPA is required to issue the permit with limits and conditions necessary to ensure compliance with State water quality standards at the time of permit reissuance. Neither the CWA nor EPA regulations require that a TMDL be completed before a water quality-based limit may be included in a permit. Rather, 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 5, shows multiple events with chlorophyll-a concentrations well above 20 ug/l, and above the maximum concentrations captured with the intermittent SMAST sampling.

Figure 5. 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

The sonde monitoring also confirms that these water quality violations continue to the present. The most recent published 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 6.

Figure 6a. Surface Chlorophyll and DO percent saturation, 2011

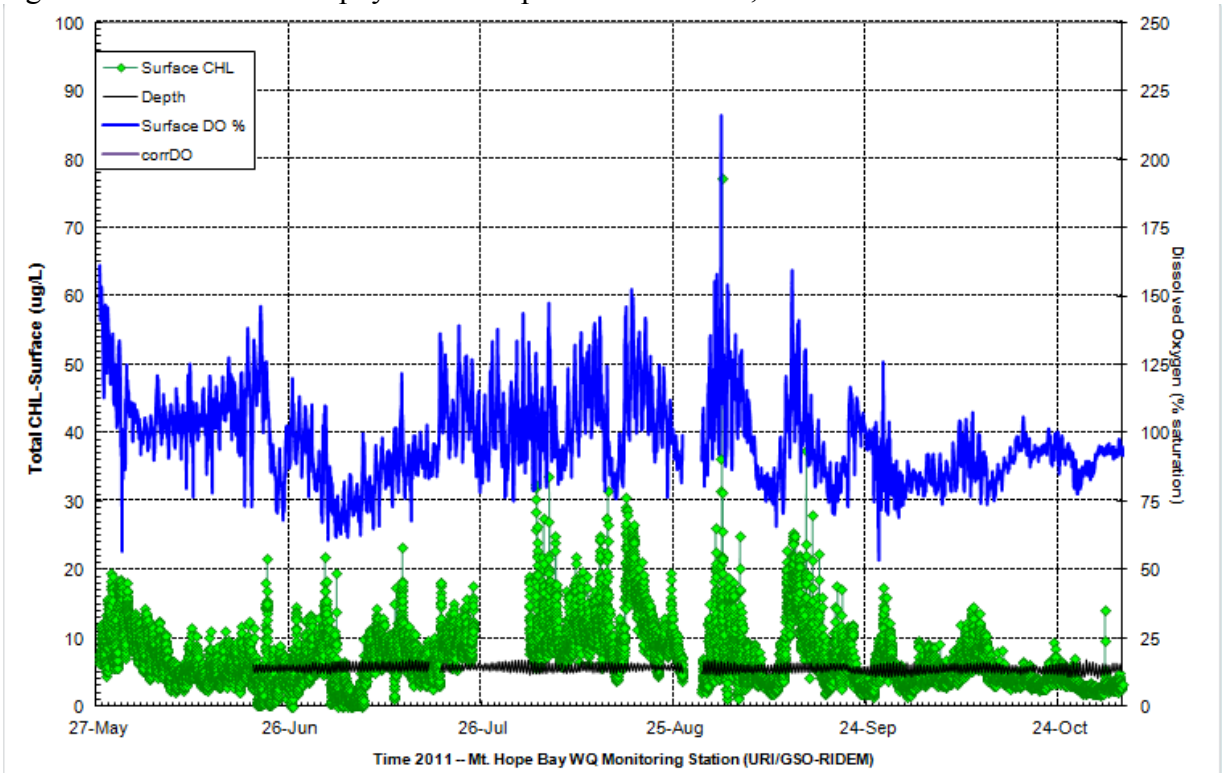
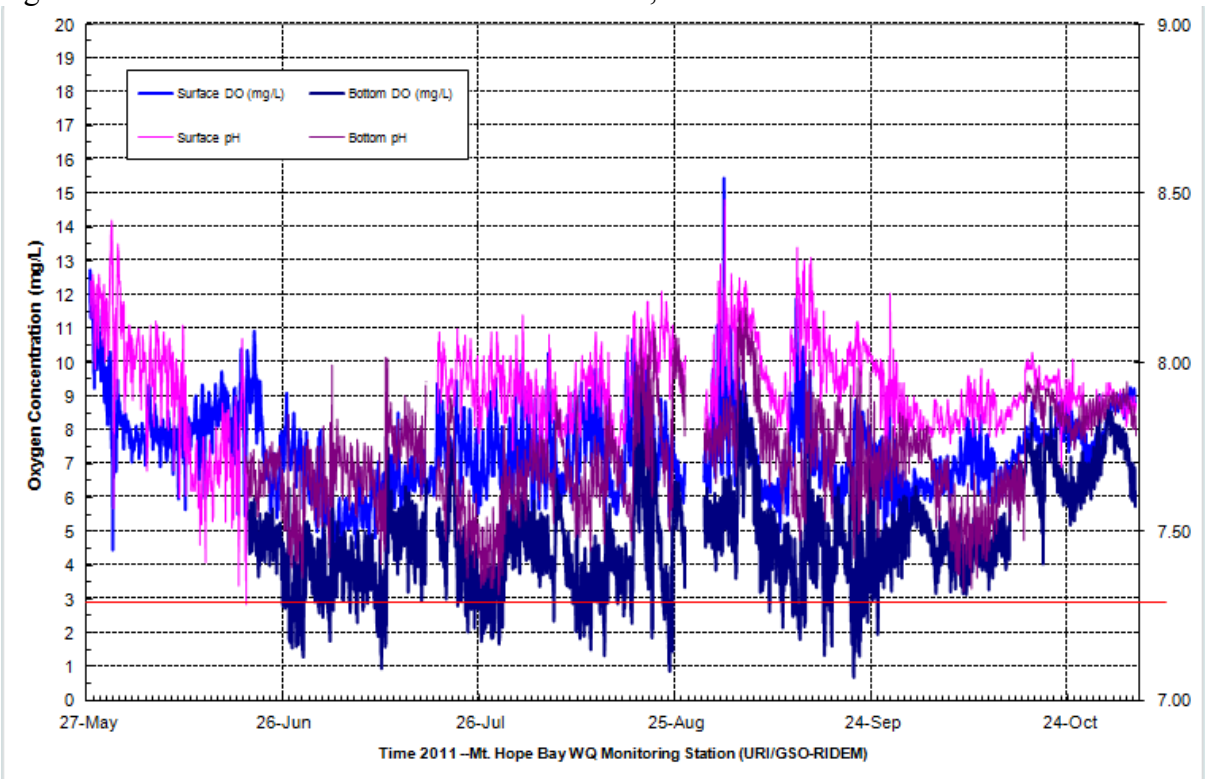


Figure 6b. DO concentration at surface and bottom, 2011



Charts by URI/GSO-RIDEM. Chart and data available at www.dem.ri.gov/bart

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 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 data from the SMAST monitoring program, which included monitoring on the Taunton River and major tributaries to the Taunton River Estuary, in additional to the estuarine stations. 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,[10] EPA used the USGS LOADEST program to calculate a 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 4 shows the point sources, the receiving stream, their nitrogen discharges and the delivered load to the estuary.

[10] 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), 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 4. 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)
Direct discharges to Estuary				
Taunton	8.4	Taunton River Estuary	610	610
Somerset	4.2	Taunton River Estuary	349.5	349.5
			Total direct point source load:	959
Upstream discharges				
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
			Total upstream point source load:	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.[11] The average summer load to the estuary in 2004 to 2005 is 4,228 lbs/day.

Table 5 and Figure 7 show the total watershed nitrogen loads to the Taunton River Estuary. Wastewater treatment plant loads make up 66% of the total nitrogen load. Nonpoint sources make up the remaining 34%. The Bridgewater WWTF load, at 132 lbs/day, is approximately 3.1% of the total nitrogen load.

[11] Atmospheric deposition to the watershed is included in the nonpoint source loading figures.

Figure 7. Taunton River Estuary Loads by Category

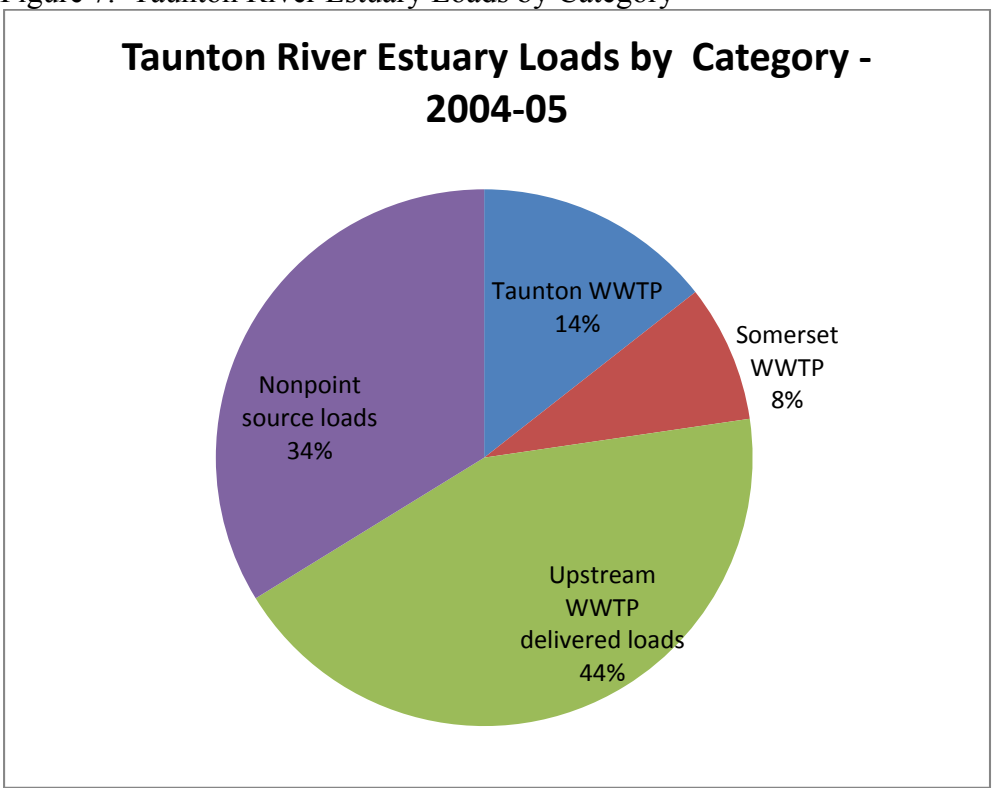


Table 5. Taunton River Estuary Loads by Category

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

On this basis, EPA concludes that the Bridgewater WWTF'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 also notes that there have been some reductions in treatment plant loads since 2004-05, particularly in connection with upgrades to the Brockton AWRF completed in 2010. The Brockton upgrade has reduced its discharge by approximately 800 lb/day, resulting (after attenuation) in about a 712 lb/day or 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 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. This approach is consistent with EPA guidance regarding the use of reference conditions for the purposes of developing nutrient water quality criteria. The Taunton River Estuary is classified as an SB water and is not a location where eelgrass has historically been found.[12] Therefore the primary water quality parameter considered in determining a sentinel location is DO. 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.[13]

Data from the SMAST monitoring program indicates widespread DO violations at a range of TN concentrations. Table 5 of the SMAST report (Table 2 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 3.

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[12] 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.

[13] 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).

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.

On the basis of these data, EPA determined that station MHB16 was appropriate as a sentinel 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. See NHDES, 2009.

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 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[14] was used to represent the sentinel 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 6. Freshwater flows at the mouths of the river is determined based on the USGS streamgage data using a drainage area ratio calculation as follows:

[14] As discussed above, 2004-05 represent a typical year.

Flow at mouth = Flow at USGS gage * Drainage area at mouth/Drainage area at gage

Table 6. Average Freshwater Flow 2004-05

	1 Taunton River (Bridge-water) *USGS Gage*	2 Taunton River (area to mouth of estuary minus tributaries) *Drainage Area calculation*	3 Three Mile River (North Dighton) *USGS Gage*	4 Three Mile River (mouth) *Drainage Area calculation*	5 Segre-ganset River (Dighton) *USGS Gage*	6 Segre ganset River (mouth) *Drainage Area calculation*	7 Assonet River (dam) *based on Segregansett*	8 Quequechan River (mouth) *based on Segregansett*	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	**389 cfs**
2005	217 cfs	341 cfs	55 cfs	56 cfs	4.6 cfs	6.4 cfs	9.4 cfs	13.1 cfs	**427 cfs**
								Average:	**408 cfs**

Salinity: A mass balance equation is applied as follows:

Average salinity at ocean boundary (Rhode Island Sound) = 30 ppt (Kincaid and Pockalny, 2003)
Average salinity at MHB19 in Taunton River Estuary for 2004-05 = 22.35 ppt

Average freshwater flow 2004-05 (Table 6) = 408 cfs

(30 ppt * X cfs + 0 ppt * 408 cfs)/(408 cfs + X) = 22.35 ppt

X = 1,192 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 cfs + 1,192 cfs)*(0.646)*(8.34)*(0.45 mg/l) = 3,879 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:

Ocean load = 1,192 cfs * (0.646)*(8.34)*(0.28 mg/l) = 1,798 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.[15] 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.[16] The Brockton AWRF 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 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 Island Department of Environmental Management (RIDEM) for Narragansett Bay facilities. (RIDEM, 2004) See Table 7. 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.

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[15] 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.

[16] Ocean loads are not considered controllable.

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 7 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 permit limits 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 7. 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 LOT permit limit of 3.0 mg/l is required for the larger dischargers of nitrogen to the estuary. Effluent limits for the smaller dischargers, including the Bridgewater WWTF, are therefore calculated based on an assumption of a 3.0 mg/l on the Taunton and Brockton facilities. This results in a permit limit based on a 5.0 mg/l effluent concentration for the Bridgewater WWTF.

To put this limit in context, Table 8 shows an example permitting scenario that would meet the allowable loading threshold. 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 a 3.0 mg/l effluent concentration. Somerset WWTP (the third largest discharge and a direct discharger to the estuary) at 3.7 mg/l; and the remaining three facilities (Bridgewater, Mansfield and Middleborough) at 5.0 mg/l. Final determinations as to the permit limits on facilities other than the Bridgewater WWTF are being made in each individual permit issuance.

Table 8. 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

For these reasons, EPA has included a monthly average total nitrogen limit of 60 lbs/day mg/l (May to October) 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 variations in the amount of flow from the point sources, a mass load-only limit is therefore protective of water quality, and is consistent with 40 CFR 122.45(f).[17] 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 March 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

[17] 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.

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.

Total Residual Chlorine (TRC)

Chlorine and chlorine compounds produced by the chlorination of wastewater can be extremely toxic to aquatic life. Effluent limits are based on water quality criteria for total residual chlorine (TRC) which are specified in EPA water quality criteria established pursuant to Section 304(a) of the CWA. The most recent EPA recommended criteria are found in National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047). The fresh water aquatic life criteria for TRC are 11 ug/l for protection from chronic toxicity and 19 ug/l for protection from acute toxicity.

In its issuance of the existing permit EPA determined that there is reasonable potential for TRC concentrations discharged in the effluent to cause or contribute to an exceedance of the water quality criteria given and calculated an average monthly limitation of 24 ug/l and maximum daily limitation of 42 ug/l for TRC based on the dilution under 7Q10 conditions. The limits are calculated below.

Given:
Acute freshwater criterion 19 ug/l chlorine
Chronic freshwater criterion 11 ug/l chlorine
Dilution factor 2.2

Then:
Acute criterion x dilution factor = Daily Maximum Limit
19 ug/l x 2.2 = 42 ug/l
chronic criterion x dilution factor = Monthly Average Limit
11 ug/l x 2.2 = 24 ug/l

There were no violations of the TRC limit in the period from January 2011 to December 2013. Monitoring frequency is maintained at three times per day.

The draft permit continues the existing permit's requirement that chlorination and dechlorination systems provide an alarm for indicating system interruptions or malfunctions. Any interruption or malfunction of the chlorine dosing system may result in levels of chlorine that are inadequate for achieving effective disinfection, or interruptions and/or malfunctions of the dechlorination system may result in excessive levels of chlorine in the final effluent. The draft permit requires that all interruptions or malfunctions be reported with the monthly DMRs. The draft permit requires that the report include the date and time of the interruption or malfunction, the nature of the problem, and the estimated amount of time that the reduced levels of chlorine or dechlorination chemicals occurred.

Copper

The limits for copper in the existing permit (11 ug/l monthly average, 15 ug/l maximum daily) 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 2003. The facility has been unable to meet the limits in the existing permit and has been operating under an interim monthly average limit of 35 ug/l set forth in a compliance order. Since the issuance of the existing permit the Commonwealth of Massachusetts has issued, and EPA has approved, site-specific water quality criteria for copper for the Town River that are less stringent than the prior criteria. The new site specific criteria for copper establish a chronic criterion of 18.1 ug/l(dissolved, "d"),[18] and an acute criterion of 25.7 ug/l(d). The draft permit contains effluent limits of 35 ug/l(total recoverable "tr")(monthly average) and 46 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 MassDEP *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 CWA §§ 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 CWA'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

[18] 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$_{(tr)}$

limit meets current effluent guidelines and will not cause a violation of water quality standards.[19] 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."

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 6 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 = 2.71 cfs
Design flow = 2.23 cfs
Criteria for total recoverable copper = 25.7 ug/l(d)/0.960 = 26.8 ug/l (tr)
Effluent limit = [(2.23 + 2.71 cfs)*26.8 ug/l – 2.71 cfs * 6 ug/l]/2.23 = 52.1 ug/l

Calculation of chronic limit for copper:
Chronic criteria (dissolved) = 18.1 ug/l(d)
7Q10 flow = 2.71 cfs
Design flow = 2.23 cfs
Criteria for total recoverable copper = 18.1 ug/l(d)/0.960 = 18.85 ug/l (tr)
Effluent limit = [(2.23 + 2.71 cfs)*18.85 ug/l – 2.71 cfs * 6 ug/l]/2.23 = 34.5 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

[19] 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).

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) (TSD) (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 1. The statistical analysis is shown in Attachment C. These calculations indicate that limits based solely on past performance would result in a monthly average limit of 37 µg/l(tr) and a maximum daily limit of 46 µg/l(tr).

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 criteria-based limit is more stringent with respect to the chronic criterion, and the performance-based limit is more stringent with respect to the acute criterion. The draft permit therefore includes the criteria-based monthly average and performance-based maximum daily permit limits, as follows:

Monthly average: 35 µg/l(tr)
Maximum daily: 46 µg/l(tr)]

Other metals

EPA also reviewed the facility monitoring data to determine if there is reasonable potential to exceed the water quality criteria for other pollutants. Table 9 shows the concentrations of metals in the Bridgewater WWTF effluent from February 2010 through November 2013 from the analytical testing done in connection with the facility's Whole Effluent Toxicity testing. EPA bases its determination of "reasonable potential" on a characterization of the upper bound of expected effluent concentrations based on a statistical analysis of the available monitoring data. As noted in the TSD, "[a]ll monitoring data, including results for concentrations of individual chemicals, have some degree of uncertainty associated with them. The more limited the amount of test data available, the larger the uncertainty." Thus with a limited data set, the maximum concentration that has been found in the samples may not reflect the full range of effluent concentration. On the other hand, individual high data points may be outliers or otherwise not indicative of the normal range of effluent concentrations.

Table 9. Effluent Analytical Data from Whole Effluent Toxicity Testing

	Effluent Analytical Data (ug/l)						
	Hardness	**Al**	**Cd[1]**	**Cu**	**Ni**	**Pb[1]**	**Zn**
2/15/2011	79	32	ND-0.5	26	8	0.7	36
5/10/2011	92	49	ND-0.5	21	8	0.7	28
8/16/2011	80	26	ND-0.5	18	5	ND-0.5	15
11/15/2011	72	32	ND-0.5	25	5	0.5	21
2/14/2012	69	45	ND-0.5	31	5	0.6	28
5/4/2012	87	25	ND-0.5	16	5	ND-0.5	17
8/13/2012	91	ND-20	ND-0.5	19	4	ND-0.5	15
11/14/2012	76	48	ND-0.5	29	5	2	23
2/11/2013	81	36	ND-0.5	27	4	ND-0.5	26
5/13/2013	91	21	ND-0.5	25	8	ND-0.5	36
6/2/2013	100	40	ND-0.5	25	5	0.5	19
8/12/2013	97	ND-20	ND-0.5	18	5	0.7	22
11/12/2013	82	35	ND-0.5	33	5	ND-0.5	23
Median	82	35	ND-0.5	25	5	1	23
95th percentile[2]		53	ND-0.5	32	8	1.35	38
99th percentile[2]		64	ND-0.5	38	10	1.94	46
Chronic Criterion[3]		87	0.18	18.1	33	1.59	76
Acute Criterion[3]		750	1.23	24.7	296	40.9	76

To account for this, EPA has developed a statistical approach to characterizing effluent variability. As "experience has shown that daily pollutant discharges are generally lognormally distributed," *TSD* at App. E, EPA uses a lognormal distribution to model the shape of the observed data, unless analysis indicates a different distributional model provides a better fit to the data. The model parameters (mean and variance) are derived from the monitoring data.

The lognormal distribution generally provides a good fit to environmental data because it is bounded on the lower end (i.e. you cannot have pollutant concentrations less than zero) and is positively skewed. It also has the practical benefit that if an original lognormal data set X is logarithmically transformed (i.e. Y = ln[X]) the resulting variable Y will be normally distributed. Then the upper percentile expected values of X can be calculated using the z-score of the standardized normal distribution (i.e. the normal distribution with mean = 0 and variance = 1), a common and relatively simple statistical calculation. The p^{th} percentile of X is estimated by

$$X_p = \exp(\mu_y + z_p \sigma_y), \qquad \text{where } \mu_y = \text{mean of Y}$$
$$\sigma_y = \text{standard deviation of Y}$$
$$Y = \ln[X]$$

For the 95^{th} percentile, $z_{95} = 1.645$, so that

$$X_{95} = \mu_y + 1.645\ \sigma_y$$

The 95th percentile value is used to determine whether a discharge has a reasonable potential to cause or contribute to an exceedance of a water quality standard. The combination of the upper bound effluent concentration with dilution in the receiving water is calculated to determine whether the water quality criteria will be exceeded. The *TSD* also includes a procedure for determine such percentiles when the dataset includes non-detect results, as is the case for the Bridgewater WWTF, based on a delta-lognormal distribution. The statistical analyses for the metals with non-detect results (aluminum, cadmium and lead) in the Bridgewater WWTF discharges are set forth in Attachment C.

The resulting effluent concentrations are all lower than the applicable water quality criteria from EPA, *National Recommended Water Quality Criteria 2002*, which have been incorporated into the Massachusetts SWQS, 314 CMR 4.05 (5)(e). For cadmium, nickel, lead and zinc the water quality criteria are hardness dependent. Because the reasonable potential analysis is performed using dilution under 7Q10 conditions, a projected hardness under 7Q10 conditions is calculated using the same mass balance equations and the median hardness of the effluent (82 mg/l) and upstream receiving water (38 mg/l), for a calculated hardness of 58 mg/l. Table 10.

Table 10. Metals Criteria

7Q10 =	1.713	MGD
Design flow =	1.44	MGD
Hardness =	58.095147	mg/L

Metal	m_A	b_A	m_C	b_C	CF acute	CF chronic	Dissolved Criteria		Total Recoverable Criteria	
							Acute Criteria (CMC) (ug/L)	Chronic Criteria (CCC) (ug/L)	Acute Criteria (CMC) (ug/L)	Chronic Criteria (CCC) (ug/L)
Hardness Dependent Metals										
Cadmium	1.0166	-3.9240	0.7409	-4.7190	0.967	0.932	1.19	0.17	1.23	0.18
Chromium III	0.8190	3.7256	0.8190	0.6848	0.316	0.860	365.20	47.50	1155.68	55.24
Lead	1.2730	-1.4600	1.2730	-4.7050	0.870	0.870	35.59	1.39	40.90	1.59
Nickel	0.8460	2.2550	0.8460	0.0584	0.998	0.997	295.75	32.85	296.34	32.95
Silver	1.7200	-6.5900	---	---	0.850	---	1.26	---	1.49	---
Zinc	0.8473	0.8840	0.8473	0.8840	0.978	0.986	73.96	74.57	75.63	75.63

Source: National Recommended Water Quality Criteria 2002
http://www.epa.gov/waterscience/criteria/wqctable/

As the 95th percentile of effluent concentrations are all below the applicable water quality criteria, there is no reasonable potential to cause an exceedance of water quality standards and no permit limits on these metals are necessary.

Toxicity Testing

National studies conducted by EPA 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 and industrial contributions, the low level of dilution at the discharge location, water quality standards, and in accordance with EPA regulation and policy, the draft permit includes chronic and acute toxicity limitations and monitoring requirements. (See, e.g., "Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants", 50 Fed. Reg. 30,784 (July 24, 1985); see also, EPA's *TSD*). EPA Region I has developed a toxicity control policy. The policy requires wastewater treatment facilities to perform toxicity bioassays on their effluents. The MassDEP requires bioassay toxicity testing for state certification.

The MassDEP's Division of Watershed Management has a current toxics policy that requires toxicity testing for all major dischargers such as the Bridgewater WWTF (*Implementation Policy for the Control of Toxic Pollutants in Surface Waters*, MassDEP 1990). In addition, EPA feels that toxicity testing is required to assure that the synergistic effect of the pollutants in the discharge does not cause toxicity, even though the pollutants may be at low concentrations in the effluent. The inclusion of whole effluent toxicity limitations in the draft permit will assure that the Bridgewater WWTF does not discharge combinations of toxic compounds into the Town River in amounts that would affect aquatic or human life.

Pursuant to EPA Region I Policy, and MassDEP's *Implementation Policy for the Control of Toxic Pollutants in Surface Waters* (February 1990), dischargers having a dilution factor less than 10 are required to conduct acute and chronic toxicity testing four times per year unless there are passing results over an extended period of time. A dilution factor of 2.2 was calculated for this facility. In accordance with the above guidance, the draft permit includes an acute toxicity limit (LC50 of > 100%) and a chronic toxicity limit (C-NOEC of > 45 %). The C-NOEC calculations are as follows: (1/dilution factor * 100) = (1/2.2 * 100) = 45 percent.

Toxicity testing shall be performed on the daphnid, *Ceriodaphnia dubia* in accordance with the EPA Region I Toxicity protocol found in the draft permit **Attachment A** for the acute test and **Attachment B** for the chronic test, and the tests will be conducted four times a year. 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 facility has had three recent exceedance of the chronic toxicity limit (see Table 1) and is investigating causes.

EPA and MassDEP may use the results of the toxicity tests and chemical analyses conducted by the permittee, required by the permit, as well as national water quality criteria, state water quality criteria, and any other appropriate information or data, to develop numerical effluent limitations for any pollutants.

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[20]). 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 existing permit or the previous draft 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.

IX. 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

[20] "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.

(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 Town 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.

X. 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. The United States Fish and Wildlife Service (USFWS) administers Section 7 consultations for freshwater species, whereas NMFS administers Section 7 consultations for marine species and anadromous fish.

EPA has determined that no federally-listed or proposed, threatened or endangered species or critical habitat are known to occur in the Town 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.

XI. 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 requires the permittee to report monitoring results obtained during each calendar month in the Discharge Monitoring Reports (DMRs) no later than the 15th day of the month following the completed reporting period.

The Draft Permit includes new provisions related to electronic 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 DMRs 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 to EPA in hard copy form, or report electronically using NetDMR.

NetDMR is a national web-based tool for regulated Clean Water Act permittees to submit 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 can be found on the EPA Region 1 NetDMR website located at http://www.epa.gov/region1/npdes/netdmr/index.html.

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 learn more about upcoming trainings, please visit the EPA Region 1 NetDMR website http://www.epa.gov/region1/npdes/netdmr/index.html .

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 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.

In most cases, reports required under the permit shall be submitted to EPA as an electronic attachment through NetDMR, subject to the same six month time frame and opt-out provisions as identified for NetDMR. Certain exceptions are provided in the permit such as for the submittal of pre-treatment reports and for providing written notifications required under the Part II Standard Permit Conditions. Once a permittee begins submitting reports to EPA 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.

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.

VIII. 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. EPA has requested permit certification by the State pursuant to 40 CFR §124.53 and expects the draft permit will be certified.

XIV. 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.

XV. 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 :

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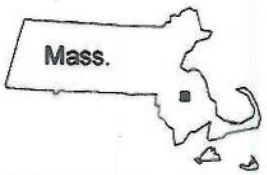
Ken Moraff, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency

Monitoring Period End Date	BOD5						TRC (April 1 - October 31)		Fecal Coliform (April 1 - October 31)			Copper	Flow		Nitrate/Nitrite				Total Kjeldahl Nitrogen			
	Average Monthly	Max Daily	Average Montly	Average Weekly	Max Daily	Percent Removal	Average Monthly	Max Daily	Average Monthly	Average Weekly	Max Daily	Max Daily	Average Monthly	Max Daily	Monthly Average	Daily Max	Monthly Average	Daily Max	Monthly Average	Daily Max	Monthly Average	Daily Max
	lb/day		mg/L			%	ug/L		cfu/100mL			ug/L	MGD		lb/day		mg/L		lb/day		mg/L	
01/31/2011	60	78	7	9	9	96	Test Not Required					33	1.045	1.122	176	176	22	22	23	23	2.9	2.9
02/28/2011	99	154	11	15	17	93	Test Not Required					33	1.042	1.722	196	196	26	26	38	38	5	5
03/31/2011	145	213	13	17	17	93	Test Not Required					20	0.995	1.569	168	168	14	14	101	101	8.4	8.4
04/30/2011	73	106	7	9	10	97	< 20	41	31	70	163	24	0.974	1.558	181	193	16.5	17	95	127	8.8	12
05/31/2011	57	122	6	9	13	98	< 20	33	56	103	105	11	0.977	1.262	187	195	20.5	22	42	57	4.6	6
06/30/2011	33	71	4	4	9	98	< 20	32	29	41	192	17	0.981	1.01	142	149	19	19	23	24	3.1	3.2
07/31/2011	30	42	4	6	6	98	< 20	32	4	23	26	17	0.984	1.022	134	134	19.5	20	14	15	2	2.2
08/31/2011	33	43	5	5	6	98	< 20	39	10	25	95	26	0.985	1.047	139	142	19.5	21	16	16	2.25	2.4
09/30/2011	78	142	8	11	12	97	< 20	29	42	178	185	23	0.995	1.423	192	192	22	23	41	47	4.8	5.6
10/31/2011	71	93	8	10	10	98	< 20	23	41	75	227	17	1.014	1.495	184	185	19.5	20	69	78	7.3	8.4
11/30/2011	127	177	12	15	15	96	Test Not Required					20	1.037	1.369	184	184	19	19	34	34	3.5	3.5
12/31/2011	108	171	10	15	15	96	Test Not Required					38	1.064	1.755	216	216	22	22	55	55	5.6	5.6
01/31/2012	73	132	8	11	13	97	Test Not Required					27	1.073	1.256	159	159	19	19	21	21	2.5	2.5
02/29/2012	96	126	11	14	14	96	Test Not Required					26	1.064	1.138	190	190	20	20	55	55	5.8	5.8
03/31/2012	107	162	12	15	15	96	Test Not Required					23	1.038	1.212	160	160	20	20	27	27	3.4	3.4
04/30/2012	54	129	7	11	17	99	< 20	32	42	68	104	18	1.014	1.083	191	198	24	24	44	55	5.55	6.6
05/31/2012	49	105	6	8	12	98	< 20	38	42	84	191	28	1.002	1.135	155	164	20	21	21	22	2.65	2.8
06/30/2012	28	36	4	7	5	98	< 20	41	11	73	31	24	0.999	0.974	171	172	23.5	24	15	18	2.1	2.5
07/31/2012	27	46	4	6	7	98	< 20	42	5	20	23	18	0.994	0.829	146	147	22.5	23	12	14	1.9	2.2
08/31/2012	23	41	3	5	6	98	< 20	24	4	9	20	19	0.99	0.941	145	146	22.5	24	14	15	2.2	2.2
09/30/2012	39	59	5	7	7	98	< 20	28	10	16	32	24	0.981	1.085	224	231	27.5	28	29	30	3.5	3.5
10/31/2012	40	57	5	7	7	98	< 20	27	23	38	174	30	0.965	1.076	209	216	24.5	25	48	48	5.6	5.6
11/30/2012	86	115	10	10	14	97	Test Not Required					29	0.945	1.207	166	166	20	20	63	63	7.6	7.6
12/31/2012	87	131	10	14	14	97	Test Not Required					33	0.924	1.095	199	199	24	24	74	74	9	9
01/31/2013	63	135	7	8	13	98	Test Not Required					25	0.926	1.249	203	203	23	23	25	25	2.8	2.8
02/28/2013	128	207	12	16	19	96	Test Not Required					35	0.942	1.697	200	200	20	20	69	69	6.9	6.9
03/31/2013	178	242	14	17	17	95	Test Not Required					25	0.974	1.912	209	216	24.5	25	71	71	6.6	6.6
04/30/2013	98	129	10	11	11	97	< 20	25	39	82	167	25	0.99	1.288	189	199	19	20	85	89	8.55	9
05/31/2013	49	75	6	9	9	98	< 20	38	30	123	116	21	0.989	1.069	154	178	20	22	34	45	4.4	5.6
06/30/2013	58	102	5	7	8	97	< 20	26	36	54	69	16	1.019	1.824	137	139	15	18	24	33	2.4	2.9
07/31/2013	33	88	4	7	7	97	< 20	37	8	16	17	16	1.029	1.062	131	136	17.5	18	20	25	2.65	3.1
08/31/2013	22	42	4	7	7	99	< 20	40	7	10	16	15	1.024	0.984	145	158	23	24	13	16	2.1	2.7
09/30/2013	59	125	7	12	14	98	< 20	41	7	11	43	26	1.026	1.07	216	226	27	31	27	28	3.4	3.9
10/31/2013	54	70	7	7	9	98	< 20	32	14	16	31	24	1.02	0.943	199	201	28	28	53	56	7.5	7.8
11/30/2013	112	130	16	17	17	97	Test Not Required					35	1.009	1.15	147	147	19	19	147	147	19	19
12/31/2013	113	146	15	18	18	95	Test Not Required					34	1.004	1.106	179	179	22	22	89	89	11	11
Existing Permit Limit	240	Report	20	30	Report	> 85%	24	42	200	400	400	35	1.44	Report	Report	Report	Report	Report	Report	Report	Report	Report
Minimum	22	36	3	4	5	93	< 20	23	4	9	16	11	0.924	0.829	131	134	14	14	12	14	1.9	2.2
Maximum	178	242	16	18	19	99	< 20	42	56	178	227	38	1.073	1.912	224	231	28	31	147	147	19	19
Average	71.9	112.3	8.0	10.4	11.6	97.0	< 20	33.3	23.4	54.0	96.5	24.3	1.0	1.2	175.6	179.4	21.3	21.9	45.3	48.6	5.2	5.6
Number of Exceedences	0	N/A	0	0	N/A	0	0	0	0	0	0	1	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Monitoring Period End Date	Ammonia Nitrogen (April 1 to October 31)		Ammonia Nitrogen (November 1 to March 31)		Dissolved Oxygen	pH		Total Phosphorus (November 1 - March 31)		Total Phosphorus (April 1 - October 31)			Settleable Solids			TSS						Ceriodaphnia dubia	
	Monthly Average		Monthly Average		Daily Min	Daily Min	Daily Max	Monthly Average	Monthly Average	Monthly Average	Daily Max	Monthly Average	Montly Average	Weekly Average	Daily Max	Monthly Average	Daily Max	Monthly Average	Weekly Average	Daily Max	Percent Removal	Acute	Chronic
	lb/day	mg/L	lb/day	mg/L	mg/L	SU		lb/day	mg/L	lb/day	lb/day	mg/L	mL/L	mL/L	mL/L	lb/day		mg/L			%	%	
01/31/2011			14	1.87	8.9	6.2	7.2	12	1.62				0.1	0.1	0.1	97	122	12	13	13	97	Test Not Required	
02/28/2011			43	4.91	8.3	6.3	7.4	16	1.81				0.1	0.1	0.1	114	181	13	16	20	97	100	100
03/31/2011			28	2.71	7.8	6.9	7.3	18	1.72				0.1	0.1	0.1	170	221	15	17	18	97	Test Not Required	
04/30/2011	17	1.63			8.2	6.3	7.3			8	10	0.78	0.1	0.1	0.1	95	127	9	11	12	98	Test Not Required	
05/31/2011	8	0.875			8	6.1	6.6			6	7	0.67	0.1	0.1	0.1	92	160	10	16	17	98	100	100
06/30/2011	9	1.2			7.1	6.1	6.9			5	6	0.6	0.1	0.1	0.1	56	86	8	8	11	99	Test Not Required	
07/31/2011	8	1.172			7.1	6	6.9			5	5	0.69	0.1	0.1	0.1	60	72	9	10	10	98	Test Not Required	
08/31/2011	5	0.694			7.2	6	6.8			4	4	0.6	0.1	0.1	0.1	70	87	10	12	13	99	100	100
09/30/2011	26	2.6			6.4	6.3	7			6	8	0.67	0.1	0.1	0.2	91	154	10	12	13	98	Test Not Required	
10/31/2011	6	0.908			6.4	6.4	7.2			7	8	0.71	0.1	0.1	0.1	65	93	7	11	10	99	Test Not Required	
11/30/2011			10	0.942	7.1	6.6	7	11	1.02				0.1	0.1	0.1	84	146	8	10	14	98	100	100
12/31/2011			31	2.9	7.3	6.2	7	24	2.31				0.1	0.1	0.1	105	131	10	12	13	98	Test Not Required	
01/31/2012			2	0.249	7.5	6.5	7	11	1.43				0.1	0.1	0.1	84	112	10	11	12	98	Test Not Required	
02/29/2012			23	2.6	7.3	6.4	7.1	24	2.71				0.1	0.1	0.1	77	98	9	11	11	98	100	100
03/31/2012			40	4.42	7.2	6.5	7.3	21	2.2				0.1	0.1	0.1	96	121	11	13	13	98	Test Not Required	
04/30/2012	24	2.87			6.5	6.2	7.1			7	7	0.82	0.1	0.1	0.1	56	69	7	8	8	99	Test Not Required	
05/31/2012	3	0.337			7	6	6.8			7	8	0.89	0.1	0.1	0.1	105	192	13	17	22	98	100	100
06/30/2012	4	0.578			7.5	6.1	6.7			5	6	0.75	0.1	0.1	0.1	69	88	9	15	12	98	Test Not Required	
07/31/2012	3	0.461			7.1	6	7			4	5	0.68	0.1	0.1	0.1	49	72	8	9	11	99	Test Not Required	
08/31/2012	3	0.498			7	6	6.8			5	7	0.71	0.1	0.1	0.1	59	94	9	10	13	98	100	100
09/30/2012	11	1.413			6.7	6	6.6			7	7	0.84	0.1	0.1	0.2	103	134	13	16	17	98	Test Not Required	
10/31/2012	10	1.308			7.1	6	6.6			6	8	0.78	0.1	0.1	0.1	90	118	11	14	14	98	Test Not Required	
11/30/2012			55	6.82	6.7	6.5	6.9	5	0.68				0.1	0.1	0.1	73	131	9	11	13	98	100	100
12/31/2012			52	6.21	7.2	6.3	6.8	22	2.63				0.1	0.1	0.1	82	105	10	12	12	98	Test Not Required	
01/31/2013			57	6.85	7.9	6.2	6.9	27	3.32				0.1	0.1	0.1	101	132	11	13	13	98	Test Not Required	
02/28/2013			39	3.53	7.4	6.5	7	26	2.27				0.1	0.1	0.1	139	194	13	13	15	98	100	100
03/31/2013			42	3.663	7.2	6.5	7.1	13	1.25				0.1	0.1	0.1	168	242	13	15	16	97	Test Not Required	
04/30/2013	28	2.9			7.3	6.2	6.8			8	10	0.77	0.1	0.1	0.1	108	169	11	14	17	98	Test Not Required	
05/31/2013	18	2.218			7.5	6	7			6	8	0.74	0.1	0.1	0.1	60	89	8	9	11	99	100	6.25
06/30/2013	21	1.97			5.1	6.1	6.8			7	8	0.66	0.1	0.1	0.2	110	204	10	13	14	98	Test Not Required	
07/31/2013	12	1.6			6.4	6	6.7			5	7	0.67	0.1	0.1	0.1	57	96	7	10	10	96	Test Not Required	
08/31/2013	4	0.657			7	6.2	7			5	5	0.7	0.1	0.1	0.1	54	83	9	11	12	98	100	6.25
09/30/2013	23	2.9			6.9	6.1	7.3			7	8	0.87	0.1	0.1	0.1	72	144	9	15	19	98	Test Not Required	
10/31/2013	18	2.7			6.5	6	7.3			7	8	1	0.1	0.1	0.1	85	124	12	12	17	98	Test Not Required	
11/30/2013			164	23	6	6.5	7.5	16	2.13				0.1	0.1	0.1	71	106	10	11	16	97	100	6.25
12/31/2013			98	13.4	6.3	6.5	7.2	16	2.2				0.1	0.1	0.1	67	105	9	10	13	97	Test Not Required	
Existing Permit Limit	36	3	Report	Report	>5.0	6	8.3	Report	Report	12	Report	1	0.1	0.1	0.3	240	Report	20	30	Report	> 85%	100	45
Minimum	3	0.337	2	0.249	5.1	6	6.6	5	0.68	4	4	0.6	0.1	0.1	0.1	49	69	7	8	8	96	100	6.25
Maximum	28	2.9	164	23	8.9	6.9	7.5	27	3.32	8	10	1	0.1	0.1	0.2	170	242	15	17	22	99	100	100
Average	12.4	1.5	46.5	5.6	7.1	6.2	7.0	17.5	2.0	6.0	7.1	0.7	0.1	0.1	0.1	87.1	127.8	10.1	12.3	13.8	97.9	100.0	76.6
Number of Exceedences	0	0	N/A	N/A	0	0	0	N/A	N/A	0	N/A	0	0	0	0	0	N/A	0	0	N/A	0	0	2

BASED ON USGS TOPOGRAPHIC MAP FOR
BRIDGEWATER
MASSACHUSETTS QUADRANGLE
REVISED 1977
10-FOOT CONTOUR INTERVAL



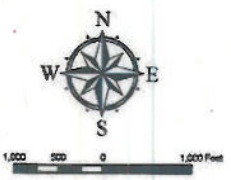


FIGURE 1
WWTP LOCUS PLAN

TOWN OF BRIDGEWATER SEWER DEPT.
NPDES PERMIT
BRIDGEWATER, MASSACHUSETTS

Tighe&Bond

SCALE 1:25,000 AUGUST 2008

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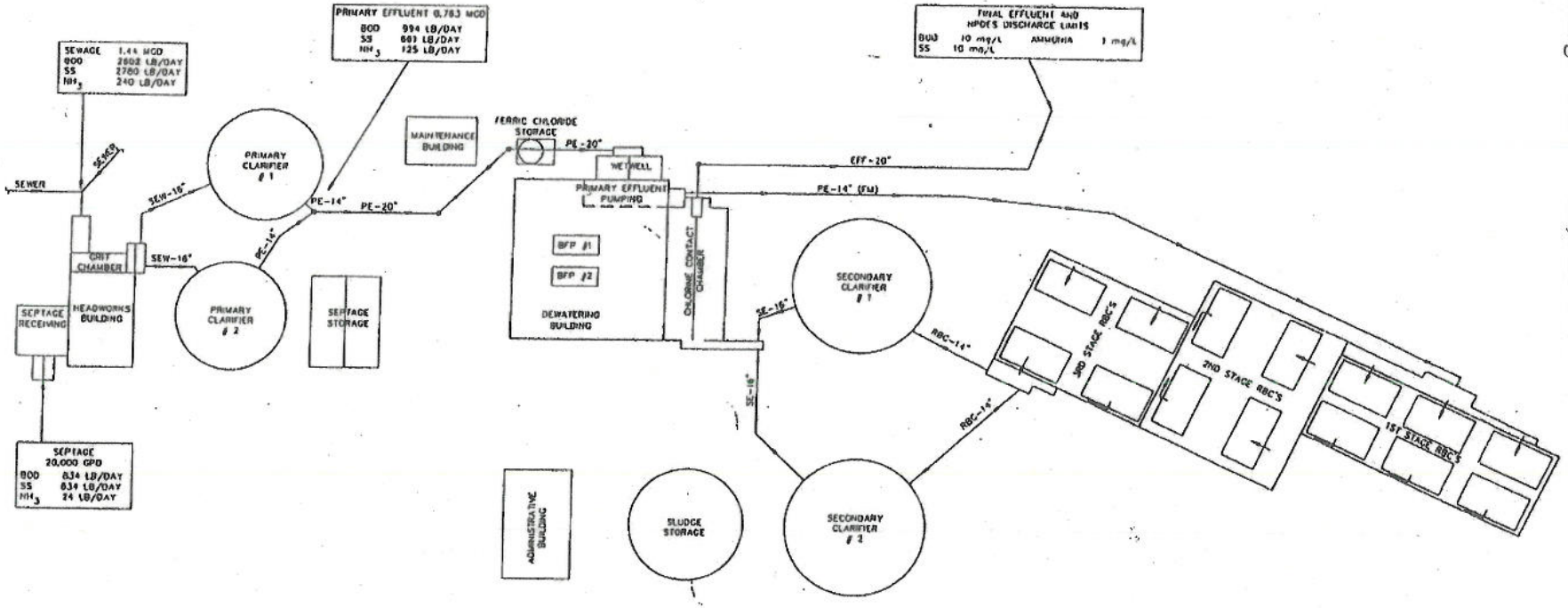

NOTE: COMPOSTING AREA NOT SHOWN

FIG 2
EXISTING WASTEWATER TREATMENT FACILITY

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.

Taunton River at Weir Village	
Year	Load Est. (lb/d)
2004	2659
2005	2289

Three Mile River	
Year	Load Est. (lb/d)
2004	547
2005	403

Segreganset River	
Year	Load Est. (lb/d)
2004	35
2005	34

Assonet River	
Year	Load Est. (lb/d)
2004	49
2005	51

Quequechan River	
Year	Load Est. (lb/d)
2004	85
2005	112

Sum of Loads (lb/d)	
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 ≤ 100cfs) are given an attenuation coefficient of 0.77 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.[1]

[1] 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.[2]

(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.[3,4]

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 Brocton 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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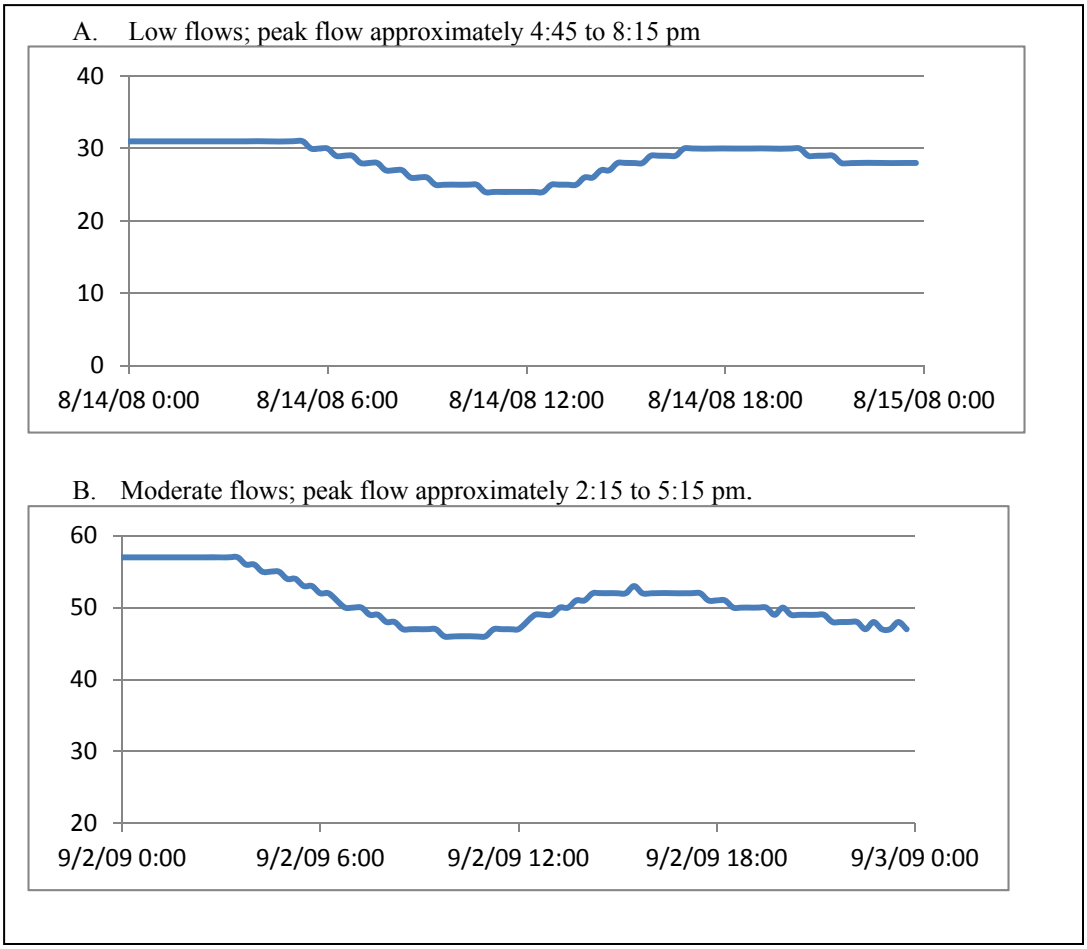
[2] For example, total nitrogen concentrations at the site of the discontinued USGS gage on the Matfield (CDM's station BR1-08) were within 5% of the concentrations found over 4 miles upstream on the Salisbury Plain River (CDM Station BR1-03), indicating on a qualitative level that little attuenuation is occurring once the additional dilution resulting from the confluence of Beaver Brook, Meadow Brook and other minor tributaries and baseflow is accounted for.

[3] Furthermore, the SPARROW regression equations themselves indicate that more wastewater load is passing thought 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.

[4] 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 Brocton 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.

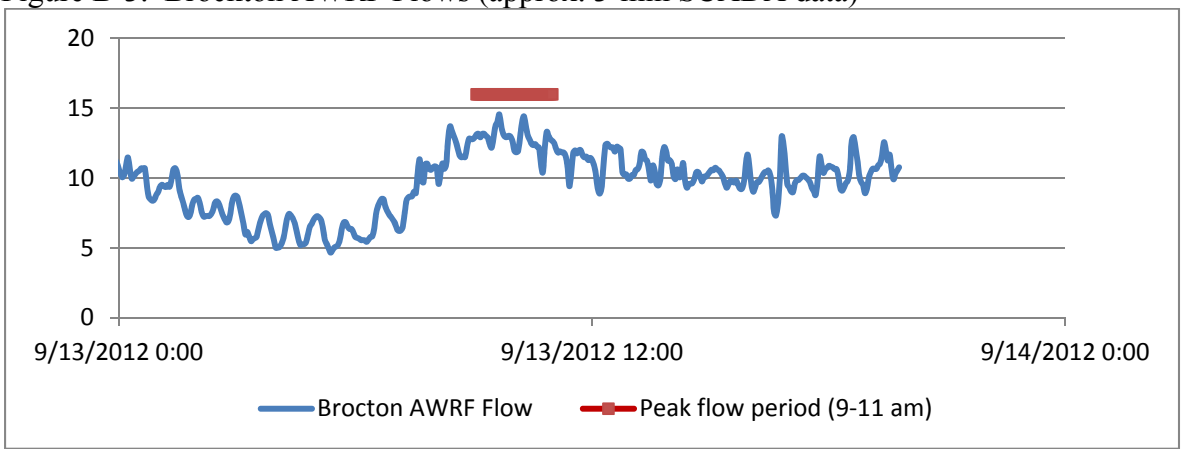
Figure B-2. USGS 01106500, Matfield River at Elmwood, 15-minute flow data



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 of 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 N2 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)	Flow (cfs)	TN (mg/l)	Flow (cfs)	TN (mg/l)	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[1]	28742	46.0	3.09	27.7	3.40	63.0	1.64	26.7	3.82

[1] 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 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.[5]

[5] 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.

Table B-2

	6/18/2012			7/9/2012			8/13/2012			9/13/2012		
	Flow (cfs)	TN (mg/l)	Load	Flow (cfs)	TN (mg/l)	Load	Flow (cfs)	TN (mg/l)	Load	Flow (cfs)	TN (mg/l)	Load
Input Loads												
Brockton AWRF	25.2	4.2	572	18.3	4.3	425	22.1	4.8	572	19.9	4.0	428
Upstream of SALP03[1]	12.2	1.7	110	7.8	2.1	89	20.1	1.7	181	5.3	1.5	44
			682			**514**			**753**			**472**
Output Load												
Total load at SALP03	37.4	3.26	**656**	26.0	3.21	**450**	42.2	3.32	**754**	25.2	3.43	**465**
Attenuation percent			**4%**			**12%**			**0%**			**1%**

[1] Flow upstream calculated from flow at SALP03 minus Brockton AWRF flow; concentration upstream from Salisbury Plain River at SALP01, representing 82% of watershed at SALP03.

	6/18/2012			7/9/2012			8/13/2012			9/13/2012		
	Flow (cfs)	TN (mg/l)	Load	Flow (cfs)	TN (mg/l)	Load	Flow (cfs)	TN (mg/l)	Load	Flow (cfs)	TN (mg/l)	Load
Input Loads												
Load at SALP03	37.4	3.3	656.1	26.0	3.2	449.6	42.2	3.3	754.1	25.2	3.4	465.1
Load added between SALP03 and MATF05	4.7	1.0	25	0.7	1.4	5	13.1	1.5	106	0.7	1.0	3
			681			**455**			**860**			**468**
Output Load												
Total load at SALP05	42.1	2.785	**632**	26.8	3.22	**464**	55.3	2.82	**839**	25.8	3.51	**488**
Attenuation percent			**7%**			**-2%**			**2%**			**-4%**

[2] Flow input between SALP03 and SALP05 calculated from flow at SALP05 minus flow at SALP03; concentration of input flow based on concentration of Beaver Brook at BEAB04, representing 91% of additional watershed between SALP03 and SALP05.

	6/18/2012			7/9/2012			8/13/2012			9/13/2012		
	Flow (cfs)	TN (mg/l)	Load	Flow (cfs)	TN (mg/l)	Load	Flow (cfs)	TN (mg/l)	Load	Flow (cfs)	TN (mg/l)	Load
Input Loads												
Load at SALP03	42.1	2.8	632.0	26.8	3.2	464.0	55.3	2.8	839.1	25.8	3.5	488.4
Load added between MATF05 and MATF08	3.9	1.6	34	1.0	1.7	9	7.7	2.8	117	0.9	1.5	7
			666			**473**			**956**			**495**
Output Load												
Total load at SALP08[3]	46	3.085	**765**	27.7	3.40	**508**	63	1.64	**555**	26.7	3.82	**549**
Attenuation percent			**-15%**			**-7%**			**42%**			**-11%**

[3] Flow input between SALP08 and SALP05 calculated from flow at SALP08 minus flow at SALP05; concentration of input flow based on concentration of Meadow Brook at MEBR06, representing 77% of additional watershed between SALP05 and SALP08

Reach	Average attenuation in reach	Cumulative attenuation	Cumulative delivery factor	k (1/day)
Upstream of SAPB03	4%	4%	96%	
Between SALP03 and MATF05	1%	5%	95%	
Between MATF05 and MATF08	2%	7%	93%	0.28

The calculated value of k (0.28 day^{-1}) was used to determine the delivery factor for the Brockton AWRF 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,[6] 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

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[6] 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

$$D'_a = \frac{D_a^{1.25} \times \sqrt{g}}{Q_a}$$

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.

Reasonable Potential Analysis
no ND, >10 data points, Lognormal distribution

Date	Cu (ug/L)	*Yi* lnCu (ug/L)
01/31/2011	33	3.4965
02/28/2011	33	3.4965
03/31/2011	20	2.9957
04/30/2011	24	3.1781
05/31/2011	11	2.3979
06/30/2011	17	2.8332
07/31/2011	17	2.8332
08/31/2011	26	3.2581
09/30/2011	23	3.1355
10/31/2011	17	2.8332
11/30/2011	20	2.9957
12/31/2011	38	3.6376
01/31/2012	27	3.2958
02/29/2012	26	3.2581
03/31/2012	23	3.1355
04/30/2012	18	2.8904
05/31/2012	28	3.3322
06/30/2012	24	3.1781
07/31/2012	18	2.8904
08/31/2012	19	2.9444
09/30/2012	24	3.1781
10/31/2012	30	3.4012
11/30/2012	29	3.3673
12/31/2012	33	3.4965
01/31/2013	25	3.2189
02/28/2013	35	3.5553
03/31/2013	25	3.2189
04/30/2013	25	3.2189
05/31/2013	21	3.0445
06/30/2013	16	2.7726
07/31/2013	16	2.7726
08/31/2013	15	2.7081
09/30/2013	26	3.2581
10/31/2013	24	3.1781
11/30/2013	35	3.5553
12/31/2013	34	3.5264

Cu - (Lognormal distribution, no ND)

Estimated Daily Maximum Effluent Concentration	
k = number of daily samples =	36
u_y = Avg of Nat. Log of daily Discharge =	3.15241
s_y = Std Dev. of Nat Log of daily discharge =	0.28627
σ_y^2 = estimated variance = (SUM[$(y_i - u_y)^2$]) / (k-1) =	0.081952778
cv(x)= Coefficient of Variation =	0.090811149
99th Percentile Daily Max Estimate = exp (u_y + 2.326*s_y)	
Estimated Daily Max 99th percentile =	**45.5260 ug/L**
95th Percentile Daily Max Estimate = exp (u_y + 1.645*s_y)	
Estimated Daily Max =	**37.4621 ug/L**

Reasonable Potential Analysis

Nondetects denoted "0"

Date	Pb (ug/L)	Yi lnPb (ug/L)	$(y_i - u_y)^2$
2/15/2011	0.7	-0.3567	0.0010124
5/10/2011	0.7	-0.3567	0.0010124
8/16/2011	0		
11/15/2011	0.5	-0.6931	0.1356378
2/14/2012	0.6	-0.5108	0.0345844
5/4/2012	0		
8/13/2012	0		
11/14/2012	2	0.6931	1.0363321
2/11/2013	0		
5/13/2013	0		
6/2/2013	0.5	-0.6931	0.1356378
8/12/2013	0.7	-0.3567	0.0010124
11/12/2013	0		

Pb- (Lognormal distribution, ND)

Daily Maximum Effluent Derivation (some measurements < detection limit)

Detection Limit** =	0.5
u_y = Avg of Nat. Log of daily Discharge (mg/L) =	-0.32486
S $(y_i - u)^2$ =	1.34523
k = number of daily samples =	13
r = number of non-detects =	6
s_y^2 = estimated variance = $(S[(y_i - u_y)^2]) / (k-r-1)$ =	0.22420
s_y = standard deviation = square root s_y^2 =	0.47350
δ = number of nondetect values/number of samples =	0.46154
z 99th percentile=z-score[(0.99-δ)/(1-δ)] =	2.08419
	1.323364216

Daily Max = exp (u_y + z-score*s_y)

99th Percentile Daily Max Estimate= 1.9387 ug/l

95th Percentile Daily Max Estimate = 1.3522 ug/l

** Detection limit here is the detection limit that resulted in the greatest number of Non Detects in the dataset

Reasonable Potential Analysis
data with ND, >10 samples, lognormal distribution

Nondetects denoted "0"

Date	Al* (ug/l)	lnAl (ug/l)	$(y_i - u_y)^2$
2/15/2011	32	3.4657	0.0043716
5/10/2011	49	3.8918	0.1295755
8/16/2011	26	3.2581	0.0749433
11/15/2011	32	3.4657	0.0043716
2/14/2012	45	3.8067	0.0755196
5/4/2012	25	3.2189	0.0979555
8/13/2012	0		
11/14/2012	48	3.8712	0.1151562
2/11/2013	36	3.5835	0.0026692
5/13/2013	21	3.0445	0.2374923
6/2/2013	40	3.6889	0.0246569
8/12/2013	0		
11/12/2013	35	3.5553	0.000552

Al- (Lognormal distribution, ND)

Daily Maximum Effluent Derivation (some measurements < detection limit)	
Detection Limit** =	20.0
u_y = Avg of Nat. Log of daily Discharge (mg/L) =	3.53185
S $(y_i - u)^2$ =	0.76726
k = number of daily samples =	13
r = number of non-detects =	2
s_y^2 = estimated variance = $(S[(y_i - u_y)^2]) / (k-r-1)$ =	0.07673
s_y = standard deviation = square root s_y^2 =	0.27700
δ = number of nondetect values/number of samples =	0.15385
z 99th percentile=z-score[(0.99-δ)/(1-δ)] =	2.26299
z 95th percentile=z-score[(0.95-δ)/(1-δ)] =	1.56245084
Daily Max = exp (u_y + z-score*s_y)	
99th Percentile Daily Max Estimate=	**63.9877 ug/l**
95th Percentile Daily Max Estimate =	**52.7016 ug/l**

** Detection limit here is the detection limit that resulted in the greatest number of Non Detects in the dataset

RESPONSE TO COMMENTS
NPDES PERMIT NO. MA0100641
BRIDGEWATER WASTEWATER TREATMENT PLANT
BRIDGEWATER, MASSACHUSETTS

In accordance with the provisions of 40 C.F.R. §124.17, this document presents EPA's responses to comments received on the draft NPDES Permit, MA0100641. The response to comments explains and supports the EPA determinations that form the basis of the final permit. From July 11, 2014 through September 8, 2014, the United States Environmental Protection Agency ("EPA") and the Massachusetts Department of Environmental Protection ("MassDEP") (together, the "Agencies") solicited public comments on a draft NPDES permit, MA0100641, developed pursuant to a permit application from the Town of Bridgewater, for the reissuance of a National Pollutant Discharge Elimination System ("NPDES") permit to discharge treated sanitary wastewater from outfall number 001 to the Town River in Bridgewater, Massachusetts.

After a review of the comments received, EPA and MassDEP have made a final decision to issue this permit authorizing this discharge. The final permit is similar to the draft permit that was available for public comment.

Although EPA's decision-making process has benefitted from the comments and additional information submitted, the information and arguments presented did not raise any substantial new questions concerning the permit. EPA did, however, make changes to the permit in response to the comments received. The analyses underlying these changes are explained in the responses to individual comments that follow and the changes are reflected in the final permit.

A copy of the final permit and this response to comment document will be posted on the EPA Region 1 web site: http://www.epa.gov/region1/npdes/permits listing_ma.html.

A copy of the final permit may also be obtained by writing or calling Betsy Davis, United States Environmental Protection Agency, 5 Post Office Square, Suite 100 (Mail Code: OEP06-1), Boston, Massachusetts 02109-3912; Telephone (617) 918-1576.

Applicable Background Information from the Taunton Wastewater Treatment Plant NPDES Permit, MA 0100897.

Many of the comments on the Bridgewater draft permit are similar, if not identical, to those lodged in other permitting actions, notably those submitted on the 2013 NPDES draft permit for the Taunton Wastewater Treatment Plant, MA0100897 ("Permit"). The Permit, issued on April 10, 2015, authorizes the City of Taunton ("City") to discharge wastewater effluent from its advanced secondary wastewater treatment facility ("Plant") into the Taunton River and subsequently to Mount Hope Bay, in Massachusetts. The City filed a Petition for Review ("Petition") to the EPA Environmental Appeals Board ("Board") to appeal the Permit. The Board rendered a decision on the Petition after the close of the public comment period for the Bridgewater draft permit. Among other things, the Permit includes a limit on nitrogen discharges from the Plant.

The Board's decision addressed and disposed of many of the issues raised in the comments submitted for the Bridgewater draft permit. For convenience, the Region has attached, and incorporates, the Board's decision into this Response to Comments.[1] The Region employed the same overall methodology in the Bridgewater draft permit as it did in the Permit for the City of Taunton; the methodology, generally and in its particulars, was affirmed by the Board in its decision.

In Taunton, the City challenged both the need for a nitrogen limit in the permit and the specific nitrogen limit imposed. The City further challenged other aspects of the Permit's nitrogen provisions, including the use of data and studies generated by the Massachusetts Estuary Program (MEP), and the requirement to reduce nitrogen year-round.

In denying the City's Petition the Board concluded that:

1. The Region did not clearly err or abuse its discretion when it determined that NPDES regulations required the Region to include a nitrogen limit in the Permit:

    a. The Region reasonably determined that the City's discharge of nitrogen to the Taunton River and Mount Hope Bay has the "reasonable potential" to cause or contribute to exceedances of applicable water quality standards, including nitrogen overenrichment.

    b. The CWA section 303(d) listing process is distinct from the NPDES permitting process, and the Massachusetts 303(d) list of impaired waters does not represent either a Massachusetts or EPA determination of whether the Taunton River is nitrogen-impaired.

    c. NPDES regulations do not require the Region to use any particular methodology or conduct any specific modeling to determine whether the "reasonable potential" standard is met, and the Region is not required to demonstrate that nitrogen is causing impairment before setting a nitrogen limit.

    d. The Region considered potential improvements in conditions in the Taunton River and Mount Hope Bay and based its decision on all the relevant data.

2. The Region did not clearly err or abuse its discretion in determining the specific nitrogen limit for the Permit:

    a. The Region reasonably determined and provided support for a threshold nitrogen concentration for the receiving waters that was consistent with unimpaired conditions in the Taunton River and Mount Hope Bay as determined by the available data. The threshold nitrogen concentration was also consistent with the range of nitrogen concentrations found to be protective of water quality in other

[1] The decision is available at https://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/30b93f139d3788908525706c005185b4/0a045314b61e682785257fa80054e600!OpenDocument.

southeastern Massachusetts estuaries and with available Massachusetts guidance on developing site-specific nitrogen thresholds.

b. The Region reasonably determined a nitrogen limit for the City's Plant, taking into account the overall flow of the Taunton River, the reduction needed to achieve the threshold nitrogen concentration in the receiving waters, the size of the City's discharge, and the limits of available technology.

c. Additionally, the City failed to demonstrate that the Region erred in relying on the monitoring station referred to as "MHB16" as a reference location from which to derive the threshold nitrogen concentration, and the Region's reliance on MHB16 as a reference location for unimpaired conditions is supported by Massachusetts and EPA guidance. Moreover, the Board found that, even without relying on MHB16 as a reference location, the Permit's nitrogen limit is well supported by the administrative record.

The Taunton and Bridgewater permitting actions share many commonalities:

Scale

First, in both permitting actions, the Region evaluated the Taunton River and Mount Hope Bay as two parts of a single, integrated estuarine system that share many common characteristics, and that have some differences, like depth and width. In the Region's view, MHB 16 and MHB 19[2] are part of a continuous estuarine complex. This choice of scale makes sense given the particular approach adopted by the Region, a simplified one that was designed to use currently available information to identify gross watershed-wide reductions over relatively long averaging periods necessary to achieve water quality standards throughout the estuarine complex, including those of downstream affected States, in accordance with the Act. Indeed, University of Massachusetts School for Marine Science and Technology (SMAST) refers to the "Taunton River-Mount Hope Bay estuarine complex," SMAST 2007[2] at 21, and recognizes the contiguous nature of these waters, concluding, at 58 "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." In its appeal the City argued unsuccessfully for an alternative approach, first segmenting the estuary into more discrete pieces, and then speculating on the nitrogen loading response at different sites in the estuary.

Variability

Second, in both permitting actions, the Region accounted for variability among the different monitoring locations in the estuary. EPA evaluated all stations, explicitly recognized the variability between stations, chose a threshold value that was not the most conservative choice, and confirmed the reasonableness of the value by comparing it against the published, peer-reviewed scientific literature. The Region fully acknowledges that there are differences between the various monitoring stations, including MHB 16 and MBH 19. The Region's approach inherently accounted for variations among sites in the estuary in arriving at a protective instream target. This decision was primarily based on actual observed instream conditions rather than models or statistical regressions. In determining a protective reference value, the Region assessed

[2] *Summary of Water Quality Monitoring Program for the Mount Hope Bay Embayment System (2004 – 2006)* at 24 (August 16, 2007).

conditions at almost two dozen sites throughout the estuary, not just one, and its decision on a nitrogen target was not dependent on conditions at any single location. These sites were characterized by a wide range of physical characteristics—different depths, different widths, different temperatures, different levels of stratification, different velocities. And with the exception of MHB 16, the Region found evidence of pervasive and long-standing eutrophication at all these sites throughout the estuary, some with nitrogen concentrations slightly above 0.45 mg/l, some with concentrations slightly below. This was consistent with the predictions of widely accepted conceptual models for eutrophication in estuarine systems.

This approach necessarily takes into account variation in nitrogen load response throughout the estuary. The claim that the Region established the instream nitrogen target based on a single, non-representative site far removed from the Taunton River and simply assumed that all stations would respond to nitrogen loading in precisely the same way is not correct. EPA did not rely on any such presumptions; the available evidence regarding total nitrogen (TN) concentrations, algal levels and dissolved oxygen (DO) depletions strongly supports EPA's conclusion that the well-understood mechanism of nutrient enrichment and cultural eutrophication is operative in the Taunton River/Mount Hope Bay system. In choosing a protective threshold, the Region compared the spectrum of conditions at almost two dozen different locations within the estuary—that is, a system-wide continuum of actual observed instream conditions, not merely conjecture or assumption. Overall, the patterns in the data observed by the Region in the Fact Sheet and the Response to Comments—elevated TN concentrations; elevated plant growth; DO fluctuations from low, even hypoxic, to supersaturated—are precisely the type that would be predicted by the widely accepted conceptual models of estuarine eutrophication, one that even the City conceded in its comments is "well-recognized."

Method

To derive the instream nitrogen target under 40 C.F.R. § 122.44(d)(1), the Region chose a simplified approach using information available at the time of permit issuance. The Region assessed the weight of all that scientific evidence, using multiple lines of evidence, including 12 years of observed instream water quality conditions; identification of a protective value; and recommended values from the scientific literature. Specifically, the Region determined reasonable potential and established a protective total nitrogen target for the Taunton River Mount Hope Bay Estuarine system based upon the weight of all the scientific evidence available at the time of permit issuance.

The Region used multiple lines of evidence, including

a. twelve years of system-wide nitrogen, chlorophyll a and DO data;
b. identification of an observed instream reference condition in the estuary where water quality standards were being consistently achieved over the long-term;
c. site-specific water quality reports on nitrogen impacts in the estuary, including those by Howes and Deacutis that were commissioned by Massachusetts and Rhode Island to guide implementation nutrient water quality standards;
d. recommended instream targets from the relevant scientific literature; and
e. actual instream targets being utilized in more than a dozen nitrogen Total Maximum Daily Loads (TMDLs) in Southeastern Massachusetts.

The choice of instream target was not a precise calculation but is intended to identify the scale of nutrient reductions required under the Clean Water Act. As the Board and First Circuit Court of Appeals has made clear, the Region was not required to demonstrate cause-and-effect in each link in the chain of eutrophication or to establish exact relationships between a discharge and instream

impacts. Nor was it required to wait for a mechanistic model or collect more data sufficient to support statistical regressions. The Region did *not* base its permit limits on statistical regressions because the available datasets do not support statistically significant results. [3]

MEP

EPA did use an approach that followed the MEP procedures to the extent the available information allowed. Similar to MEP, EPA used a weight of the evidence approach that included site specific reference site information to determine a target nitrogen threshold. Additionally, EPA used the available information to estimate the watershed load of nitrogen being delivered to the estuary system. For this system, available data allowed for this estimate to be based on actual watershed loading measurements as opposed to a theoretical land use based loading model that is typically used in the MEP approach. Finally, in the absence of a mechanistic hydrodynamic/water quality model, EPA used a salinity based mass balance model to determine the nitrogen reductions necessary to achieve the total nitrogen threshold in the most impaired part of the estuary. The level of complexity in EPA's analysis was adequate to develop a nitrogen target based on site specific information that is scientifically defensible. EPA never claimed that it performed a full MEP analysis, which requires more extensive data collection and water quality modeling. Had a full MEP analysis been completed, MassDEP would have used it to develop a TMDL and EPA would not have needed to conduct its own analysis of the necessary nitrogen reductions. The Fact Sheet specifically states that the full MEP analysis, and the TMDL that would result from it, had not been completed.

Outcome

The value chosen by the Region was at the very mid-point of all the recommended values in the administrative record and fell within a zone of reasonableness. The Region's nitrogen target was not guesswork, but was supported by Massachusetts, Rhode Island, as well as a sister federal agency, and was similar to recommended values proposed by SMAST, Cape Cod Commission, Buzzards Bay Coalition, and indeed was less stringent than recommended by the study commissioned by Rhode Island and submitted to EPA by the City as part its comments.

Changes from the draft permit to the final permit

The effluent tables in Part I.A of the final permit have changed from the Part I.A tables that were presented in the draft permit. The final permit has tables for effluent monitoring and reporting requirements on pages 2 and 3 and a table for ambient monitoring on page 4. The draft permit had one table that combined the effluent and ambient monitoring and reporting requirements. This change in the final permit is intended to clarify and distinguish the effluent limits, monitoring and reporting requirements from the ambient monitoring and reporting requirements.

In response to comment #2, the monthly average total phosphorus limit of 200 ug/l has been changed from a year round limit in the draft permit to a seasonal limit in the final permit. The monthly average total phosphorus limit is in effect from April 1 through October 31 each year.

[3] EPA has repeatedly emphasized that the Region did not use regression or stressor-response analysis to derive its nitrogen limitation, and cautions that the "SMAST data collection efforts were not designed for stressor-response analysis and are not sufficient to produce statistically significant results.

The final permit also includes a total phosphorus monitoring and reporting only requirement, from November 1 through March 31.

In response to comment #3, the monthly average total nitrogen limit is 60 lbs/day in the final permit. The references in the draft permit to the concentration-based total nitrogen limit of 5 mg/l (in footnote #9 and Section F) have been deleted from final permit.

In response to comment #6, the language in footnote 12 of the final permit, (previously numbered footnote 10 in the draft permit) has been clarified and states, "The permittee shall operate the treatment facility to reduce the discharge of total nitrogen during the months of November through April to the maximum extent practicable while maintaining compliance with all permit conditions. All available treatment equipment in place at the facility shall be operated by the permittee unless equal or better performance can be achieved by the permittee in a reduced operational mode. The addition of a carbon source that may be necessary in order to meet the total nitrogen limit during the months of May through October is not required during the months of November through April."

In response to comment #13, the final permit includes ambient monitoring and reporting requirements for parameters listed in Table 1.A on page 4 of the final permit. Ambient monitoring and reporting are required for pH, dissolved oxygen, total phosphorus, total nitrogen, total nitrate nitrogen, total nitrite nitrogen and total Kjeldahl nitrogen. The ambient monitoring requirements are explained in footnotes 10 and 11 of the final permit.

Additional changes from the draft permit to the final permit

Footnote 6 of the draft permit applies to Escherichia coli only and footnote 6 in the final permit applies to the Escherichia coli and the total residual chlorine parameters listed in the effluent table on page 2 of the final permit.

COMMENTS FROM JONAS KAZLAUSKAS, SUPERINTENDENT, BRIDGEWATER WASTEWATER TREATMENT PLANT, BRIDGEWATER, MASSACHUSETTS

COMMENT #1: pH

Our existing permit has a pH limit range of 6.0-8.3 which has been meet consistently. The new pH limit range in the draft permit is 6.5-8.3 and references both MA SWQS 314 CMR 4, and 40 C.F.R 133.102(c). The 40 C.F.R 133.102(c) sets the rate at 6.0-9.0. The previous permit required the effluent pH to be within the range of 6.0-8.3. Ferric chloride is used at the WWTP to assist in the removal of phosphorus. Ferric is utilized as it is a non-aluminum based coagulant that has proven effective in the removal of phosphorus. One of the effects of using coagulants (including ferric chloride) is that it will reduce the pH of the effluent.

The new draft permit also establishes a lower effluent phosphorous limit, which could result in the use of additional ferric chloride. The use of additional ferric chloride will further suppress the pH.

Therefore, we request that the permit pH range be set at 6.0-8.3 as listed in our existing permit for the Bridgewater WWTP.

RESPONSE TO COMMENT #1

EPA is required to include water quality-based effluent limits in NPDES permits when technology-based effluent limits do not achieve applicable state water quality standards. This requirement is based on Section 301(b) of the Clean Water Act (CWA). EPA regulations at 40 CFR 122.44(d)(1)(i) state, "Limitations must control all pollutants or pollutant parameters which are or may be discharged at a level that will cause, have reasonable potential to cause , or contribute to an excursion above any State water quality standard, including narrative criteria for water quality."

The Massachusetts Surface Water Quality Standards at 314 CMR 4.06 designate the Town River as a Class B waterbody. The Massachusetts Surface Water Quality Standards (MA SWQS) at 314 CMR 4.05(b)(3) provide a range for the pH criteria for a Class B waterbody. The pH criteria for Class B waterbody is defined as:

"pH - Shall 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 shall be no change from natural background conditions that would impair any use assigned to this Class."

In reviewing the Town's request, EPA had to assess whether the pH water quality standards for a Class B water would be achieved at the discharge location. To determine reasonable potential, EPA reviewed the upstream ambient pH, the ambient alkalinity data reported in the Town's recent Whole Effluent Toxicity Tests and the stream flow available for dilution at the discharge location during the low flow period (commonly referred to as the 7Q10 flow).

Alkalinity effects the buffering capacity of a stream to resist changes in pH. An alkalinity of 20 mg/l or greater provides a buffering capacity in the receiving water if the pH of the effluent is also low. Table 1, Alkalinity and pH of the Town River provide recent data from the Town's Whole Effluent Toxicity Tests that show the pH is less than 7.0 standard units (SU) and the alkalinity data is at or below 20 mg/l. The data indicates there is limited buffering capacity available in the receiving water and lowering the pH to 6.0 SU in the renewed permit establishes reasonable potential that the discharge will cause or have the reasonable potential to cause or contribute to an excursion of the pH criteria defined for a Class B water in the MA SWQS for the receiving water. Therefore, the pH limits in the final permit remain at 6.5 SU to 8.3 SU. Table 1 summarizes the results of ambient sampling and analysis conducted for the facility's whole effluent toxicity test.

Table 1. Alkalinity and pH of the Town River

	pH	Alkalinity
May 2015	6.73	8.6
August 2015	6.67	19
November 2015	6.55	20
February 2016	6.62	7.7

COMMENT #2: Phosphorus Permit Limit

The new total phosphorous limit of 200 ug/l has been greatly reduced from the previous limit of 1 mg/l in our existing permit. In the A.1 table of the permit, seasonal limits for nitrogen are listed, however the total phosphorous does not appear to be limited to the summer months.

We are requesting that the new phosphorous limit apply to the summer months (May 1 – October 31) only.

RESPONSE TO COMMENT #2

The total phosphorus limit of 200 ug/l is based on achieving an in-stream phosphorus concentration of 100 ug/l to prevent eutrophication in the Town River. The monthly average limit is a year round limit in the draft permit. EPA based the instream phosphorus concentration on the threshold for phosphorus recommended in EPA's *1986 Quality Criteria for Water* commonly known as the Gold Book.

Total phosphorus limits are typically set for a time of year when impacts to water quality are considered to be more pronounced. EPA considers the start of the growing season the time of year when the impact to water quality is particularly significant from total phosphorus. Therefore, the monitoring period for the monthly average total phosphorus limit has been changed from a year round limit in the draft permit to a seasonal limit of 200 ug/l from April 1 through October 31 in the final permit. The final permit also includes a total phosphorus monitoring and reporting requirement from November 1 through March 31.

COMMENT #3: Total Nitrogen Permit Limit

The new total nitrogen limit is listed at 60 lbs/day in Table A.1 of the permit, however other locations indicate an effluent limit of 5 mg/L monthly average. This new total nitrogen limit will be a challenging limit to meet at our WWTP especially when combined with to the stringent limit for phosphorous

We are requesting confirmation that the new limit is the 60 lbs/day mass balance limit only as listed in Table A.1 or is the new limit also a 5 mg/L concentration based limit? Please refer to additional questions related to this total nitrogen limit indicated below.

RESPONSE TO COMMENT #3

EPA confirms that the total nitrogen limit in the final permit is 60 lbs/day and references to a total nitrogen concentration–based limit have been removed from the final permit. As explained on page 35 of the fact sheet, the water quality analysis used to derive effluent limits for the Taunton River estuary is based on total loads to the estuary and is not affected by variations in the amount of flow from the point sources. A mass load-only limit is protective of water quality, and consistent with 40 CFR 122.45(f). The total nitrogen mass-based limit in the final permit shall be reported on the Town's October discharge monitoring reports (DMR) as a seasonal rolling average for the months of May through October.

EPA recognizes that the total nitrogen limit cannot be achieved until the treatment plant is upgraded. The five year compliance schedule in the draft permit has been retained in the final permit. The compliance schedule is intended to give the Town time to make the necessary treatment plant upgrades to achieve the new permit limit.

COMMENT #4

Our existing permit requires a total residual chlorine grab sample measurement frequency of 1 time/day which we have been able to implement and have demonstrated consistent compliance

with our total residual chlorine limit. The new total residual chlorine measurement frequency of 3 times/day included in the draft permit imposes a staffing hardship on the Town especially for Saturdays, Sundays and holidays. To achieve our current permit requirement, we have a trained laboratory staff person come to the WWTP for a limited overtime period on weekends and holidays to check the chlorination/dechlorination system and to conduct a total residual chlorine test on one grab sample and then leave for the day. If this testing frequency is changed to 3 times per day, this staff person would have to work a full day on Saturdays, Sundays and Holidays along with the extra time it will take to test 3-times per day during weekdays. Also, based on our excellent operations history, we do not see the need for an alarm per footnote 7 on page 4 of 8 of the permit which would require that a costly automated low-level chlorine residual analyzer system be installed.

Therefore, we request that the total residual chlorine grab sample measurement frequency be set at 1 time/day as listed in our existing permit for the Bridgewater's WWTP and we request that the alarm system requirement in footnote 7 be deleted from the permit.

RESPONSE TO COMMENT #4

The total residual chlorine sampling frequency of three times per day in the draft permit is incorrect. EPA acknowledges that the total residual chlorine data reported on the Town's monthly DMRs have been consistently achieved over the last several years. The total residual chlorine monitoring and reporting requirement has been changed in the final permit from three times per day to once per day. The grab sample is required to be collected on each day of the week.

Installation of an alarm system for the chlorination/dechlorination system has been a standard operation and maintenance (O&M) requirement in Massachusetts POTWs for the past several years. The alarm system is required to alert WWTP personnel in the event of an equipment malfunction and/or interruption of the chemical dosing system regardless of the compliance history or age of the system. A malfunction of the chlorine dosing system has the potential to release a dose of chlorine that may be potentially toxic to fish and/or aquatic wildlife in the Town River that would not be detected from the once per day grab sample required in the permit. The basis for this permit requirement in the final permit is the potential for toxicity to the receiving water.

COMMENT #5

Our existing permit includes requirements for proper operation and maintenance of the sewer system which have been successful for the Town of Bridgewater. The implied requirement that we have dedicated collection system staff as indicated on page 8 of 18 under C.1. Maintenance Staff, item C.5. Collection System a. (1) and item C.5 Collection System b. (3) on page 10 of 18 in the draft permit would impose a staffing hardship on the Town. As a small 1.44 mgd plant, we have staff that fill multiple rolls. A crew may be doing pump station inspections in the morning and cleaning out a tank at the WWTP in the afternoon. If there is a sewer plug or pipeline collapse, it's all hands on deck and staff the normally work at the plant work on a problem in the collection system until it is resolved. We need to keep this flexibility since the size of our facility does not warrant a separate collection system crew.

Therefore, we request that the wording be changed to clarify that staff dedicated solely to operation of the collection system is not required similar to the wording in our existing permit for the Bridgewater WWTP

RESPONSE TO COMMENT #5

EPA commends the Town of Bridgewater for maintaining an operation and maintenance program for the Town's sewerage collection system which the Town deems to be successful with the present staffing level. The draft permit has an operation and maintenance reporting requirement for the treatment plant that includes staffing information. It is not EPA's intent to require that the Town have "dedicated" collection system staff.

The permit requirement states only that "adequate" staff be available to carry out the operation, maintenance, repair and testing functions with the terms and conditions of the permit but it does not prohibit staff from filling multiple roles. Section C. (5)(a) gives the permittee the opportunity to devise a collection system operation and maintenance plan which include setting goals and assigning staff to achieve those goals which are appropriate for the Town. Therefore, the requirement that an adequate staff be available to carry out the operation, maintenance, repair and testing functions to ensure compliance with the terms and conditions of the permit is the Town's decision. This requirement shall remain in the final permit.

COMMENT #6

The draft permit does not include a limit for nitrogen from November 1st to March 31st. Therefore, we question the need for footnote 10 on page 5 of 18 in the permit. If EPA determines that even though there is no winter limits for nitrogen, we take exception to the following wording in footnote 10: "All available treatment equipment in place at the facility shall be operated unless equal or better performance can be achieved in a reduced operating mode."

This statement appears to give EPA and MassDEP the authority to dictate to our licensed and experienced wastewater operators how our facility shall be operated and may have the unintended consequence of a violation being issued when a regulator visits our facility and believes that a particular piece of equipment should be operational even though it does not improve nitrogen removal especially during the time when there is no numerical limit.

Therefore, we request that footnote #10 be eliminated or that the wording be changed to clarify that our operations staff, not EPA or MassDEP, have full operating responsibility and will determine what equipment should be operational and what equipment should not.

RESPONSE TO COMMENT #6

EPA has included a condition in the final permit to optimize nitrogen removal during the cold weather season from November to March. This approach is intended to minimize total nitrogen from accumulating in the estuarine system during the cold weather months. The less total nitrogen accumulated during the cold weather months reduces the impact of eutrophication during the growing season.

EPA has not included nitrogen limits for this time period because these months are not the most critical period for phytoplankton growth. The permit limits during the warm weather season along with the winter optimization requirements are intended to keep the annual total nitrogen load low. The numeric limitations and the optimization requirements, in combination, 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.

If a particular operation or piece of equipment does not improve nitrogen removal its use is not required to minimize nitrogen discharges. For clarification, minimization does not require the operator to violate other permit conditions.

Footnote 12 (what was footnote 10 in the draft permit) of the final permit has been modified and now reads, "The permittee shall operate the treatment facility to reduce the discharge of total nitrogen during the months of November through April to the maximum extent practicable while maintaining compliance with all other permit conditions. All available treatment equipment in place at the facility shall be operated by the permittee 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 during the months of May through October is not required during the months of November through April."

COMMENT #7: Additional comments/Questions

We are aware that many positive performance changes have occurred at WWTPs in the Taunton River Estuary after much of the sampling data and related calculations were completed as referenced in the Fact Sheet. Also, since that time, it is reported that the water quality in Mount Hope Bay has improved significantly due to the CSO deep tunnel project in Fall River and other improvement projects tributary to the area. Given the significant cost burden that the proposed nutrient limits will imposed on the Town of Bridgewater and other communities with WWTPs in the Taunton River Estuary, it makes sense to us that current data which reflects water quality improvements that have been made should be used by EPA to re-calculate nitrogen and phosphorus loads before the new limits are imposed. We would also assert that a TMDL study with current data for the Taunton River Estuary is warranted and should be completed before the new limits are imposed.

We share the concerns expressed by another permittee [4] with a WWTP in the Taunton River Estuary which are:

- That it is not scientifically possible to reliably predict the degree of nitrogen control required to ensure compliance with appropriate standards using old data and the methodology employed by EPA.
- That the conditions governing dissolved oxygen (DO) concentrations in Mount Hope Bay differ significantly from those in the Taunton River. This could impact the degree of nitrogen removal required by the Town of Bridgewater and other municipal WWTPs that discharge to the Taunton River Basin.
- That EPA has failed to account for existing treatment improvements that are affecting the dissolved oxygen values in the Taunton River by using old outdated data.
- That EPA has failed to provide a cause and effect demonstration that nutrients are the actual cause of low DO conditions in the Taunton River as required by state and federal law.
- The assertion that the total nitrogen (TN) endpoint to derive the TN effluent limit is not scientifically defensible.

[4]City of Taunton Comments to Draft Permit prepared by the Town and Hall & Associates

- That TN is the wrong parameter to regulate for DO control in short detention systems such as the Taunton River.
- That EPA's analysis is based on outdated information (a reoccurring theme).
- The assertion that the EPA has ignored the conceptual model of significant factors that affect DO and have not demonstrated that they are occurring in the Taunton River.

The Town believes that the above concerns should be resolved and any necessary study and related modeling be completed before we can accept the nutrient limits included in the draft permit.[5]

Conclusion

It is the position of the Town of Bridgewater that for our WWTP, the extremely stringent effluent phosphorous and nitrogen limits proposed in the draft permit have not been adequately explained or supported by proper site-specific scientific methods to show why they are needed to protect water quality in the Taunton River Basin.

It is the position of the Town of Bridgewater that we be allowed time to conduct upstream sampling in the Town River so that more accurate mass balance calculations can be completed. The EPA encourages the facility to provide more site-specific sampling data as stated on page 10 of the Fact Sheet for the Bridgewater WWTP.

It is the position of the Town of Bridgewater that the total nitrogen and phosphorus permit limits for the major WWTPs in Taunton, Brockton and Somerset which represent 80% of the total direct wastewater flow to the Taunton River Estuary be implemented, water quality assessed, and maximum loading limits recalculated before the total nitrogen and phosphorus permit limits are established for the Bridgewater WWTP which represents less than 4% of the total direct wastewater flow to the Taunton River Estuary along with the other small WWTP contributors.

It is the position of the Town of Bridgewater that the EPA should allow us time to complete the CWMP process that is currently underway for our Town before new permit limits are established. Our CWMP may indicate that the Town needs an increase in plant flow to meet future growth which could impact the scientific determination of appropriate total nitrogen and phosphorus permit limits for our WWTP.

At the present time, the total nitrogen and phosphorus limits included in the draft permit cannot be achieved at our facility. This fact needs to be incorporated into the CWMP availability or effectiveness of treatment technologies process so appropriate upgrade alternatives can be evaluated, cost estimates prepared and a recommended plan approved by the Town and the MEPA process. The Bridgewater WWTP was designed to provide biological treatment with the ability to nitrify using a rotating biological contactor (RBC) process. While the facility consistently meets effluent limits for BOD and ammonia nitrogen, the nature of the process design makes the facility inherently unsuited to adapting for denitrification. Specifically, the lack of additional or flexible process tankage at the WWTP eliminates the ability to optimize the existing process for total nitrogen removal; and this constraint combined with the limitations of the existing WWTF site make adapting this facility for total nitrogen removal to be far more invasive than may be possible for other facilities.

[5] City of Taunton Comments to Draft Permit prepared by the Town and Hall & Associates

Without recognition of the specifics of the Bridgewater WWTP, the proposed total nitrogen limits in our draft permit are the same as the limit proposed for several other (larger) plants in the Taunton Basin, while smaller plants are not being issued nitrogen limits at all. Considering the significant variation in plant capabilities, the Town observes that exploring a basin approach to addressing nitrogen may be more applicable, possibly including options such as nutrient trading (where some facilities that are more readily adapted to denitrification can more efficiently remove a greater part of the nitrogen load. We request that EPA explore this broader approach to nitrogen control in the basin before issuing the formal nitrogen limits proposed.

Also, we know that the resulting WWTP upgrade will have a very significant cost. Therefore, the Town requests time to complete our CWMP and evaluate the total cost of the project to ensure that it will not place an unreasonable financial burden on households in our community. The EPA's Interim Economic Guidance for Water Quality Standards document will be used to complete this determination.

Therefore, based on the information described above, we respectfully request that the draft permit be withdrawn or put on hold until an appropriate time when the items described above are completed.

RESPONSE TO COMMENT #7

EPA agrees with the Town that investments made in Clean Water Act (CWA) compliance by POTWs discharging to the Taunton River Estuary and Mount Hope Bay are intended to result in water quality improvements. The CSO reductions cited in the comment, while important in addressing other pressing water quality problems, are not expected to have a significant impact on DO conditions in the upper Taunton River estuary, the area for which EPA's nutrient analysis was conducted and the permit limits are based on.

Effluent limits and conditions in individual permits are unique to each permit. The mass-based total nitrogen limits for the three POTWs with design flows between 1.0 MGD and 4.0 MGD were derived based on a post-treatment total nitrogen concentration of 5 mg/l. The Town's permit limit is less stringent than the permit limit given to facilities with a design flow greater than 4.0 MGD.

To assess the need for water quality-based effluent limits, EPA characterizes the effluent and the receiving water to determine the need for a water quality-based effluent limit using a reasonable potential analysis. This is the approach EPA has used to determine water quality-based effluent limits for POTW's discharging to the Taunton River Estuary and Mount Hope Bay and will continue to apply as individual permits comes up for renewal.

The total phosphorus and total nitrogen limits in the final permit are based on achieving the narrative Massachusetts Surface Water Quality Standard (MA SWQS) for nutrients at 314 CMR 4.05(c). The narrative nutrient standard states, "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 Best

Available Technology (BAT) for non-POTWs, to remove such nutrients to ensure protection of existing."

Data used in EPA's nutrient analysis

EPA did include information about current conditions in the Fact Sheet, including data that elevated chlorophyll-a concentrations and persistent DO depletion below 5 mg/l continue in Mount Hope Bay based on the most recent available monitoring data, see pages 25 of the Fact Sheet. EPA did not base its baseline analysis on the more recent available data because the recent data do not provide a comprehensive dataset suitable for analysis of nitrogen loading for the WWTP point source discharges to the Taunton River Estuary. The 2004-06 dataset, which was the product of a monitoring program approved by MassDEP and consistent with Massachusetts Estuaries Program (MEP) procedures, includes estuarine monitoring for both nutrients and eutrophication indicators (DO and chlorophyll-a) at 22 stations within Mount Hope Bay and the tidal rivers contributing to the bay, while the more recent estuarine water quality monitoring for DO and chlorophyll-a is limited to a single site in Mount Hope Bay. The 2004-06 dataset also includes nutrient monitoring at stations in the freshwater sections of the Taunton River and four other contributing streams, which can be used in combination with flow records to determine river loadings to the estuary. In contrast the recent river loading sampling is limited to a single site in the Taunton River Estuary, is not directly comparable to freshwater sampling and is limited in parameters monitored.

A review of the most recent data for the Mount Hope Bay monitoring station clearly indicates persistent low DO in the bottom water, persistent supersaturated DO in the surface waters and elevated chlorophyll a concentrations (2014 and 2015 URI spreadsheets). These recent data indicate that any reductions in pollutant loads that have been achieved through improved treatment have not been sufficient to achieve water quality standards, a result that is consistent with the prediction from EPA's analysis that a substantially greater reduction in nitrogen loadings would be necessary in order for water quality standards to be achieved.

In sum, EPA rejects the comment's suggestion that it must reanalyze the entire system rather than use the 2004-05 baseline because there have been some load reductions and other water quality projects since that time, even where (1) model predictions indicate eutrophication impacts will continue; (2) the available evidence indicates that EPA's predications are correct and eutrophication impacts are in fact continuing; and (3) such an update would require initiation of a new multi-year intensive monitoring effort similar to that done in 2004-06, delaying permit issuance for a minimum of two years. Nitrogen limits consistent with the Fact Sheet analysis are necessary to ensure that water quality standards are met and are included in the Final Permit.

Total Maximum Daily Load and Comprehensive Wastewater Management Plan

The Town requested the Agencies postpone issuance of the final permit until one of the following assessments becomes available; an approved TMDL for nutrients, the Town's Comprehensive Wastewater Management Plan (CWMP), or site-specific criteria that can be used to re-evaluate the total phosphorus and total nitrogen limits. There is no basis for waiting for the completion of ongoing local planning prior to reissuing the permit. Reissuance of an NPDES permit is typically a lengthy process and the Agencies use data that is available when developing a permit. The permit expired 8 years ago and reissuance is necessary in order to address the well documented ongoing water quality impacts.

However, EPA investigated the status of a nutrient TMDL and the CWMP with the MassDEP. EPA has learned that a nutrient TMDL for the Taunton River Estuary and Mount Hope Bay is not currently being worked on by the MassDEP. In regards to the CWMP, MassDEP indicated that the Town is in the final stages of submitting a CWMP to the State for review and approval. EPA recommends the Town plan upgrades to the treatment facility to consistently achieve MA SWQS.

Cost Considerations

Although the CWA precludes EPA from considering economic impacts when developing water quality based effluent limitations, the costs involved in achieving compliance with a water quality-based effluent limitation may be taken into account. The regulations at 40 CFR 122.47 address the use of compliance schedules in an NPDES Permit. A compliance schedule is a schedule of remedial measures included in a permit that will lead to compliance with the CWA and NPDES regulations.

A five year compliance schedule has been included in the final permit for the Town to achieve compliance with the total phosphorus and total nitrogen limits. The compliance schedule is intended to give the Town time to plan, design, and construct upgrades to the treatment plant to achieve the effluent limits and conditions in the permit. EPA believes this is a reasonable schedule given that the Town is finalizing the CWMP and in the early planning stages of upgrading the facility. However, if, at any time, the permittee can demonstrate that complying with this schedule will result in sewer rates that are not affordable under EPAs affordability guidance, an extension of the schedule can be authorized.

Water Quality Trading

EPA encourages water quality-based trading in NPDES permits if and when it is feasible. The Town's suggestion of a basin-wide nitrogen trading program is an approach EPA may support if the trading program attained state water quality standards and met all the CWA requirements. However, EPA will not postpone issuance of the final permit to develop and finalize a basin-wide nitrogen trading program. If the town decides to pursue development of a nutrient trading program, EPA will work the Town during this permit cycle to establish an acceptable trading arrangement with another POTW in the watershed that meets the requirements of the CWA. The Town should review information on nutrient trading at: Water Quality Trading Basics and Policy |National Pollutant Discharge Elimination System (NPDES) | US EPA.

Responses to Bridgewater's shared concerns with the City of Taunton on EPA's nutrient analysis

- That it is not scientifically possible to reliably predict the degree of nitrogen control required to ensure compliance with appropriate standards using old data and the methodology employed by EPA.

See response for Data used in EPA's nutrient analysis.

- That the conditions governing dissolved oxygen (DO) concentrations in Mount Hope Bay differ significantly from those in the Taunton River. This could impact the degree of nitrogen removal required by the Town of Bridgewater and other municipal WWTPs that discharge to the Taunton River Basin.

Mount Hope Bay and the Taunton River are a series of segments of the same estuarine system and the available evidence indicates that it is vulnerable to dissolved oxygen impacts from

nutrient enrichment. The system is characterized by different levels of mixing of the same two source waters, continual exchange of waters among the estuarine segments, the same sources for sediment, the same climatic conditions, minor difference in depth range (Taunton River depths range from 4 to 10 meters; Mount Hope Bay from 3.5 to 12 meters) and different widths (the Taunton River is one-third to one-half mile across; while Mount Hope Bay is over 2 miles across at its widest point).

Nitrogen limits consistent with the Fact Sheet analysis are necessary to ensure that water quality standards are met and are included in the Final Permit.

- The EPA has failed to account for existing treatment improvements that are affecting the dissolved oxygen values in the Taunton River by using old outdated data.

A review of the most recent data for the Mount Hope Bay monitoring station clearly indicates persistent low DO in the bottom water, persistent supersaturated DO in the surface waters and elevated chlorophyll a concentrations (2014 and 2015 URI spreadsheets). These recent data indicate that any reductions in pollutant loads that have been achieved through improved treatment have not been sufficient to achieve water quality standards, a result that is consistent with the prediction from EPA's analysis that a substantially greater reduction in nitrogen loadings would be necessary in order for water quality standards to be achieved.

- That EPA has failed to provide a cause and effect demonstration that nutrients are the actual cause of low DO conditions in the Taunton River as required by state and federal law.

The contention that a demonstration of actual causation is necessary before instituting permit limits is simply wrong; that argument has been specifically rejected by the Environmental Appeals Board. *In re Town of Newmarket, NH*, NPDES Appeal No. 12-05, 16 E.A.D. __ (2013), slip op. at 54 n.23 ("The plain language of the regulatory requirement (that a permit issuer determine whether a source has the 'reasonable potential to cause or contribute' to an exceedance of a water quality standard) does not require a conclusive demonstration of 'cause and effect'."). EPA again emphasizes that the setting of NPDES limits, including the interpretation of narrative criteria and assessment of reasonable potential, is governed by the specific provisions of the NPDES regulations and CWA § 402 and not by regulations governing the adoption of water quality standards, 303(d) listing or other provisions. Thus (and although EPA's analysis is not inconsistent with state approaches), case law under other CWA sections are only relevant to the extent they are consistent with NPDES requirements

EPA notes that in complex systems such as estuaries, DO conditions are affected by a number of interacting factors and it is generally not the case that algal growth (or any other single condition) is the *only* factor influencing DO concentrations. Nor is it ever possible to establish actual causation to a scientific certainty, as that can be achieved only through controlled experiments that are impossible to conduct in a natural system. Despite these limitations, the consistent pattern of high TN concentration, elevated chlorophyll-a, and depleted DO provide strong evidence that the well understood mechanism of nutrient over enrichment is operative in this system. EPA is not required to indefinitely defer permit limits to await the possibility of more precisely quantifying the extent to which other factors are also contributing to the impairment.

This comment is premised on the misconception that EPA must rule out all other possible explanations for the observed water quality responses before it can include a nutrient limit. This is not the case. The need for permit limits is not restricted to situations where the pollutant is the single cause of a water quality issue and all other factors can be discounted or eliminated. Rather,

a permit limit is required whenever a pollutant discharge "causes, has reasonable potential to cause, or contributes" to an impairment. 40 CFR § 122.44(d)(1)(i). EPA is not required to show that there are no other factors influencing DO in the Taunton River Estuary and indeed that would be impossible, as DO conditions are the result of interaction of a number of factors. The question for permit limits is whether the nutrient discharges and the accompanying elevated algal population (clearly seen in the Taunton River Estuary) contribute to the problem or have reasonable potential do so. Given the well understood effect of nutrients on algal population and DO and the indicators that this mechanism is operative in this system, EPA's conclusion is amply supported and is neither presumption, speculation nor guesswork.

- The assertion that the total nitrogen (TN) endpoint to derive the TN effluent limit is not scientifically defensible.

The connection between nutrient levels, algal growth and DO conditions is not only rational but, is well understood in the scientific community and is supported by the data for this system. Although EPA acknowledges some unavoidable level of scientific and technical uncertainty in this permitting action, the existence of uncertainty does not excuse EPA from its obligation to set permit limits where a discharge "causes, has a reasonable potential to cause, or contributes to an excursion above a narrative criterion." 40 CFR § 122.44(d)(1)(i). EPA also agrees that there is some uncertainty with respect to the precise numeric water quality criterion for nitrogen that "will attain and maintain applicable narrative water quality criteria and fully protect the designated use" as required pursuant to 40 CFR § 122.44(d)(1)(vi)(A), although such uncertainty is within a relatively narrow zone. As set forth in 40 CFR 122.44(d)(1)(vi):

> Where a State has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority **must** establish effluent limits using one or more of the following options . . ."

This obligation exists even where there is incomplete or uncertain information concerning the precise target that will meet the narrative criterion.

The Environmental Appeals Board has specifically held that "[i]n the face of unavoidable scientific uncertainty, the Region is authorized, if not required, to exercise reasonable discretion and judgment." *In re Dominion Energy Brayton Point, LLC,* 13 E.A.D. 407, 426 (EAB 2007). The federal courts in reviewing Agency decisions have similarly recognized that scientific uncertainty is not a bar to administrative decision making: "We do not demand certainty where there is none. There may be no strong reason for choosing [a particular numerical standard] rather than a somewhat higher or lower number. If so, we will uphold the agency's choice of a numerical standard if it is within a 'zone of reasonableness.'" *Small Refiner Lead Phase-Down Task Force v. EPA,* 705 F.2d 506, 525 (D.C. Cir. 1983) (citation omitted); *see also Hercules, Inc. v. EPA,* 598 F.2d 91, 116-17 (D.C. Cir. 1978). More than three decades ago, the D.C. Circuit aptly described the CWA's balance when confronted with a difficult situation and the obligation to eliminate water quality impairments: ". . . EPA may issue permits with conditions designed to reduce the level of effluent discharges to acceptable levels. This may well mean opting for a gross reduction in pollutant discharge rather than the fine-tuning suggested by numerical limitations. *But this ambitious statute is not hospitable to the concept that the appropriate response to a difficult pollution problem is not to try at all.*" *Natural Resources Defense Council, Inc. v. Costle,* 568 F.2d 1369, 1380 (D.C. Cir. 1977) (emphasis added) (finding unlawful a rule that would have

exempted certain discharges from permitting requirements based on the difficulty in setting limits).

EPA's approach examined the continuum of water quality conditions in the Taunton River Estuary and Mount Hope Bay to identify a transition point from impaired to unimpaired conditions. This approach is a form of reference-based approach and a similar approach has been widely applied in TMDLs developed under the MEP and approved by MassDEP and EPA. The results are consistent with ranges and thresholds for acceptable TN concentrations found in other estuaries within and outside of Massachusetts. Although this is a simplified approach that does not attempt to quantify individual subprocesses involved in eutrophication, it is entirely appropriate for assessing large scale nutrient load reductions over relatively long averaging periods. This is a scientifically defensible approach that is neither arbitrary nor capricious.

- That TN is the wrong parameter to regulate for DO control in short detention systems such as the Taunton River.

EPA used the SMAST data for its analysis because it is the only complete and consistently collected dataset available, was collected in accordance with MassDEP quality assurance procedures, and represents the best available information for this system. More recent data are limited in scope and have issues with intercomparability and do not provide the comprehensive data for all aspects of the system that is provided by the SMAST data. Table R1 in EPA's response to comment document of the final permit for the City of Taunton shows a comparison of the SMAST with the more recent datasets and indicates the relative strength of the SMAST data set in terms of scope of data collected, number of monitoring sites, and parameters monitored.

EPA's Fact Sheet includes a discussion of the 2010 monitoring data from the Narragansett Bay Water Quality Network fixed monitoring site in Mount Hope Bay, which indicates continued conditions of DO depletion, extended periods below 5.0 mg/l DO, and elevated chlorophyll at that location.

- The EPA's analysis is based on outdated information (a recurring theme).

See response for Data used in EPA's nutrient analysis.

- The assertion that the EPA has ignored the conceptual model of significant factors that affect DO and have not demonstrated that they are occurring in the Taunton River.

The question for permit limits is whether the nutrient discharges and the accompanying elevated algal population (clearly seen in the Taunton River Estuary) contribute to the problem or have reasonable potential do so. Given the well understood effect of nutrients on algal population and DO and the indicators that this mechanism is operative in this system, EPA's conclusion is amply supported and is neither presumption, speculation nor guesswork. EPA is not required to show that there are no other factors influencing DO in the Taunton River Estuary and indeed that would be impossible, as DO conditions are the result of interaction of a number of factors.

EPA also directs the Town of Bridgewater to the EPA Region 1 NPDES website at http://www.eparegion1/npdes/permits/2015.com/ for the entire response to comment document for the City of Taunton's NPDES permit. A copy of the City of Taunton's final permit may be reviewed at this website as well.

COMMENTS FROM WAYNE KLOCKNER, VICE_PRESIDENT AND MASSACHUSETTS STATE DIRECTOR AND TERRY SULLIVAN, RHODE ISLAND STATE DIRECTOR, THE NATURE CONSERVANCY, BOSTON, MASSACHUSETTS

COMMENT #8: Permit and Effluent Limits

The Nature Conservancy supports the draft NPDES permit, and we agree with EPA that these limits are necessary to achieve water quality standards in the Town River and downstream waterways, and that the limits are justified by the best available science. Requiring the Bridgewater facility and other dischargers to meet these new limits will help to protect and improve water quality in the Taunton River watershed and associated estuary. We view this permit as a key piece of a comprehensive and watershed-wide approach to restoring the environmental conditions of the Taunton River estuary.

The Taunton River is the longest free flowing coastal river in New England, with tidal influence reaching nearly 20 miles inland from Narragansett Bay. This extent of tidal influence maintains large, high quality, and globally rare brackish and freshwater tidal marshes. The river supports populations of environmentally-sensitive species such as river otters and freshwater mussels; three globally rare species of plants and two globally rare fish, bridle shiner and Atlantic sturgeon, inhabit the watershed. The Taunton River provides important habitat for one of the largest spawning populations of river herring in New England and populations of other fish that play a critical role in supporting marine food webs. The River was designated Wild and Scenic in 2009, to protect six outstanding resource values: agriculture, ecology and biodiversity, estuary, fisheries, history and archaeology, and recreation.

RESPONSE TO COMMENT #8

EPA acknowledges the comment and agrees with the importance of the habitats of the Taunton River and Narragansett Bay.

COMMENT #9: Total Nitrogen Limit

Nutrient pollution from wastewater is widely recognized as a major source of impairment for Narragansett Bay and other estuaries throughout the region. The Conservancy is committed to efforts to reduce reactive nitrogen levels in this region because of persistent problems related to excessive nitrogen including widespread algal blooms causing shellfish harvest closures, low dissolved oxygen levels, and loss of eelgrass.

From Nantucket Sound to Block Island Sound to Great South Bay, NY, The Nature Conservancy is investing in estuarine restoration focused on salt marsh, seagrass, oysters, bay scallops, hard clams, and diadromous fish habitat. However, monitoring and research have shown that to be truly effective at scale, restoration success requires improved water quality to support a diversity and abundance of native species and habitats. Limiting nitrogen from wastewater treatment facilities is a high priority for the Conservancy in our efforts to improve water quality and thus ecosystem health in the region's estuaries.

The Conservancy strongly supports the scientifically-derived 60 lbs/day total nitrogen seasonal limit described in the draft permit. As the draft permit describes, recent monitoring by the University of Massachusetts School for Marine Science and Technology (SMAST) has shown elevated total nitrogen concentrations in the Taunton River Estuary and Mount Hope Bay.

SMAST and Narragansett Bay Water Quality Network monitoring data have also shown other indicators of eutrophic condition, including low dissolved oxygen and elevated chlorophyll-a concentrations. Based on these data, EPA has concluded that excess nitrogen in the Taunton River Estuary and Mount Hope Bay has reached the level of a violation of state water quality standards for nutrients and aesthetics, and has subsequently determined a nitrogen limit is necessary to meet water quality requirements. The Bridgewater facility currently constitutes 3.1% of the total watershed nitrogen load; a 51% reduction in nitrogen from the watershed, allocated among several sources, is needed. We agree that a numerical limit on total nitrogen should be included in the permit, and commend the use of recent local data to determine the limit. The Nature Conservancy is also supportive of other source reductions and limits needed to reach the overall required load reduction, including reductions in nonpoint source pollution.

RESPONSE TO COMMENT #9

EPA acknowledges the comment and support from the Nature Conservancy on the need for the permit's total nitrogen limit.

COMMENT #10: Flow Limits

The Conservancy is supportive of measures to protect and restore the water balance in the Taunton River watershed, consistent with goals of the 2008/2011 Taunton River Watershed Study and the 2004 Massachusetts Water Policy. We encourage careful consideration of flow limits for wastewater treatment plants in the watershed, to restore water balance and promote groundwater recharge, as well as to maintain consistency with anti-degradation regulations to prevent increased discharge of pollutants to already impaired waters. Therefore, we support maintaining the current flow limit for the Bridgewater facility.

RESPONSE TO COMMENT #10

EPA acknowledges the comment from the Nature Conservancy. The flow limit in the draft permit has been carried forward to the final permit.

COMMENTS FROM LAWRENCE ROWLEY, INTERIM COMMISSIONER OF PUBLIC WORKS, BROCKTON, MASSACHUSETTS

COMMENT #11: In several locations within the fact sheet (e.g., Table 4 – pg. 28, Table 7 – pg. 34, Table 8 – pg. 35), the Design flow for The City's Advanced Water Reclamation Facility (MA0101010) is listed as 18.0. The City requests that this be corrected to reflect the actual, approved design flow of 20.5 MGD.

The City previously documented this increase in flow during its 2003 NPDES renewal process, in conjunction with planned improvements to the facility. The technical development for this flow increase is provided in the enclosed document titled *Design Memorandum W-1A,* dated July 17, 2003, which provided the basis-of-design flows and loads for the subsequent AWRF upgrade (including annual average day flow of 20.5 MGD, max day flow of 36 MGD, and peak hour flow of 60 MGD.) Further, an Environmental Notification Form was submitted in September 2003 to the Executive Office of Environmental Affairs, the response to which (EOEA #13109, attached) acknowledged the increased capacity from 18 million gallons per day (MGD) to 20.5 MGD, and stated that no Environmental Impact Report was required.

Subsequent to this process, a consent decree was initiated with the City on September 28, 2006, requiring comprehensive improvements to the AWRF and collection system, private inflow reduction, as well as several supplemental environmental projects. One of these environmental projects completed with the City's funding assistance and active participation, with MADEP and the regional planning agency, was a regional wastewater study for the Upper Taunton River watershed, which identified needs for wastewater collection and treatment for neighboring communities. A Notice of Project Change was submitted to the Executive Office of Energy and Environmental Affairs in October 2012, to reallocate available capacity under the acknowledged 20.5 MGD capacity. The EEA response (attached) indicates that the "project will not increase potential pollutant loading to the Taunton River" and "it will not increase environmental impacts."

The City respectfully requests that the supporting documents for The Town of Bridgewater's NPDES permit, and all subsequent related documents, be revised to reflect the correct, approved design flow of 20.5 MGD.

RESPONSE TO COMMENT #11

EPA is required to prepare a fact sheet for every draft permit to a major NPDES facility or for a draft permit that raises major issues according to 40 CFR 124.8. The fact sheet briefly documents the rationale and assumptions used in deriving the permit limits in a draft permit. A fact sheet is not revised after a draft permit is placed on public notice.

EPA acknowledges that the City of Brockton requests the design flow of the Brockton Advanced Water Pollution Control Facility's be stated in the fact sheet for the Bridgewater WWTP as 20.5 MGD. EPA also acknowledges the flow increase requested by the City of Brockton has not been shown to be consistent with MA SWQS and the flow increase has not been approved by the Agencies at this time.

COMMENTS FROM JONATHAN STONE, SAVE THE BAY, PROVIDENCE, RHODE ISLAND

COMMENT #12

Save The Bay is writing to support the draft discharge permit for the Town of Bridgewater's wastewater treatment plant. This permit will protect the health of the Taunton River and Narragansett Bay by decreasing nitrogen inputs to the estuary and phosphorus inputs to the Town River. It also maintains current effluent limits consistent with anti-degradation rules. Save The Bay supports continued work by watershed municipalities to fix and maintain existing infrastructure and to add infiltration capacity to reduce non-point source pollution.

Save The Bay strongly supports a total nitrogen limit of 5 mg/l and we feel the case for this limit was well articulated in the draft permit through the discussion of existing data. We support the findings that show a needed nitrogen load reduction of 51% overall. Low dissolved oxygen and high chlorophyll readings continue to impair the Taunton River estuary. In the absence of a TMDL and numeric criteria for total nitrogen, these other data represent important indicators of estuary health. We continue to support this approach for the Brockton facility as well, and look forward to seeing a new permit for that plant. Upcoming permit decisions for the cities of Taunton and Fall River will also be major factors. In the efforts to implement and achieve scientifically-based nutrient reductions of the Taunton River, Mount

Hope Bay and Narragansett Bay.

The Town River is an important tributary and a headwater stream that joins with the Matfield River to form the mainstem of the Taunton River. The Taunton River mainstem and estuary were designated as Wild & Scenic in 2009 because of their high quality habitat. The Taunton River is an important regional ecosystem supporting rare habitats and aquatic species. However, as the largest source of fresh water to Narragansett Bay, this river system contributes significant amounts of nutrients in the forms of nitrogen and phosphorus to the Mount Hope Bay estuary.

Habitat quality has increased significantly in Mount Hope Bay and Upper Narragansett Bay since the elimination of once-through cooling at Brayton Point Power. We are now seeing shellfish beds reopened in Swansea, the return of bay scallops, and an increase in fish habitat. But if eelgrass and other native species are to be restored in the Upper Bay. Algae blooms need to be reduced (as evidenced by high chlorophyll readings), and dissolved oxygen needs to maintain higher levels. Reduction in nitrogen from the Taunton River is necessary for this to happen.

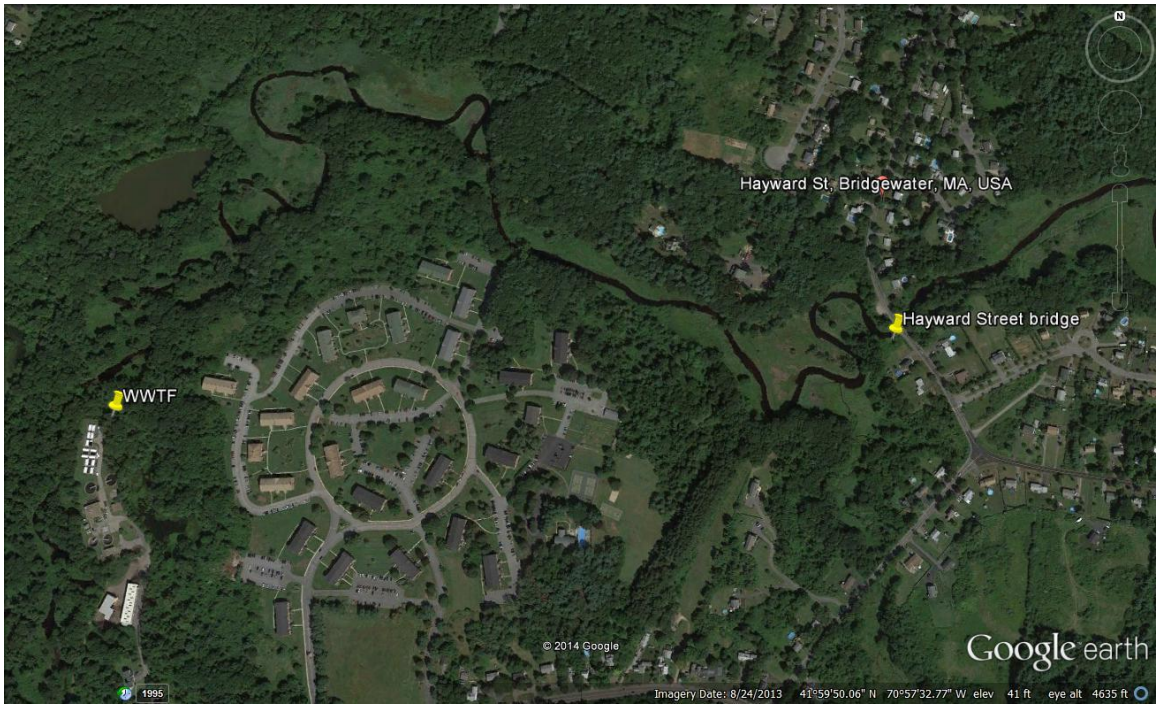
RESPONSE TO COMMENT #12

EPA acknowledges the comment and agrees with the commenter that nutrients in the Taunton River must be reduced to improve the water quality in Narragansett Bay. Please note that the effluent limitation for total nitrogen in the final permit has been set to a mass limit of 60 lbs/day.

COMMENTS FROM MARTA J. NOVER, PRESIDENT, TAUNTON RIVER WATERSHED ALLIANCE, INC., TAUNTON, MASSACHUSETTS

COMMENT #13: Eutrophication in the Taunton River

We are deeply concerned about documented conditions of eutrophication, including low dissolved oxygen levels, algae growth and growth of nuisance aquatic plants in the lower estuarine reaches of the Taunton River and in Mount Hope Bay. There is broad consensus that excessive loads of total phosphorus and total nitrogen are the primary cause of eutrophication of waterways, and that discharges from wastewater treatment facilities are a major source of these pollutants. The Bridgewater WWTF discharges effluent to the Town River at a point 2.4 miles upstream from the point where it joins the Matfield River to form the Taunton River mainstem. Attached are photos of the Town River taken by TRWA member Priscilla Chapman on Saturday, September 6, 2014 in the vicinity of the Hayward Street Bridge, downstream of the WWTF. The photos show green scum (algae) and luxuriant submerged aquatic life growth typical of eutrophication caused by excessive instream nutrient levels.[1]



TRWA supports the effluent limit for phosphorus discharge of 0.2 mg/l proposed in the Draft Permit for this facility. As explained in the Fact Sheet to accompany the Draft Permit,

the Environmental Protection Agency (EPA) determined that this limit is needed to meet the "Gold Book" criterion of 0.1 mg/l concentration after dilution in receiving waters. **TRWA also supports the proposed limit for total nitrogen of 60 lbs/day, in effect for the period of May through October, based on a discharge concentration of 5 mg/l.** In determining this limit, EPA analyzed nitrogen loads from all wastewater treatment plants in the Taunton River system and allocated proposed proportional reductions to each. In determining this allocation, EPA also recognized that stormwater and other sources that are not regulated under NPDES also contribute nutrients to the river. EPA assumed a 20% reduction of total nitrogen from those sources.

Background

The Taunton River is the largest freshwater source to Mount Hope Bay. It supports habitat for 45 species of fish, globally rare freshwater and brackish tidal marshes and, together with its tributary the Nemasket River, the largest alewife run in Massachusetts. It was added to the National Wild and Scenic Rivers System in 2009.

The Bridgewater WWTF has a design flow of 1.44 million gallons per day, and treats an average of 20,000 gallons of septage per day. As noted above, it discharges effluent to the Town River (segment MA-62-13) at a location 2.4 miles upstream from its conjunction with the Matfield River. The Town and Taunton Rivers are both classified as "Class B water, warm water fishery." Class B waters are designated as habitat for fish, other aquatic life and wildlife and for primary and secondary contact recreation (Massachusetts Surface Water Quality Standards, 314 CMR 4.05[3] [b]). The Town River is described in the Massachusetts 2012 Integrated List of Waters as "no uses assessed;" however downstream estuarine portions of the Taunton River are considered impaired for organic enrichment/low dissolved oxygen as well as for pathogens. Mount Hope Bay is impaired for Total Nitrogen, dissolved oxygen, temperature, fecal coliform and chlorophyll-a.

40 CFR 122.44 (d)(1)(i) of the federal Clean Water Act regulations requires EPA to establish limitations to control all pollutants which "are or may be discharged to waters of the United States at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." Based on the evidence of water quality violations downstream caused at least in part by excessive nutrient loading, **it is EPA's responsibility and nondiscretionary duty to establish effluent limits for total phosphorus and total nitrogen for the Bridgewater WWTF.**

Additional issues we would like to address include:

Schedule for Compliance

TRWA recognizes that compliance with the proposed discharge limits for phosphorus and total nitrogen will involve costs to Bridgewater and its residents. The Draft Permit for the Bridgewater WWTF proposes a five-year compliance schedule to meet the new limits. Given the relatively small size of the facility, TRWA believes this schedule is reasonable. We understand that a WWTF project is considered "unaffordable" by EPA if it will raise sewer user charges above 1 to 2% of the median household income in a municipality, and in those cases the agency will allow additional time for compliance.

We note that according to information from EPA, 24 municipal wastewater treatment plants in Massachusetts currently have a permitted Total Phosphorus effluent limit of 0.2 mg/l and 15 plants in Massachusetts have a permitted limit of 0.1 mg/l (see attached tables). In 2011, 12 municipal wastewater plants in Massachusetts achieved phosphorus discharge limits between

0.06 mg/l (Maynard) and 0.17 mg/l (Spencer) with average annual sewer fees ranging from $242 to $551. The average annual statewide household sewer rate is $510.

Massachusetts Municipal Wastewater Treatment Plants with Total Phosphorus Limit of 0.2 mg/l

	Facility	Receiving Water
1	Warehame	Agawam River
2	Rockland	French Stream (Atlantic Ocean)
3	Middlesex School	Spencer Brook (Assabet River)
4	Upton	West River (Blackstone River)
5	Northbridge	Unnamed brook (Blackstone River)
6	Charles River Pollution Control District (Medway-Franklin-Millis)	Charles River
7	Billerica	Concord River
8	Concord	Concord River
9	Leicester	Rawson Brook (French River)
10	Oxford Rochdale	French River
11	Webster	French River
12	Lee	Housatonic River
13	Fitchburg East	Nashua River
14	Leominster	Nashua River
15	Ayer	Nashua River
16	Templeton	Otter River (Millers River)
17	Templeton Developmental Center (state facility)	Otter River (Millers River)
18	Spencer	Cranberry Brook (Quaboag River)
19	North Brookfield	Dunn Brook (Quaboag River)
20	Southbridge	Quinebaug River
21	Sturbridge	Quinebaug River
22	Brockton	Salisbury Plain River (Taunton River)
23	Middleboro	Nemasket River (Taunton River)
24	Mansfield	Three Mile River (Taunton River)

Massachusetts Municipal Wastewater Treatment Plants with Total Phosphorus Limit of 0.1 mg/l

	Facility	Receiving Water
1	Westboro	Assabet River
2	Marlborough West	Assabet River
3	Hudson	Assabet River
4	Maynard	Assabet River
5	Milford	Charles River
6	Wrentham Developmental Center (state facility)	Stop River (Charles River)
7	MCI Norfolk (state facility)	Stop River (Charles River)
8	Medfield	Charles River
9	Pittsfield	Housatonic River
10	Gardner (0.12 mg/l)	Otter River (Millers River)
11	Marlborough East	Hop Brook (Sudbury River)

12	Wayland	Sudbury River
13	Charlton (0.12 mg/l)	Cadbury (Quinebaug River)
14	Attleboro	Ten Mile River
15	N. Attleboro	Ten Mile River

Water Quality Sampling and Analysis/Pollution Characterization

To support understanding of the nature and impact of the discharge from the WWTF on watershed pollution loadings, to assess progress achieving water quality standards and to provide information as necessary for effluent limitation development in future permit reissuance five years from now, TRWA requests that the final NPDES permit require the WWTF to implement an environmental monitoring program for the portions of the Town and Taunton Rivers that fall within Bridgewater's boundaries. We recommend that the program be undertaken in conjunction with the TRWA and other organizations interested in the water quality of the Taunton River system, with technical support provided by the WWTF. The program should include seasonal monthly collection and analysis of water samples at a minimum of 6 locations, including sites upstream and downstream of the WWTF on the Town River and at least one site on the Taunton River. Testing should include the following parameters: total suspended solids; nitrate; total phosphorus; dissolved oxygen; biochemical oxygen demand; fecal coliform.

The monitoring program should also include discharge measurements on the Town and Matfield Rivers prior to their conjunction to form the Taunton mainstem as well as evaluation of long-term trends of the Town's water pollution control efforts, preparation of seasonal report assessments of analytical results and preparations of an annual report. We note that similar requirements were included in the 1998 NPDES permit for the City of Taunton Wastewater Treatment Plant, pp. 26 and 27 of Exhibit 301.

Non-Point Source runoff

While TRWA strongly supports reductions in phosphorus and nitrogen discharge limits for wastewater treatment facilities, we recognize that significant loads of these pollutants enter the Taunton River and its tributaries as both NPDES regulated stormwater from municipal separate stormwater systems (MS4s) and stormwater runoff from non-NPDES regulated "non-point" sources. These sources include fertilizer applied to farmland, golf courses, and recreational fields and to lawns and gardens in residential and commercial areas, soap from car washes and animal excrement, among others. For the immediate term EPA's estimate of 20% reduction of nitrogen discharge from these sources is optimistic making it essential that the proposed permit limitations be viewed as the minimum level of stringency required. EPA indicates that the watershed dischargers will have to work hard to achieve these reductions or potentially face more stringent limitations in the future particularly as more land is developed in the watershed.

TRWA is committed to expanding our public outreach to municipalities, residents and business owners in the Taunton River Watershed to encourage better control of erosion and sedimentation, stormwater recharge, restoration of previously altered natural areas and reduction in use of fertilizer and other nitrogen- and phosphorus-based products. We urge EPA to move forward expeditiously with issuance of the Massachusetts Small MS4 NPDES stormwater general permit and initiatives to involve municipalities in developing plans to reduce the pollutant load and toxicity of stormwater runoff and the volume, through infiltration and other "low-impact development" techniques. We would welcome the opportunity to work in partnership with EPA and cities and towns in the watershed to address these issues in ways that lower future costs of

pollution control as well as the risks of flooding. We suggest that this NPDES permit require the Town to provide a public education and pollution prevention program to promote source and toxicity reduction from commercial and residential users. Since the permit effluent limitations for total nitrogen are based on a reduction in regulated and non-regulated stormwater nitrogen loads, this permit and those for the other permit holders in the watershed should require the permittee to report annually on their efforts and progress to encourage reductions in non-wastewater nitrogen loads from within their jurisdiction.

Conclusion

TRWA supports the effluent limit for phosphorus of 0.2 mg/l and the limit for total nitrogen of 60 lbs/day proposed in the Draft NPDES Permit for the Bridgewater WWTF. We urge EPA to retain the proposed limits in the final permit for this facility and we encourage an expeditious issuance of the permit. Thank you for considering these comments.

RESPONSE TO COMMENT #13

EPA agrees with the Taunton River Watershed Association (TRWA) that an overabundance of nutrients in the Taunton River Estuary and Mount Hope Bay are contributing to eutrophication in these waterbodies. EPA also agrees that a significant source of phosphorus and nitrogen is from the effluent discharged from POTWs and the attached photos effectively highlight the impact of nutrients in the Town River. EPA appreciates TRWA's support of the effluent limits in the Town's permit and the offer to work with EPA and municipalities to reduce pollutant discharges in the watershed.

The total phosphorus and total nitrogen limits are based on the requirements of the Clean Water Act, 40 Code of Federal Regulations (CFR) Parts 122, 131, 133 and the Massachusetts Surface Water Quality Standards at 314 CMR 4.05. EPA used effluent and ambient data available at the time the permit was being developed to establish the limits. The final permit retains the monthly average total phosphorus limit and the mass-based total nitrogen limit as well as the compliance schedule that was in the draft permit. EPA revised the monthly average total phosphorus limit in the final permit from a year round limit to a seasonal limit with a monitoring and reporting requirement for the months the limit is not in effect. EPA also changed the monthly average total nitrogen limit from a monthly average to a seasonal rolling average limit. This change is discussed in response to comment #2.

The TRWA requests the final permit include an environmental monitoring program for segments of the Town River, the Matfield River and Taunton River that are within the area of the POTW. The request includes ambient monitoring and reporting for several pollutant parameters upstream and downstream of the discharge, an assessment of the monitoring results, an evaluation of long-term trends of the facility's pollution control efforts and seasonal and annual reporting. EPA has included a requirement in the final permit for the permittee to conduct ambient monitoring and reporting upstream and downstream of the outfall for several parameters. The data will be used to review trends and develop total nitrogen and total phosphorus limits in subsequent permits issued to the Town. The final permit includes ambient monitoring and reporting requirements for total phosphorus, total nitrogen, dissolved oxygen, and river flow data from the USGS Bridgewater gage. EPA limited ambient monitoring requirements to parameters needed to determine future nutrient limits since the Taunton River Estuary and Mount Hope Bay are impaired for nutrients. Footnotes 10 and 11 in the final permit provide details on the ambient monitoring requirements.

EPA has not included ambient monitoring for BOD_5, TSS or fecal coliform as a requirement of the final permit. A review of DMR data shows the facility has been in compliance with these parameters for at least the past five years. The BOD_5 and TSS limits are based on a wasteload allocation and are more stringent than technology–based secondary treatment standards at 40 CFR 133.102. Regarding fecal coliform, the DMR data for fecal coliform shows compliance with the permit limits for the last several years. The limits for bacteria are based on MA SWQS at 314 CMR 4.05(b). EPA approved the Final Pathogen Total Maximum Daily Load (TMDL) report for the Taunton River Watershed in June 2011. The TMDL provides a framework to address bacteria and other fecal-related pollution in the watershed and prioritizes segments in the Taunton River that need to be addressed to reduce this pollutant.

EPA concurs with TRWA that nutrient loads from regulated and non-regulated non-point sources remain a significant source of pollutants contributing to nutrient impairments in the Taunton River Estuary. Efforts to reduce total nitrogen loading from these sources as well as from the POTW discharges are linked and EPA sees the benefit and opportunity in trading each of these sources in each of the municipalities.

EPA Region 1 and MassDEP signed the final NPDES General Permit for stormwater discharges from small municipal separate storm sewer systems (MS4s) on April 4, 2016. This permit becomes effective on July 1, 2017. The MS4 General Permit requires implementation of a Stormwater Management Plan (SWMP) and the permittee must provide an opportunity each year for the public to participate in the implementation of the SWMP. There may also be opportunities for TRWA to work in partnership with MS4 permittees on public education and outreach. EPA considers this permit the most appropriate NPDES permit at this time for TRWA to collaborate and partner with municipalities to address stormwater impacts from total nitrogen. The final general permit can be viewed at: https://www.gpo.gov/fdsys/pkg/FR-2016-04-13/pdf/2016-08503.pdf.

During the term of the Town's NPDES permit, EPA will be monitoring the effectiveness of the MS4 General Permit along with the non-point source programs in Bridgewater and other municipalities to verify the assumption of a 20% reduction in the nitrogen load to waterbodies from stormwater and non-regulated non-point sources discharges. The validity of the 20% assumption will be an important factor in reassessing whether nutrient limits in future POTW permits fulfill the requirements of the Clean Water Act.