

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),

**Town of Northbridge**

is authorized to discharge from the facility located at

**Wastewater Treatment Plant  
644 Providence Road  
Whitinsville, MA 01588**

to receiving water named

**Unnamed Tributary to the Blackstone River**

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 and the authorization to discharge expire at midnight, five (5) years from the effective date.

This permit supersedes the permit issued on September 13, 2006

This permit consists of 15 pages in Part I including effluent limitations, monitoring requirements, and state permit conditions, Attachment A – Freshwater Chronic Toxicity Test Procedure and Protocol (May 2007), and 25 pages in Part II, Standard Conditions.

Signed this 27<sup>th</sup> day of June, 2013.

/S/ SIGNATURE ON FILE

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

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

## PART I

A.1. During the period beginning on the effective date and lasting through expiration, the permittee is authorized to discharge treated wastewater from outfall <b>001</b> to an unnamed tributary to the Blackstone River. Such discharges shall be limited and monitored by the permittee as specified below.							
<u>EFFLUENT CHARACTERISTIC</u>		<u>EFFLUENT LIMITS</u>			<u>MONITORING REQUIREMENTS<sup>2</sup></u>		
<u>PARAMETER</u>	<u>AVERAGE MONTHLY</u>	<u>AVERAGE WEEKLY</u>	<u>AVERAGE MONTHLY</u>	<u>AVERAGE WEEKLY</u>	<u>MAXIMUM DAILY</u>	<u>MEASUREMENT FREQUENCY</u>	<u>SAMPLE TYPE</u>
FLOW <sup>1</sup>	****	****	2.0 MGD	****	Report MGD	CONTINUOUS	RECORDER
FLOW <sup>1</sup>	****	****	Report MGD	****	*****	CONTINUOUS	RECORDER
BOD <sub>5</sub> <sup>3</sup>	167 lbs/Day	167 lbs/Day	10 mg/l	10 mg/l	Report mg/l	3/WEEK	24-HR COMPOSITE <sup>4</sup>
TSS <sup>3</sup>	167 lbs/Day	167 lbs/Day	10 mg/l	10 mg/l	Report mg/l	3/WEEK	24-HR COMPOSITE <sup>4</sup>
pH RANGE <sup>5</sup>	6.5 - 8.3 SU (SEE PERMIT PARAGRAPH I.A.1.b.)					1/DAY	GRAB
ESCHERICHIA COLI <sup>5,6</sup> (April 1 to October 31)	****	*****	126 cfu/100 ml	****	409 cfu/100 ml	3/WEEK	GRAB
ENTEROCOCCI <sup>6,7</sup>	****	*****	108 cfu/100 ml	****	350 cfu/100 ml	1/WEEK	GRAB
TOTAL COPPER	****	*****	22 ug/l	****	32 ug/l	1/MONTH	24-HR COMPOSITE <sup>4</sup>
TOTAL ZINC	****	*****	58 ug/l	****	58 ug/l	1/MONTH	24-HR COMPOSITE <sup>4</sup>
TOTAL LEAD <sup>8</sup>	****	*****	0.9 ug/l	****	Report ug/l	1/MONTH	24-HR COMPOSITE <sup>4</sup>
TOTAL CADMIUM <sup>8</sup>	****	*****	0.16 ug/l	****	0.94 ug/l	1/MONTH	24-HR COMPOSITE <sup>4</sup>
TOTAL ALUMINUM	****	*****	87 ug/l	****	844 ug/l	1/MONTH	24-HR COMPOSITE <sup>4</sup>
DISSOLVED OXYGEN <sup>5</sup> (April 1 <sup>st</sup> -October 31 <sup>st</sup> )	NOT LESS THAN 5.0 mg/l					1/DAY	GRAB

Sampling location: After discharge from ultraviolet disinfection and prior to discharge to the unnamed tributary to the Blackstone River

## CONTINUED FROM PREVIOUS PAGE

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<u>EFFLUENT CHARACTERISTIC</u>		<u>EFFLUENT LIMITS</u>				<u>MONITORING REQUIREMENTS<sup>2</sup></u>	
PARAMETER	AVERAGE MONTHLY	AVERAGE WEEKLY	AVERAGE MONTHLY	AVERAGE WEEKLY	MAXIMUM DAILY	MEASUREMENT FREQUENCY	SAMPLE TYPE
AMMONIA-NITROGEN (May 1 - October 31)	33.4 lbs/Day	66.7 lbs/Day	2 mg/l	4 mg/l	Report mg/l	1/WEEK	24-HR COMPOSITE <sup>4</sup>
AMMONIA-NITROGEN (November 1 - April 30)	150 lbs/Day	300 lbs/Day	9 mg/l	18 mg/l	Report mg/l	1/WEEK	24-HR COMPOSITE <sup>4</sup>
TOTAL PHOSPHORUS <sup>13</sup> (April 1 - October 31)	3.3 lbs/Day	****	0.2 mg/l	****	Report mg/l	2/WEEK	24-HR COMPOSITE <sup>4</sup>
TOTAL PHOSPHORUS <sup>13</sup> (November 1 - March 31)	16.7 lbs/Day	****	1.0 mg/l	****	Report mg/l	2/MONTH	24-HR COMPOSITE <sup>4</sup>
ORTHO PHOSPHORUS <sup>13</sup> (November 1 - March 31)	Report lbs/Day	****	Report mg/l	****	Report mg/l	2/MONTH	24-HR COMPOSITE <sup>4</sup>
TOTAL NITROGEN <sup>14</sup> (May 1 - October 31)	133 lbs/Day	****	8 mg/l	****	Report mg/l	1/WEEK	24-HR COMPOSITE <sup>4</sup>
TOTAL KJELDAHL NITROGEN	Report lbs/Day	****	Report mg/l	****	Report mg/l	1/WEEK	24-HR COMPOSITE <sup>4</sup>
TOTAL NITRATE + NITRITE	Report lbs/Day	****	Report mg/l	****	Report mg/l	1/WEEK	24-HR COMPOSITE <sup>4</sup>
WHOLE EFFLUENT TOXICITY <sup>9, 10, 11, 12</sup>	Acute LC <sub>50</sub> ≥ 100% Chronic C-NOEC ≥ 83%					4/YEAR	24-HR COMPOSITE <sup>4</sup>
Hardness <sup>15</sup>	***	***	***	***	Report mg/l	4/YEAR	24-HR COMPOSITE <sup>4</sup>
Ammonia Nitrogen as N <sup>15</sup>	***	***	***	***	Report mg/l	4/YEAR	24-HR COMPOSITE <sup>4</sup>
Total Recoverable Aluminum <sup>15</sup>	***	***	***	***	Report mg/l	4/YEAR	24-HR COMPOSITE <sup>4</sup>
Total Recoverable Cadmium <sup>15</sup>	***	***	***	***	Report mg/l	4/YEAR	24-HR COMPOSITE <sup>4</sup>
Total Recoverable Copper <sup>15</sup>	***	***	***	***	Report mg/l	4/YEAR	24-HR COMPOSITE <sup>4</sup>
Total Recoverable Nickel <sup>15</sup>	***	***	***	***	Report mg/l	4/YEAR	24-HR COMPOSITE <sup>4</sup>
Total Recoverable Lead <sup>15</sup>	***	***	***	***	Report mg/l	4/YEAR	24-HR COMPOSITE <sup>4</sup>
Total Recoverable Zinc <sup>15</sup>	***	***	***	***	Report mg/l	4/YEAR	24-HR COMPOSITE <sup>4</sup>

## Footnotes:

1. 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.
2. 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.

3. Sampling required for influent and effluent.
4. 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.
5. Required for Massachusetts State Certification.
6. The monthly average limits for E. coli and enterococci are expressed as a geometric means.
7. The enterococci limits are a requirement of the U. S. EPA permit and are not a requirement of the Massachusetts Department of Environmental Protection (MassDEP) permit. The enterococci sample shall be collected concurrently with one of the E.coli samples during the April to October period. After a minimum of one year, the permittee may request reduction of enterococci monitoring to winter only, if the monitoring data demonstrates that compliance with the E.coli limit is adequate to ensure compliance with the enterococcus limit. The request shall be made in writing to EPA and shall include all concurrent monitoring data collected by the permittee. The permittee shall continue sampling for both E.coli and enterococci between April and October until receiving written approval of its request from EPA.
8. The minimum level (ML) for lead and cadmium is defined as 0.5 ug/l. This value is the minimum level for this metal using the Furnace Atomic Absorption analytical method (EPA Method 220.2). Compliance or non-compliance with the average monthly cadmium limit will be determined based on the ML from this method, or another approved method that has an equivalent or lower ML, one of which must be used.

Sample results of 0.5 ug/l or less shall be reported in accordance with the DMR instructions. The effluent metals sampling from the WET testing may be used to help satisfy these monitoring requirements.

9. The permittee shall conduct chronic (and modified acute) toxicity tests *four* times per year. The chronic test may be used to calculate the acute LC<sub>50</sub> at the 48 hour exposure interval. The permittee shall test the daphnid, *Ceriodaphnia dubia*, only. Toxicity test samples shall be collected during the months of January, April, July and October. The test results shall be submitted by the last day of the month following the completion of the test. The results are due February 28, May 31, August 31 and November 30, respectively. The tests must be performed in accordance with test procedures and protocols specified in **Attachment A** of this permit.

Test Dates Second Week in	Submit Results By:	Test Species	Acute Limit LC <sub>50</sub>	Chronic Limit C-NOEC
January April July October	February 28 May 31 August 31 November 30	<i>Ceriodaphnia dubia</i> (daphnid)	≥ 100%	≥ 83%

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.

10. The LC<sub>50</sub> is the concentration of effluent which causes mortality to 50% of the test organisms. Therefore, a 100% limit means that a sample of 100% effluent (no dilution) shall cause no more than a 50% mortality rate.
11. 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 83% or greater" limit is defined as a sample which is composed of 83% (or greater) effluent, the remainder being dilution water.

12. The permittee may use laboratory water as diluent and such diluent shall have characteristics such as hardness, pH, conductivity, alkalinity, organic carbon, and total suspended solids similar to those of the receiving water and shall not elicit a toxic response. Alternate dilution water tests must be run with a minimum of two controls: a receiving water (unnamed tributary to the Blackstone River) control and a toxic free alternate dilution water control. Permittee shall resume use of receiving water as diluent if directed by EPA or MassDEP.
13. The maximum daily value must be reported for each month. Consistent with Section B.1 of Part II of the Permit, the Permittee shall properly operate and maintain the phosphorus removal facilities in order to obtain the lowest effluent concentration possible. The maximum daily concentration values reported for ortho phosphorus shall be the values from the same day that the maximum daily total phosphorus concentration values were measured.
14. The nitrogen requirements are conditions of the U.S. Environmental Protection Agency (EPA) permit and are not requirements of the MassDEP permit. Sampling must be conducted and reported as specified, beginning on the effective date of the permit. The permittee shall operate the treatment facility to reduce the discharge of total nitrogen during the months of November to April to the maximum extent possible, using all available treatment equipment in place at the facility. The total nitrogen values will be calculated by adding the results of the nitrite and nitrate nitrogen and the total Kjeldahl nitrogen sampling. 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.
15. For each whole effluent toxicity test, the permittee shall report on the appropriate discharge monitoring report (DMR), the concentrations of the hardness, ammonia nitrogen as nitrogen, total recoverable aluminum, cadmium, copper, lead, nickel, and zinc found in the 100 percent effluent sample. All these aforementioned chemical parameters shall be determined to at least the minimum quantification level shown in **Attachment A**. Also the permittee should note that all chemical parameter results must still be reported in the appropriate toxicity report.

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

- a. The discharge shall not cause a violation of the water quality standards of the receiving waters.
- b. The pH of the effluent shall not be less than 6.5 or greater than 8.3 at any time.
- c. The discharge shall not cause objectionable discoloration of the receiving waters.
- d. The effluent shall not contain a visible oil sheen, foam, or floating solids at any time.

- e. The permittee's treatment facility shall maintain a minimum of 85 percent removal of both total suspended solids and biochemical oxygen demand. The percent removal shall be based on monthly average values.
  - f. The results of sampling for any parameter done in accordance with EPA approved methods above its required frequency must also be reported.
  - g. If the average annual flow in any calendar year exceeds 80 percent of the facility's design flow, the permittee shall submit a report to MassDEP by March 31 of the following calendar year describing its plans for further flow increases and describing how it will maintain compliance with the flow limit and all other effluent limitations and conditions.
2. All POTWs must provide adequate notice to the Director of the following:
- a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the Clean Water Act if it were directly discharging those pollutants; and
  - b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
  - c. For purposes of this paragraph, adequate notice shall include information on:
    - (1) The quantity and quality of effluent introduced into the POTW; and
    - (2) Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.
3. Prohibitions Concerning Interference and Pass Through:
- a. Pollutants introduced into POTW's by a non-domestic source (user) shall not pass through the POTW or interfere with the operation or performance of the works.
4. Toxics Control
- a. The permittee shall not discharge any pollutant or combination of pollutants in toxic amounts.
  - b. Any toxic components of the effluent shall not result in any demonstrable harm to aquatic life or violate any state or federal water quality standard which has been or may be promulgated. Upon promulgation of any such standard, this permit may be revised or amended in accordance with such standards.
5. Numerical Effluent Limitations for Toxicants

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

## **B. UNAUTHORIZED DISCHARGES**

The permittee is authorized to discharge only in accordance with the terms and conditions of this permit and only from the outfall(s) listed in Part I A.1. 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 MassDEP Regional Office telephone numbers). The reporting form and instruction for its completion may be found on-line at <http://www.mass.gov/dep/water/approvals/surffms.htm#sso>.

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

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

### **1. Maintenance Staff**

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

### **2. Preventive Maintenance Program**

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

### **3. Infiltration/Inflow**

The permittee shall control infiltration and inflow (I/I) into the sewer system as necessary



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

4. Collection System Mapping

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

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

5. Collection System Operation and Maintenance Plan

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

- a. Within six (6) months of the effective date of the permit, the permittee shall submit to EPA and MassDEP
  - (1) A description of the collection system management goals, staffing, information management, and legal authorities;
  - (2) A description of the collection system and the overall condition of the collection system including a list of all pump stations and a description of recent studies and construction activities; and

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

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

- a. A description of the staffing levels maintained during the year;
- b. A map and a description of inspection and maintenance activities conducted and corrective actions taken during the previous year;
- c. Expenditures for any collection system maintenance activities and corrective actions taken during the previous year;
- d. A map with areas identified for investigation/action in the coming year;

- e. If treatment plant flow has reached 80% of its design flow (1.6 MGD) based on the annual average flow during the reporting year, or there have been capacity related overflows, submit a calculation of the maximum daily, weekly, and monthly infiltration and the maximum daily, weekly, and monthly inflow for the reporting year; and
- f. A summary of unauthorized discharges during the past year and their causes and a report of any corrective actions taken as a result of the unauthorized discharges reported pursuant to the Unauthorized Discharges section of this permit.

7. Alternate Power Source

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

**D. SLUDGE CONDITIONS**

1. 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

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

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

Which of the 40 CFR 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.<sup>2</sup>

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

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<sup>2</sup> 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>

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.

## **E. MONITORING AND REPORTING**

1. **For a period of one year from the effective date of the permit**, the permittee may either submit monitoring data and other reports to EPA in hard copy form or report electronically using NetDMR, a web-based tool that allows permittees to electronically submit discharge monitoring reports (DMRs) and other required reports via a secure internet connection. **Beginning no later than one year after the effective date of the permit**, the permittee shall begin reporting using NetDMR, unless the facility is able to demonstrate a reasonable basis that precludes the use of NetDMR for submitting DMRs and reports. Specific requirements regarding submittal of data and reports in hard copy form and for submittal using NetDMR are described below:

- a. Submittal of Reports Using NetDMR

NetDMR is accessed from: <http://www.epa.gov/netdmr>. **Within one year of the effective date of this permit**, the permittee shall begin submitting DMRs and reports required under this permit electronically to EPA using NetDMR, unless the facility 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”).

DMRs shall be submitted electronically to EPA no later than the 15th day of the month following the completed reporting period. All reports required under the permit shall be submitted to EPA, including the MassDEP Monthly Operations and Maintenance Report, as an electronic attachment to the DMR. Once a permittee begins submitting reports using NetDMR, it will no longer be required to submit hard copies of DMRs or other reports to EPA and will no longer be required to submit hard copies of DMRs to MassDEP. However, permittees shall continue to send hard copies of reports other than DMRs (including Monthly Operation and Maintenance Reports) to MassDEP until further notice from MassDEP.

- b. Submittal of NetDMR Opt-Out Requests

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 is 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, 2<sup>nd</sup> Floor**  
**Worcester, Massachusetts 01608**

c. Submittal of Reports in Hard Copy Form

Monitoring results shall be summarized for each calendar month and reported on separate hard copy Discharge Monitoring Report Form(s) (DMRs) postmarked no later than the 15<sup>th</sup> day of the month following the completed reporting period. All reports required under this permit, including MassDEP Monthly Operation and Maintenance Reports, shall be submitted as an attachment to the DMRs. Signed and dated originals of the DMRs, and all other reports or notifications required herein or in Part II shall be submitted to the Director at the following address:

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

Duplicate signed copies of all reports or notifications required above shall be submitted to the State at the following addresses:

**MassDEP – Central Region**  
**Bureau of Resource Protection**  
**627 Main Street**  
**Worcester, MA 01608**

Copies of toxicity tests and nitrogen optimization reports only to:

**Massachusetts Department of Environmental Protection**  
**Surface Water Discharge Permit Program**

**627 Main Street, 2<sup>nd</sup> Floor  
Worcester, Massachusetts 01608**

Any verbal reports, if required in **Parts I** and/or **II** of this permit, shall be made to both EPA-New England and to MassDEP.

**F. STATE PERMIT CONDITIONS**

1. This authorization to discharge includes two separate and independent permit authorizations. The two permit authorizations are (i) a federal National Pollutant Discharge Elimination System permit issued by the U.S. Environmental Protection Agency (EPA) pursuant to the Federal Clean Water Act, 33 U.S.C. §§1251 et seq.; and (ii) an identical state surface water discharge permit issued by the Commissioner of the Massachusetts Department of Environmental Protection (MassDEP) pursuant to the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and 314 C.M.R. 3.00. All of the requirements contained in this authorization, as well as the standard conditions contained in 314 CMR 3.19, are hereby incorporated by reference into this state surface water discharge permit.
2. This authorization also incorporates the state water quality certification issued by MassDEP under § 401(a) of the Federal Clean Water Act, 40 C.F.R. 124.53, M.G.L. c. 21, § 27 and 314 CMR 3.07. All of the requirements (if any) contained in MassDEP's water quality certification for the permit are hereby incorporated by reference into this state surface water discharge permit as special conditions pursuant to 314 CMR 3.11.
3. Each agency shall have the independent right to enforce the terms and conditions of this permit. Any modification, suspension or revocation of this permit shall be effective only with respect to the agency taking such action, and shall not affect the validity or status of this permit as issued by the other agency, unless and until each agency has concurred in writing with such modification, suspension or revocation. In the event any portion of this permit is declared invalid, illegal or otherwise issued in violation of state law such permit shall remain in full force and effect under federal law as a NPDES Permit issued by the U.S. Environmental Protection Agency. In the event this permit is declared invalid, illegal or otherwise issued in violation of federal law, this permit shall remain in full force and effect under state law as a permit issued by the Commonwealth of Massachusetts.

# **FRESHWATER CHRONIC TOXICITY TEST PROCEDURE AND PROTOCOL USEPA Region 1**

## **I. GENERAL REQUIREMENTS**

The permittee shall be responsible for the conduct of acceptable chronic (and modified acute) 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 and modified acute toxicity data shall be reported as outlined in Section VIII. The chronic fathead minnow and daphnid test data can be used to calculate an LC50 at the end of 48 hours of exposure when both acute (LC50) and chronic (C-NOEC) test endpoints are specified in the permit.

## **II. METHODS**

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

## **III. SAMPLE COLLECTION AND USE**

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

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



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

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

#### IV. DILUTION WATER

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

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

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

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

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

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

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

Director  
Office of Ecosystem Protection (CAA)  
U.S. Environmental Protection Agency-New England  
One Congress St., Suite 1100  
Boston, MA 02114-2023

and

Manager  
Water Technical Unit (SEW)  
U.S. Environmental Protection Agency  
One Congress Street, Suite 1100  
Boston, MA 02114-2023

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

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

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

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

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

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

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

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

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

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

In the case where concurrent reference toxicity testing is required due to a low frequency of testing with a particular method, if the reference toxicity test results fall slightly outside of laboratory established control limits, but the primary test met the TAC, the results of the primary test will be considered acceptable. However, if the results of the concurrent test fall well outside the established **upper** control limits i.e.  $\geq 3$  standard deviations for IC25s and LC50 values and  $\geq$  two concentration intervals for NOECs or NOAECs, and even though the primary test meets TAC, the primary test will be considered unacceptable and must be repeated.

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

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

## VI. CHEMICAL ANALYSIS

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

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

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

Other as permit requires

#### Notes:

1. Hardness may be determined by:

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

## VII. TOXICITY TEST DATA ANALYSIS AND REVIEW

### A. Test Review

#### 1. Concentration / Response Relationship

A concentration/response relationship evaluation is required for test endpoint determinations from both Hypothesis Testing and Point Estimate techniques. The test report is to include documentation of this evaluation in support of the endpoint values reported. The dose-response review must be performed as required in Section 10.2.6 of EPA-821-R-02-013. Guidance for this review can be found at

<http://www.epa.gov/y-cvgtuekgpeglo-gvj-qf-uly-gvlf-hly-gvi-wkf-g0fh>. In most cases, the review will result in one of the following three conclusions: (1) Results are reliable and reportable; (2) Results are anomalous and require explanation; or (3) Results are inconclusive and a retest with fresh samples is required.

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

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

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

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

## B. Statistical Analysis

### 1. General - Recommended Statistical Analysis Method

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

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

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

### 2. *Pimephales promelas*

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

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

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

### 3. *Ceriodaphnia dubia*

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

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

## VIII. TOXICITY TEST REPORTING

A report of results must include the following:

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

In addition to the summary sheets the report must include:

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

# NPDES PART II STANDARD CONDITIONS

(January, 2007)

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NPDES PART II STANDARD CONDITIONS  
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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.



## NPDES PART II STANDARD CONDITIONS

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### 4. Reopener Clause

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

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

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

### 5. Oil and Hazardous Substance Liability

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

### 6. Property Rights

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

### 7. Confidentiality of Information

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

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### 8. Duty to Reapply

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

### 9. State Authorities

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

### 10. Other Laws

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

## PART II. B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

### 1. Proper Operation and Maintenance

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

### 2. Need to Halt or Reduce Not a Defense

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

### 3. Duty to Mitigate

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

### 4. Bypass

#### a. Definitions

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

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

### b. Bypass not exceeding limitations

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

### c. Notice

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

### d. Prohibition of bypass

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

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

## 5. Upset

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

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

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

### PART II. C. MONITORING REQUIREMENTS

#### 1. Monitoring and Records

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

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

### 2. Inspection and Entry

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

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

## PART II. D. REPORTING REQUIREMENTS

### 1. Reporting Requirements

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

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

- d. Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this permit.
  - (1) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices.
  - (2) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of the monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.
  - (3) Calculations for all limitations which require averaging or measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.
- e. Twenty-four hour reporting.
  - (1) The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances.

A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
  - (2) The following shall be included as information which must be reported within 24 hours under this paragraph.
    - (a) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR §122.41(g).)
    - (b) Any upset which exceeds any effluent limitation in the permit.
    - (c) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Regional Administrator in the permit to be reported within 24 hours. (See 40 CFR §122.44(g).)
  - (3) The Regional Administrator may waive the written report on a case-by-case basis for reports under Paragraph D.1.e. if the oral report has been received within 24 hours.

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

### 2. Signatory Requirement

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

### 3. Availability of Reports.

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

## PART II. E. DEFINITIONS AND ABBREVIATIONS

### 1. Definitions for Individual NPDES Permits including Storm Water Requirements

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

*Discharge of a pollutant* means:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

*Waters of the United States* means:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

*Range land* is open land with indigenous vegetation.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### 3. Commonly Used Abbreviations

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

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

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

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NEW ENGLAND - REGION I  
5 POST OFFICE SQUARE, SUITE 100  
BOSTON, MASSACHUSETTS 02109-3912**

**FACT SHEET**

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

NPDES PERMIT NUMBER: **MA0100722**

PUBLIC NOTICE START AND END DATES: September 25, 2012 – October 24, 2012

NAME AND MAILING ADDRESS OF APPLICANT:

**Town of Northbridge  
Department of Public Works  
7 Main Street  
Whitinsville, MA 01588**

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

**Wastewater Treatment Plant  
644 Providence Road  
Whitinsville, MA 01588**

RECEIVING WATER: **Unnamed Tributary to the Blackstone River**  
USGS Hydrologic Code #01090003 – Blackstone River Watershed (51)

RECEIVING WATER CLASSIFICATION(S): **Class B – warm water fishery**



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### **Attachments:**

Attachment A. Mass Limit Calculations

Attachment B. Delivery Factors

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

The above named applicant has applied to the U.S. Environmental Protection Agency ("EPA") for the reissuance of its NPDES permit to discharge into the designated receiving water. The facility is engaged in the collection and treatment of domestic wastewater. The discharge from this wastewater treatment facility is via Outfall 001 to an unnamed tributary to the Blackstone River.

## **II. Description of Treatment System and Discharges**

A quantitative description of the wastewater treatment plant discharge in terms of significant effluent parameters based on recent monitoring data is shown in **Table 1**. **Figure 1** shows the geographical location, and **Figure 2** shows the flow process diagram of the Northbridge Wastewater Treatment Plant (WWTP).

The Northbridge WWTP is a 2.0 million gallon per day (MGD) advanced wastewater treatment facility, which serves a population of about 10,000. There is currently one industrial user, Riverdale Mills, that discharges to the WWTP. The collection system consists of separate sanitary sewers and there are no known combined sewers or combined sewer overflows.

The WWTP utilizes a sequencing batch reactor (SBR) treatment process as shown in Figure 2. A channel monster first shreds any coarse sewage solids and other materials. Flow is measured and influent composite sampling occurs at this point for applicable parameters. The wastewater then passes through a bar screen, which is manually cleaned, then to two rectangular primary clarifiers, which settle out sludge and remove floating scum. Flows from these clarifiers are then pumped to the SBRs. Prior to the SBRs, alum is added for phosphorus removal and soda ash for pH control. In the SBRs a batch activated sludge process that combines treatment and sedimentation is used to remove pollutants. Treated wastewater is then discharged by gravity to the equalization tank. If effluent quality is not satisfactory, the permittee has the option of diverting the SBR effluent to the on-site sand filter beds for further solids removal, rather than discharging to the equalization tank. Normally, this bypass line is closed and all decanted SBR effluent is pumped to the equalization tank. From the equalization tank (or sand filter beds, if used), treated wastewater flows to the UV system for disinfection. At this point flow is measured by a magnetic flow meter and effluent composite sampling and grab sampling occurs. A flow control valve is used to assure that there is sufficient detention time for the effluent that passes through the UV system.

## **III. Receiving Water Description**

The Northbridge WWTP treated effluent is discharged to an unnamed tributary, which flows through a wetland area to the Blackstone River. The Blackstone River is an interstate water that has its headwaters in Worcester. It flows south through Millbury, Sutton, Grafton, Northbridge, Uxbridge, Millville and Blackstone to the state line with Rhode Island, approximately eleven miles downstream of Northbridge. The river then flows through Rhode Island to Pawtucket, where the Slater Mill Dam marks the boundary with the marine waters of the Seekonk River, the

uppermost segment of Narragansett Bay. The Seekonk River joins the Providence River, which then flows into the main body of Narragansett Bay. The Seekonk and Providence Rivers are estuaries and are classified as marine waters. The Blackstone River has a number of dams and related impoundments along its length.

The unnamed tributary at the point of discharge is classified as a Class B waterbody by the Massachusetts Department of Environmental Protection (MassDEP). The Blackstone River, from its source to the Rhode Island border, is classified as a Class B Warm Water Fishery. Designated uses for Class B waters include habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary (e.g., swimming) and secondary (e.g., fishing and boating) contact recreation. *See* 314 CMR 4.05(3)(b) and 4.06 (Table 11). Such waters must have consistently good aesthetic value.

Rhode Island has classified the Blackstone River as a Class B1 water from the Massachusetts border to the Central Falls CSO outfall, and as a Class B1 {a} water from the CSO outfall to the Seekonk River. The Seekonk River is designated as a Class SB1 water from the Blackstone to the confluence with the Providence River. The Providence River has been designated as a Class SB1 {a} water from its confluences with the Seekonk and two other tributaries until a boundary extending between Warwick and East Providence, and a Class SB{a} water from that point until it reaches the Upper Narragansett Bay segment. Rhode Island Water Quality Regulations, July 2006, amended December 2009 (“RI WQR”), Appendix A.

Rhode Island Class B1 waters’ designated uses include primary and secondary recreational uses and fish and wildlife habitat, except that primary contact recreational uses may be impacted by pathogens from approved wastewater discharges. RI WQR at Rule 8.B(1)(d). Rhode Island Class SB waters’ designated uses include primary and secondary contact recreation; fish and wildlife habitat; shellfish harvesting; and must have good aesthetic value. *Id.* at Rule 8(B)(2)(b). Class SB1 waters share the same designated uses as Class SB, with the exception of shellfish harvesting. *Id.* at Rule 8(B)(2)(c). The {a} designation indicates partial use due to impacts from CSOs. RI WQR, Appendix A.

The Blackstone River is listed on the *Massachusetts Year 2010 Integrated List of Waters* (the MA 303(d) list) as a water that is impaired (not meeting water quality standards) and requiring one or more Total Maximum Daily Loads (TMDLs). The segment of the Blackstone River that receives the Northbridge WWTP discharge, Segment MA51-04, is listed for impairments caused by unknown toxicity, priority organics, metals, nutrients, pH, flow alteration, pathogens, taste/odor/color, suspended solids and turbidity. The Blackstone River in Rhode Island is listed on Rhode Island’s *2010 303(d) List of Impaired Waters* for impairments caused by cadmium, lead, total phosphorus, dissolved oxygen, fecal coliform, enterococcus, mercury and PCB in fish tissue, and benthic macroinvertebrate bioassessments (as well as non-native plant impairments not caused by pollutants). The Seekonk and Providence Rivers are listed for impairments caused by total nitrogen, low dissolved oxygen, and fecal coliform.

No TMDLs have been completed for these pollutants in either Massachusetts or Rhode Island. However extensive work has been completed to document and analyze these impairments, as set forth in the discussion of effluent limits derivation below.

#### **IV. Limitations and Conditions**

The effluent limitations and all other requirements described in Part VI 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 Clean Water Act. 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 Massachusetts Surface Water Quality Standards (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 Clean Water Act 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. Explanation of Permit's Effluent Limitations**

### **A. Basis of current permit limits**

The current permit was issued on September 13, 2006, and incorporated limits for biochemical oxygen demand (BOD<sub>5</sub>), carbonaceous oxygen demand (CBOD), total suspended solids (TSS), and ammonia nitrogen based on a waste load allocation (WLA) set forth in *Blackstone River Watershed Dissolved Oxygen Waste Load Allocation for Massachusetts and Rhode Island* (November 1997). This WLA was based on a dissolved oxygen (DO) mathematical model developed by the University of Rhode Island and funded by the EPA, the MassDEP and the Rhode Island Department of Environmental Management (RIDEM), which was calibrated and verified using water quality survey data collected in 1991. The water quality data and modeling report can be found in the *Blackstone River Initiative Report* (February 1998). Modeling results formed the basis for water quality based seasonal limits that were found necessary to achieve the minimum dissolved oxygen criterion of 5.0 mg/l for the Blackstone River. The 2006 permit also contained a total phosphorus effluent limit of 0.2 mg/l to address eutrophication in the Blackstone River, and water quality based limits for bacteria and the metals copper, lead and zinc.

The draft permit maintains the existing concentration-based limits on BOD, CBOD, TSS, phosphorus and ammonia nitrogen while also expressing those limits as mass load limits. The draft permit also sets an additional limit for total nitrogen and includes a modified copper limit consistent with the site-specific water quality criteria for the Blackstone River adopted by Massachusetts since the issuance of the last permit. These are discussed in greater detail in the pollutant-specific sections that follow.

### **B. Effluent Limits Derivation**

The effluent limits in the draft permit are established to ensure compliance with technology-based requirements, the MA SWQS, the approved WLA for dissolved oxygen, and RI WQR. In most cases the applicable water quality criteria for Massachusetts are similar to, and in some cases more stringent than, the applicable water quality criteria for Rhode Island, so that the effluent limits designed to meet the MA SWQS also ensure compliance with RI WQR. This is not the case for the limits on total nitrogen and on bacteria in the winter months, and those limits are established solely to ensure compliance with the RI WQR.

## **1. Flow**

The draft permit contains an annual average flow limit of 2.0 MGD, which is the long-term average design flow of the facility. The flow limit in the current permit is expressed as a monthly average flow of 2.0 MGD. This change from a monthly average to an annual average is the result of MassDEP adopting a policy establishing flow limits in POTW permits as an annual average in order to account for seasonal flow variations, particularly those associated with high flow and high groundwater which commonly occur in the spring time. See *MassDEP-DWM NPDES Permit Program Policies Related to Flow and Nutrients in NPDES Permits* (2000). Northbridge's flow averaged 1.1 MGD in the five year period from 2007 to 2011.

## **2. Conventional Pollutants**

### **a. BOD and TSS**

The concentration-based effluent limits for biochemical oxygen demand (BOD) and total suspended solids (TSS) remain the same as in the current permit and are based on the WLA. The monthly average and weekly average BOD limits are 10 mg/l. There were four BOD violations (one monthly and three weekly) in the period 2007 to 2011. The monthly and weekly average TSS limits are also 10 mg/l, and no TSS violations were reported in that period.

Mass loading effluent limits for average monthly and average weekly BOD and TSS are also included in the draft permit. These are calculated by multiplying the allowable effluent concentration in mg/l by the design flow in MGD and converting to units of pounds per day. The calculations are shown in Attachment A.

### **b. Ammonia and DO**

The draft permit limits for ammonia nitrogen and dissolved oxygen (DO) are the same as in the current permit. The permit limits for ammonia nitrogen (2 mg/l monthly and 4 mg/l weekly May to October, 9 mg/l and 18 mg/l November to April, expressed in mg/l of nitrogen) were established in order to control both in-stream oxygen demand and ammonia toxicity. There were no violations of the ammonia nitrogen limits from 2007 to 2011.

The minimum DO requirement of 5.0 mg/l, equal to the State WQS criteria for Class B waters, has been continued in the draft permit with daily monitoring. There was one violation of the minimum DO requirement from 2007 to 2011.

### **c. Bacteria**

Limitations for bacteria in the existing permit are based upon state water quality standards for Massachusetts (for the seasonal period of April to October) and Rhode Island (for the entire year). The Northbridge WWTP uses ultraviolet treatment to control bacteria discharges. There were no violations of the fecal coliform limit in the period 2007 to 2011.

The bacteria limits based on the MA SWQS have been changed to reflect the *E. coli* criteria in the revisions to the MA SWQS, 314 CMR § 4.05(3)(b), approved by EPA in 2007. These are seasonal limits in effect from April to October. 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. 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 three times per week.

Bacteria limits based on the RI WQR have also been changed to reflect the change to enterococci criteria in the revisions to the RI WQR. The RI WQR provide that enterococci concentrations are not to exceed a geometric mean value of 54 colonies/100 ml, with a single sample maximum of 61 colonies/100 ml. For permitting purposes RIDEM uses the geometric mean criterion to establish monthly average permit limit, and the 90% upper confidence level value for “lightly used full body contact recreation” of 175 colonies/100ml to set daily maximum permit limits. RIDEM, *Burrillville Wastewater Treatment Facility Permit Development Document* (January 2012).

To establish the appropriate bacteria limit to meet the RI standard at the state line, EPA has estimated the amount of bacteria die-off that is expected to occur between Northbridge and the state line. Die-off was estimated using a first order die-off equation as shown below and derived from Crane, S.R., and Moore, J.A., “Modeling enteric bacterial die-off: a review”, *Water, Air and Soil Pollution*, 27, 411-39 (1986); and Illinois state water quality standards, Title 35, Subtitle C: Water Pollution; Part 378 (Effluent Disinfection Exemptions.).

$$N(t) = \{N(o)\}e^{-kt}$$

Where:

$N(t)$  = Predicted concentration of bacteria at travel time  $t$ , downstream, in #/100 ml

$N(o)$  = Bacteria concentration in the effluent of the source, in #/100 ml

$k$  = The first order die-off rate constant, in 1/day

$t$  = travel time to the point of interest below the source, in days

Although the value of  $N(o)$  would typically be the source, or effluent concentration of bacteria, by setting this value to 1 the value that is solved for,  $N(t)$ , will be a fraction of the bacteria discharged at the source. This allows estimation of the percentage of the effluent concentration that is present at the downstream point (the State line). EPA assumed a river velocity of 1.0 feet per second, consistent with the current permit. This value was within the range that was estimated for river flows consistent with this time of year by a USGS modeling effort. A travel distance of 62,336 feet was used. Using these values results in an estimated travel time of 0.72 days. EPA selected a decay rate ( $k$ ) of 1.0/day from the literature. Mancini, J.L., “Numerical estimates of coliform mortality rates under various conditions”, *Journal of Water Pollution Control Federation*, 50, (1978), pp 2477 – 2484. This results in a percentage of the bacteria

count at the state line, or  $N(t)$ , of 50% (0.50). In other words, 50% of the bacteria that is discharged at the Northbridge WWTF would be present at the state line.

Using the die-off estimate of 50%, EPA has set the enterococci limits for the period of November 1 to March 31 at a monthly geometric mean of 108 colonies/100 ml and a daily maximum of 350 colonies/100 ml, as calculated below. The proposed limits are consistent with Rhode Island's WQR.

$$\frac{\text{Bacteria target at State line}}{\text{percent of discharge bacteria present at state line}} = \text{maximum discharged at WWTF}$$

Monthly average:  
(Geometric mean)

Daily maximum:

$$\frac{54}{0.50} = 108 \text{ colonies/100 ml}$$

$$\frac{175}{0.50} = 350 \text{ colonies/100 ml}$$

The draft permit limit does not take into account dilution consistent with EPA policy (*see EPA Memorandum, supra*), and because of the multitude of other sources of bacteria in the river that effectively eliminate the dilution benefit of the instream flow. Blackstone River data indicate that bacteria concentrations in the river exceed the Rhode Island criteria at various times of the year and under a variety of different flow conditions. *See, e.g.,* Louis Berger Group, Inc., *Water Quality – Blackstone River, Final Report 2: Field Investigations* (2008). Consequently, allowing for dilution would not ensure that the discharge does not cause or contribute to a violation of the RI WQR at the state line.

The monitoring frequency is established at one time per week. Enterococci samples shall be collected concurrently with an *E. coli* sample. This is a year-round limit, consistent with Rhode Island's year-round water quality standard. However, should monitoring data from the April to October period indicate that control of *E. coli* is sufficient to ensure adequate control of enterococci, the permittee may request that enterococci monitoring be reduced to winter only. Any such request must be based on a minimum of one year of concurrent monitoring and include a side by side comparison of all concurrent bacteria monitoring data.

#### **d. pH**

Limitations for pH are based upon State Certification requirements for Publicly Owned Treatment Works (POTW) under Section 401(d) of the CWA, 40 CFR 124.53 and 124.55, and water quality standards. There were 3 violations of the pH maximum in the period from 2007 through 2011 and no violations of the pH maximum.

### **3. Nutrients**

Nutrients, such as phosphorus and nitrogen, are necessary for the growth of aquatic plants and



animals necessary for a healthy ecosystem. In excess, however, nutrients can contribute to fish disease, brown tide, algae blooms and low dissolved oxygen (DO). Excessive nutrients, generally phosphorus in freshwater and nitrogen in salt water, stimulate the growth of algae, which can start a chain of events detrimental to the health of an aquatic ecosystem. Algae inhibit sunlight from penetrating through the water column. Once deprived of sunlight, underwater plants cannot survive and are lost. Animals that depend on these plants for food and shelter leave the area or die. Large biomass of algae causes extreme diurnal swings in DO levels. In addition, as the algae decay, they further depress the DO levels in the water. Fish and shellfish are in turn deprived of oxygen, and fish kills can occur. Excessive algae may also cause foul smells and decreased aesthetic value, which could affect swimming and recreational uses.

**a. Phosphorus**

The draft permit carries over the current permit's monthly average phosphorus limit of 0.2 mg/l from April to October to control this discharge's contribution to eutrophication in the Blackstone River. This permit limit was based on extensive evidence of phosphorus-driven eutrophication of the Blackstone River in state water quality assessments and other studies. See MassDEP, *Blackstone River Watershed 2003 Biological Assessment* (2006); *Blackstone River Watershed 2003 DWM Water Quality Monitoring Data* (MassDEP 2005); *Blackstone River Initiative Report* (2001) Army Corps of Engineers, *Phase I: Water Quality Evaluation and Modeling of the Massachusetts Blackstone River, Draft* (March 2004). This included monthly monitoring from May to October 2003 documenting upstream total phosphorus levels ranging from 0.16 to 0.69 mg/l, and downstream values ranging from 0.11 to 0.37 mg/l in Millville. These values far exceed the recommended values contained in EPA's national technical guidance and the peer-reviewed scientific literature pertaining to nutrients, which support a target of 0.1 mg/l for this facility. *2006 Fact Sheet* (citing *1986 Quality Criteria for Water* (EPA 1986)).

The effluent limit of 0.2 mg/l in the current permit is based on the MA SWQS requirement for the implementation of "highest and best practical treatment," interpreted by MassDEP as an effluent limit of 0.2 mg/l for POTWs, where necessary to control cultural eutrophication. EPA is also, however, required under the Clean Water Act to determine whether such an effluent limit is sufficient to ensure that the receiving water quality complies with all applicable water quality standards. 40 CFR § 122.44(d)(vii)(A). EPA must therefore determine whether an effluent limit of 0.2 mg/l is sufficiently stringent to ensure compliance with the standard that "all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses." 314 CMR 4.05(5)(c).

To determine whether the water quality standard is met, EPA interprets the Massachusetts narrative criterion in numeric terms by looking to nationally recommended criteria and other technical guidance documents. See 40 CFR 122.44(d)(1)(vi)(B). EPA has previously established a numeric target of 0.1 mg/l to meet the narrative criterion in the Blackstone River, based on the *1986 Quality Criteria for Water* ("Gold Book") recommendation of 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. This target is consistent with criteria and guidelines adopted by other states for total phosphorus, as well as other EPA Guidance, see, e.g., *Nutrient Criteria Technical*

*Guidance Manual: Rivers and Streams* (EPA 2000), and EPA's choice of this standard has been upheld by the Environmental Appeals Board in *In re Upper Blackstone Water Pollution Abatement District*, 14 E.A.D. \_\_ (2010).

To determine whether a 0.2 mg/l is sufficient to ensure that the instream level of 0.1 mg/l is met under 7Q10 low flow conditions, EPA calculated the projected instream concentration assuming all the contributing point sources are discharging at their effluent limits under design flow conditions. Design flows and effluent limits for these facilities are set forth in Table 2 below. It should be noted that this does not represent the current discharge concentrations to the Blackstone River, which are significantly higher, but rather the expected discharge concentrations after the facilities are brought into compliance with their newest permit limits.<sup>1</sup> Phosphorus levels in the base flow in the Blackstone River is also included, with a background concentration of 0.04 mg/l based on monitoring data upstream of UBWPAD collected by MassDEP in 2002, near 7Q10 conditions. MassDEP, *Blackstone River 2003-2007 Water Quality Assessment Report*, at F-8 (2008).<sup>2</sup>

Table 2. Blackstone River POTW Phosphorus Limits

Source	Flow (MGD)	P limit
UBWPAD	56.0	0.1 mg/l
Grafton	2.4	0.2 mg/l*
Northbridge	2.0	0.2 mg/l

\* proposed

Instream concentration is determined using a mass balance equation as follows:

$$Q_r C_r = \sum Q_d C_d + Q_s C_s$$

Where

$Q_r$  = receiving water flow downstream of the discharge ( $\sum Q_d + Q_s$ )

$C_r$  = total phosphorus concentration in the receiving water downstream of the discharge

$C_d$  = total phosphorus concentration in each discharge (assumed to be permit limit)

$Q_s$  = Blackstone River base flow at 7Q10 = 14.43 cfs = 9.33 MGD<sup>3</sup>

$C_s$  = phosphorus concentration in baseflow, from sampling upstream of all POTWs = 0.04 mg/l

Solving for  $C_r$  yields:

$$C_r = \frac{\sum Q_d C_d + Q_s C_s}{Q_r}$$

<sup>1</sup> Grafton's permit limit is based on the recently issued Draft Permit for that facility.

<sup>2</sup> While these data are several years old they are consistent with more recent monitoring data from the Blackstone Watershed Coalition's volunteer monitoring program taken upstream of POTW influence.

<sup>3</sup> Baseflow is calculated by drainage area ratio adjustment to the 7Q10 flow at Grafton, which was calculated subtracting upstream POTW flows from the total 7Q10 at Grafton that was derived from the Wasteload Allocation Model. See Attachment B.

$$C_r = \frac{56 * 0.1 + 2.4 * 0.2 + 2.0 * 0.2 + 9.33 * 0.04}{69.7}$$

$$C_r = 0.10 \text{ mg/l}$$

This calculation indicates that an effluent limit of 0.2 mg/l, consistent with the “highest and best practical treatment” mandated under the MA SWQS, is sufficient to ensure that the narrative water quality standard for nutrients is met. The draft permit therefore maintains the monthly average seasonal phosphorus limit of 0.2 mg/l.

In addition to the seasonal phosphorus limit of 0.2 mg/l, the current permit contains a winter period total phosphorus limit of 1.0 mg/l in effect from November 1 through March 31. A higher phosphorus effluent discharge limitation in the winter period is appropriate because the expected predominant form of phosphorus, the dissolved fraction, lacking plant growth to absorb it, will likely remain dissolved and flow out of the system. Imposing a limit on phosphorus during the cold weather months is, however, necessary to ensure that phosphorus discharged during the cold weather months does not result in the accumulation of phosphorus in the sediments, and subsequent release during the warm weather growing season. To confirm that EPA’s assumption of the anticipated behavior of dissolved and particulate phosphorus is correct, a monitoring requirement for orthophosphorus was included in the current permit for the winter period in order to determine the dissolved particulate fraction of phosphorus in this discharge. DMR data from the facility confirms that the orthophosphorus fraction is predominant, as expected: in the winter periods from 2008 through 2012 the average total phosphorus concentration was 0.42 mg/l with an orthophosphorus component of 0.39 mg/l (93% of the total P). The 1 mg/l winter limit is therefore maintained in the draft permit.

### iii. UBWPAD modeling effort

EPA also notes that the UBWPAD has funded the development of an HSPF model of the Blackstone River, conducted by CDM Smith and the University of Massachusetts. EPA has reviewed the model (including underlying model input files provided by CDM to EPA) and results to determine whether they form a basis for a different permit limit for phosphorus for this facility. For the reasons below, EPA has concluded that they do not.

First, EPA notes that this modeling effort is funded by the UBWPAD and is specifically designed to address the impacts of UBWPAD permit limits and potential alternatives in dam management and nonpoint source reduction. It clearly does not attempt to assess impacts of changes in permit limits and discharges from any of the other Massachusetts facilities downstream on the Blackstone River, which are assumed to be at their 1997-2005<sup>4</sup> discharges for all the future scenarios analyzed. *Review of Scenario Results Utilizing the Blackstone River HSPF Model 2010 Calibration* at 9 (April 2011). This is unfortunate, as substantial reductions

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<sup>4</sup> While the model extends through 2007, the modeling team used year 2003 and 2000 data in lieu of actual discharges in 2006 and 2007. *Blackstone River HSPF Water Quality Model Calibration Report* at 4-4 (August 2008). This does not appear to have been updated in later refinements of the model, based on EPA’s review of the model input files provided in connection with the UBWPAD permit modification request.

in phosphorus concentrations were achieved by these facilities between 2000 and 2007, and since that time, in connection with permit limits implemented during this period.

As CDM Smith noted in a letter to EPA dated August 9, 2012, the modeled annual average discharge from the smaller MA plants was 25,986 lbs/yr<sup>5</sup>, 33% more than the reported discharges in 2007 (19,538 lbs/yr) and 75% more than the 2010-11 discharges (14,944 lbs/yr). The difference would be even larger for the critical summer months when more stringent permit limits are in effect, and new limits on Uxbridge and Grafton are expected to reduce current loads by more than half. In scale the load reduction being implemented from the smaller MA facilities, which discharge directly upstream of the most impacted reaches in the modeling results, is comparable to the 20% NPS reduction scenario in the model (87,400 to 69,900 lbs/yr).

*Blackstone River HSPF Model 2009 Scenario Report*, Tables 15 and 16 (2010).<sup>6</sup> The HSPF modeling effort appears to contain an implicit assumption that reductions in discharges from the other WWTPs on the Blackstone River are irrelevant, a position with which EPA disagrees. This makes the modeling results unsuitable for setting permit limits on these facilities.

The decision to focus on 2002 for presentation of results of all scenarios, based on the hydrological conditions during that year that approached 7Q10, exacerbates this issue. Not only are the 2002 phosphorus concentrations for Northbridge, Grafton and Uxbridge far above the current levels, but the Millbury WWTP was still operating in 2002. The scenario plots show a clear spike in phosphorus concentrations at the location of the (now discontinued) Millbury outfall, as well as noticeable spikes at the locations of Grafton and Northbridge (less so Uxbridge) that represent far greater phosphorus discharges than current loads, let alone the reductions that would be seen under new permit limits for Grafton and Uxbridge. These plots therefore do not plausibly reflect what actual conditions would be under the future scenarios.

Moreover, there are additional questions concerning the model itself, particularly the fact that the model does not incorporate periphyton; the consistent overprediction of chlorophyll-a concentrations by the model; and the large errors and paucity of validation data in the Rhode Island reaches. As the Technical Advisory Committee assembled to review the modeling effort stated, “the current HSPF model may be used with caution (because it gives a conservative prediction [too-high] of chlorophyll-a and ammonia concentrations) for evaluating relative in-stream benefits likely to be realized from alternative nutrient reduction scenarios for the UBWPAD discharge and other point and non-point source inputs to the river. However, we believe that improvements will need to be made in the model’s ability to predict algal growth dynamics and nitrogen nutrient levels during the growing season, before it is appropriate for use in more detailed applications, such as for development of a nutrient Total Maximum Daily Load (TMDL).” *Technical Advisory Committee (TAC) Review Report on The Blackstone River HSPF Water Quality Model* at 2 (April 29, 2011).

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<sup>5</sup> This is a correction of the mass balance figures contained in the *Blackstone River HSPF Model 2009 Scenario Report*, Table 15 (2010) which stated that loads from the “other PS” in Massachusetts totaled 98,000 lbs/yr.

<sup>6</sup> As CDM Smith did not correct these figures in its letter of August 9, 2012, EPA assumes that the reported values are correct. We note that while CDM suggests that any review of the model be based on information provided with their modification request, and not the “older, more dated 2009 Scenario report”, the updated modeling reports do not contain updated mass balance tables or any other data tables showing input loads.

In light of the above, EPA does not believe it is appropriate to use this model in the setting of permits limits for this facility. However, EPA notes that the modeling results on a general level support EPA's position that a high level control on all sources, not just the UBWPAD, is necessary to control eutrophication in the Blackstone River. That is the basis for EPA's implementation of phosphorus limits in this permit and those of the other downstream WWTPs. In addition, EPA is addressing nonpoint source and stormwater reduction efforts through grant funding, stormwater permitting for construction, industrial and municipal separate storm sewer (MS4) sources, and other programs. EPA believes this multi-pronged approach is consistent with all available data regarding the necessary steps to achieve water quality standards in the Blackstone River.

In summary, the draft permit total phosphorus limit for the period of April 1 to October 31 is 0.2 mg/l and for the period of November 1 to March 31 is 1.0 mg/l. The monitoring frequency for the summer is 2/week, and the winter monitoring frequency is 2/month.

#### **b. Nitrogen**

The draft permit contains an effluent limitation of 8 mg/l total nitrogen, in order to ensure that this discharge does not contribute to eutrophication in the Seekonk and Providence River estuaries. This requirement is imposed in order to meet the water quality standards of Rhode Island, an affected downstream state under 40 CFR § 122.44(d)(vii)(b)(4).

Rhode Island, like Massachusetts, does not provide numeric criteria for nutrients. The relevant narrative criterion for nutrients provides:

Nutrients: 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.

Rhode Island Water Quality Regulations, Rule 8.D(3)(10)(Table 2); see also Rule 8.D(1)(d). The regulations also include requirements for minimum instantaneous DO levels and cumulative DO exposure, Rule 8.D(3) Table 3, and other applicable criteria including:

At a minimum, all waters shall be free of pollutants in concentrations or combinations or from anthropogenic activities subject to these regulations that:

- i. Adversely affect the composition of fish and wildlife;
- ii. Adversely affect the physical, chemical, or biological integrity of the habitat;
- iii. Interfere with the propagation of fish and wildlife;
- iv. Adversely alter the life cycle functions, uses, processes and activities of fish and wildlife . . .

Rule 8.D(1).

### **i. Evidence of eutrophication and link to nitrogen discharges**

Narragansett Bay, and particularly the Seekonk and Providence River estuaries that form its upper reaches, has suffered severe cultural eutrophication for many years. This cultural eutrophication results in periodic phytoplankton blooms, low DO levels and associated fish kills. Numerous studies have documented hypoxic conditions in the upper bay and Seekonk and Providence Rivers, with the worst conditions found at the upper boundary of the Seekonk River where the Blackstone River discharges. *Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, Rhode Island Department of Environmental Management (December 2004); Deacutis, et al., "Hypoxia in the Upper Half of Narragansett Bay, RI, During August 2001 and 2002," *Northeastern Naturalist*, 13 (Special Issue 4):173-198 (2006); Bergondo, et al., "Time-series observations during the low sub-surface oxygen events in Narragansett Bay during summer 2001," *Marine Chemistry*, 97, 90-103 (2005). In addition, important habitat has been destroyed: historic estimates of eel grass in Narragansett Bay ranged from 8,000 - 16,000 acres and current estimates of eel grass indicate that less than 100 acres remain. No eel grass remains in the upper two thirds of Narragansett Bay and the Providence River. Severe eutrophication is believed to be a significant contributor to the dramatic decline in eel grass. See *Governor's Narragansett Bay and Watershed Planning Commission, Nutrient and Bacteria Pollution Panel, Initial Report* (March 3, 2004); *Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, Rhode Island Department of Environmental Management (December 2004); *Plan for Managing Nutrient Loadings to Rhode Island Waters*, RIDEM (February 1, 2005).

It is clear that eutrophication in the Seekonk and Providence Rivers and Narragansett Bay has reached levels where it is adversely affecting the composition of fish and wildlife; adversely affecting the physical, chemical, and biological integrity of the habitat; interfering with the propagation of fish and wildlife; adversely altering the activities of fish and wildlife; and causing DO to drop well below allowable levels. The effects of eutrophication, including algae blooms and fish kills, are also interfering with the designated uses of the water. Eutrophication has, therefore, reached a point where it is causing violations of water quality standards.

Excessive loadings of nitrogen have been identified as the cause of the eutrophication. This link has been demonstrated by water quality data and by various studies and reports. The RIDEM report, titled *Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers* (December 2004), summarizes and references many of the studies and reports. RIDEM's 2004 report analyzes both water quality data and information about major discharges to the Providence and Seekonk Rivers. The report, drawing in part on data developed in earlier studies, divides the rivers into segments and analyzes pollutant loadings and specific water quality impairments in each segment. Much of the data used in the analysis is from a 1995 - 1996 study by RIDEM's Water Resources unit that consisted of measurements of nitrogen loadings from point source discharges and the five major tributaries to the Providence/Seekonk River system. The report also includes an analysis of data produced by a physical model of the Providence/Seekonk River system. That physical model was operated by the Marine Ecosystems Research Laboratory (MERL), and was part of an experiment to evaluate the impact of various levels of nutrient loading on the rivers and Narragansett Bay. EPA's guidance document

*Nutrient Criteria Technical Guidance Manual, Estuarine and Coastal Marine Waters* cites the MERL experiments as compelling evidence that nitrogen criteria are necessary to control enrichment of estuaries.

The predominant sources of nitrogen loading in the Providence and Seekonk Rivers are municipal wastewater treatment facilities in Rhode Island and in Massachusetts. In 2006, the State of Rhode Island reissued several Rhode Island Pollutant Discharge Elimination System (RIPDES) permits for POTWs which discharge to the Providence and Seekonk Rivers. These permits include limitations on the discharge of total nitrogen for a number of facilities, in order to address the cultural eutrophication in these waters and Narragansett Bay, consistent with the targets identified in the 2004 RIDEM Report. RIDEM, *Response to Public Comments Received on Proposed Permit Modification for the Fields Point, Bucklin Point, Woonsocket and East Providence WWTFs* (2006) In addition smaller Rhode Island facilities, not identified in the 2004 RIDEM Report, have had nitrogen optimization and other requirements placed in their permits as they have been (re)issued. See RIPDES Permit No. RI0100455, Burrillville WWTP (2006).

The 2004 RIDEM Report also concluded that substantial reductions in loadings from the three largest Massachusetts POTWs on the Blackstone and Ten Mile Rivers would be necessary to achieve water quality standards in the Seekonk River and Upper Narragansett Bay. After reviewing the RIDEM studies and other relevant material and performing its own analysis, EPA agreed that nitrogen discharges from the UBWPAD WWTP (on the Blackstone River) and the Attleboro and North Attleboro WWTFs (on the Ten Mile River) are contributing to impairments in Rhode Island. EPA therefore imposed effluent limits on those facilities that are designed to ensure attainment of water quality standards and are consistent with the 2004 RIDEM Report and Rhode Island's regulation of its in-state facilities. RIDEM updated this analysis to include other Massachusetts POTWs on these rivers in 2005 but did not include the Northbridge discharge (see section 3(b)(ii)(a)(1) at page 19 below). EPA has analyzed the need for limits on additional facilities on the Blackstone River as their permits are reissued. Requirements on other facilities will be required as necessary to achieve nutrient reductions necessary to achieve water quality standards for eutrophication. Wasteloads will be calculated with a consideration given to attaining equitable regulation of discharges across the region.

Monitoring reports submitted by the Northbridge WWTP confirm that the facility discharges nitrogen to a tributary to the Blackstone River, which flows into the Seekonk River where the greatest impairments in the Narragansett Bay Basin have been measured. Therefore EPA must determine whether the Northbridge discharge "will cause, have reasonable potential to cause, or contribute to" a violation of water quality standards. 40 CFR §122.44(d)(1)(i). In doing so, EPA considers "existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, . . . and where appropriate, the dilution of the effluent in the receiving water." 40 CFR §122.44(d)(1)(ii).

Under the current permit the Northbridge WWTP reports its discharges of ammonia, total Kjeldahl nitrogen (TKN) and Total Nitrate plus Nitrite. Total nitrate plus nitrite and ammonia together represent the dissolved inorganic nitrogen ("DIN") component of the facilities nitrogen discharges. Dissolved inorganic nitrogen (DIN), the parameter used for analysis of the impact of nitrogen loadings in the RIDEM studies, is used to assess the facility's contribution to effects in

the Seekonk River. The DIN concentration from the Northbridge discharge from 2007 through 2011, based on the DMRs, has averaged 8.6 mg/l but has been highly variable, with concentrations as low as 2.7 mg/l and as high as 21 mg/l. At design flows, which are the basis for determining the potential discharge of pollutants, this would correspond to a mean of 155 lb/day and a range from 55 to 350 lbs/day. Actual DIN loads have been similarly variable, with the loads ranging from 3.7 to 150 lbs/day (mean 66 lbs/day) over the same period. The Northbridge WWTP clearly has the capability to achieve a high level of nitrogen control, but has not done so on a consistent basis.

The Northbridge discharge is located approximately 29 miles upstream of the impaired reaches in the Seekonk River, so EPA considered whether its nitrogen loading is significantly reduced by in-stream attenuation. There is conflicting evidence concerning the extent of attenuation, if any, within the Blackstone River, with estimates ranging from zero to 23%. See Nixon, et al., "Investigation of the Possible Attenuation of Dissolved Inorganic Nitrogen and Phosphorus in the Lower Blackstone River," *Anthropogenic Nutrient Inputs to Narragansett Bay – A Twenty-Five Year Perspective*, Appendix B (2005)); RIDEM, *Nutrient Permit Modifications – Response to Comments* (2005). For this analysis, EPA is applying the 13% attenuation rate used for UBWPAD discharges in the RIDEM 2004 Report based on 1995-96 monitoring data, adjusted proportional to the relative distance along the Blackstone River. This results in an attenuation rate of 8% for the Northbridge discharge. Based on the studies and analyses previously referenced, EPA believes that this rate is a reasonable estimate. At this attenuation rate, the potential loading from the Northbridge discharge to the Seekonk River at design flow is as high as 322 lb/day (146 kg/day).

To determine the impact of this loading on the Seekonk River, EPA considers the areally distributed load (load divided by area) in order to allow comparison to the results of the MERL experiment applied in the RIDEM 2004 Report. The MERL enrichment gradient experiment included a study of the impact of different loadings of nutrients on dissolved oxygen and chlorophyll a. See Oviatt, et al., "Patterns of Productivity During Eutrophication: A Mesocosm Experiment", *Marine Ecology* (1986); 2004 RIDEM Load Reduction Evaluation. The MERL enrichment gradient experiments consisted of 9 tanks (mesocosms). Three tanks were used as controls, and were designed to have regimes of temperature, mixing, turnover, and light similar to a relatively clean Northeast estuary with no major sewage inputs. The remaining six mesocosms had the same regimes, but were fed reagent grade inorganic nutrients (nitrogen, phosphorus and silica) in ratios found in Providence River sewage. The six mesocosms were fed nutrients in multiples of the estimated average sewage inorganic effluent nutrient loading to Narragansett Bay. For example the 1X mesocosm nitrogen loading was 40.3 mg/m<sup>2</sup>/day, representing the average nutrient loading in the Narragansett Bay as a whole. The 2X was twice that (80.6 mg/m<sup>2</sup>/day) and so on (4X, 8X, 16X) up to a maximum load of 32X. During the study, dissolved oxygen, chlorophyll, and dissolved inorganic nutrients were measured in the water column and benthic respiration was also measured. Id. From the collected data the investigators produced times series for oxygen, pH, temperature, nutrients, chlorophyll and system metabolism. Id. The study documented precipitous drops in dissolved oxygen levels with loadings above the 4X gradient, along with increasing and highly variable chlorophyll levels indicative of eutrophic conditions.



The areally distributed loading to the Seekonk River from the Northbridge discharge alone is 52 mg/m<sup>2</sup>/day. This compares to a “1X” loading in the MERL experiments of 40.3 mg/m<sup>2</sup>/day, and indicates that even as one of the smaller wastewater plants discharging to this reach, the Northbridge WWTP alone has the potential to contribute nitrogen levels to the Seekonk nearly matching the background areally distributed load to the bay as a whole. The Seekonk River is already the most enriched portion of the Narragansett Bay under natural conditions, with estimated natural background nitrogen inputs at the 4X level. RIDEM 2004. This makes this area especially vulnerable to overenrichment from wastewater treatment plant sources, and indeed the addition of the Northbridge to background sources alone would be expected to reduce minimum DO levels from 3.0 mg/l to 2.75 mg/l under MERL experiment conditions. See RIDEM 2005 (Figure 4). Of course, the Seekonk River is far from background levels, with loadings as of 2004 estimated at the 24X level, indicating extreme over-enrichment. Effluent limits that have been placed on other wastewater treatments plants in Rhode Island and Massachusetts are expected to achieve an areal load equivalent to the 6.5X condition at current flows, and 10X at 90% design flows. However, this goal will not be reached if the Northbridge discharge is not controlled.

Based on the available evidence, the Northbridge discharge “will cause, have reasonable potential to cause, or contribute to” a violation of water quality standards in the Seekonk River and an effluent limit must be set.

## **ii. Nitrogen Effluent Limit**

Having found that the discharge has a reasonable potential to cause an excursion over Rhode Island’s narrative standard for the nutrient nitrogen, EPA is required to set an effluent limit for this pollutant. 40 CFR § 122.44(d)(vi). In setting a limit, EPA must ensure that:

(A) The level of water quality to be achieved by limits on point sources established under this paragraph is derived from, and complies with all applicable water quality standards; and

(B) Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR 130.7.

40 CFR § 122.44d(vii).

While Rhode Island DEM has not developed a TMDL or other wasteload allocation that has been approved pursuant to 40 CFR 130.7, RIDEM has performed a load allocation analysis that it has used for purposes of establishing nitrogen limits on Rhode Island treatment plants. While EPA is not bound by this analysis, EPA has reviewed the technical basis and allocation method applied in the RIDEM analysis and has determined that it generally represents a sound and technically valid approach. EPA has therefore agreed to process Massachusetts permits in a manner consistent with the RIDEM analysis. See *Performance Partnership Agreement Between the Rhode Island Department of Environmental Management and US Environmental Protection*

*Agency Region I* (January 2006), Appendix B. In doing so, however, EPA has an independent obligation both to ensure that the load allocation analysis remains valid, particularly in light of changes in circumstances since the initial analysis was developed over five years ago, and to ensure that the level of water quality that will be achieved complies with the applicable water quality standards. We consider these questions in turn below.

a. RIDEM load allocation analysis and EPA Update

(1) RIDEM analysis

RIDEM's approach to allocating nitrogen loads has been to require higher removal rates from larger facilities than from smaller facilities (e.g. 5 mg/l for NBC Bucklin Point and UBWPAD; 8 mg/l for Attleboro and North Attleboro). RIDEM, *Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers* (2004) ("2004 RIDEM Report"). This is an accepted approach under EPA guidance for wasteload allocations. See *Technical Support Document for Water Quality-based Toxics Control*, EPA/505/2-90-001, at 69. In RIDEM's initial analysis of nitrogen loads, facilities smaller than North Attleboro (at 4.6 MGD) were not included in the analysis. See 2004 RIDEM Report. Subsequently, in 2005, RIDEM updated its analysis to incorporate three additional facilities on the Blackstone River – the Uxbridge, Grafton and Millbury WWTFs – based on a calibrated/validated Qual2e model. This analysis is summarized in the 2005 *Response to Comments Received on Proposed Permit Modifications for the Fields Point, Bucklin Point, Woonsocket and East Providence WWTFs*, Appendix A ("2005 RIDEM RTC"). See Michaelis, B., *Dissolved Oxygen Dynamics in a Shallow Stream System*, Dissertation in Civil and Environmental Engineering at the University of Rhode Island (URI 2005). That analysis indicated that under design flows and 2005 permit limits for ammonia and phosphorus, the load at the MA/RI state line from the MA POTWs discharging to the Blackstone was expected to be 4,319 lbs/day. Figure 3. Northbridge was not considered in this analysis.

Figure 3: Table from Rhode Island load analysis

Table 3. Percent delivery and percent contribution of MA WWTF to the MA/RI state line under DWS3 at design flows and currently required permit limits for ammonia and phosphorus.

Point Source	Initial Load at end of pipe (lb/day)	Final Load at MA/RI state line (lb/day)	At MA/RI state line	
			Delivery (%)	Contribution (%)
UBWPAD	3780	3493	92	79
Millbury WWTF	336	312	93	7
Grafton WWTF	239	219	92	5
Uxbridge WWTF	300	295	98	7
Total WWTF	4655	4319	93	98

\* Note "DWS3" indicates the model run under flow conditions from August 2005 ("dry weather survey 3").

The 2005 RIDEM RTC does not specifically set forth the loading target in the Seekonk River to be achieved at the proposed permit limits, but this can be calculated from the proposed effluent limits and design flows as shown in Table 3 below, giving a target load allocation to Massachusetts facilities of 1488 lbs/day DIN at the MA/RI state line. This represents a 65% reduction in loads at design flow from the Massachusetts facilities on the Blackstone River (e.g. 4319 to 1488 lbs/day), consistent with the RIDEM assertion in the 2005 RIDEM RTC that the proposed limits will reduce the total loading to the Seekonk River by 62%.

**Table 3. Load Allocation at State Line per RIDEM Analysis**

Point Source	Design flow (MGD)	90% of Design Flow (MGD) <sup>1</sup>	Proposed total N permit limit (mg/l)	DIN component of permit limit (mg/l) <sup>2</sup>	DIN load discharged at limit (lb/day)	At MA/RI State Line	
						DIN load at MA/RI state line	Delivery Factor (%) <sup>3</sup>
UBWPAD	56	50.4	5	3	1261	1165	92%
Millbury WWTF	2.7	2.43	8	6	122	113	93%
Grafton WWTF	2.4	2.16	8	6	108	99	92%
Uxbridge WWTF	2.5	2.25	8	6	113	111	98%
Total WWTF					1603	1488	93%

<sup>1</sup> Loads are calculated using 90% of design flow consistent with RIDEM's methodology in the 2004 RIDEM Report

<sup>2</sup> Non-DIN component of total N assumed to be 2 mg/l per the 2004 RIDEM Report.

<sup>3</sup> Delivery factors from the 2005 RIDEM RTC; for discussion of delivery factors see Attachment B.

## (2) EPA Update of RI analysis

In applying this load allocation analysis to the reissuance of permits to the Northbridge WWTP and Grafton and Uxbridge WWTFs, EPA noted that (1) several other facilities on the Blackstone River and its tributaries were not explicitly considered by RIDEM in its analysis; and (2) the Millbury WWTF is no longer discharging, having tied into UBWPAD. Table 4 shows the current MA dischargers to the Blackstone River system and their seasonal loads based on monitoring data from 2007-09.

**Table 4. Current DIN Loadings to Blackstone River from WWTFs**

POTW	May-Oct, 2007 to 2009 DMR data		
	Flow (MGD)	DIN (mg/l)	DIN load discharged (lb/day)
UBWPAD	33.5	7.35	1995
Douglas	0.3	5.5	15
Grafton	1.8	10.5	186
Hopedale <sup>1</sup>	0.4	10.7	32
Northbridge	0.9	11.3	75
Upton	0.19	14.9	24
Uxbridge	0.8	10.9	67
TOTAL:			2,394

<sup>1</sup> The Hopedale facility monitors total N only; DIN calculated by subtracting 2 mg/l from total N per 2004 RIDEM Report.

The omission of Douglas, Hopedale, Northbridge and Upton from RIDEM's analysis was presumably based on RIDEM's conclusion that these contributions are *de minimis*, based on the size of the discharger and/or location of the discharger on a tributary to the Blackstone River. While EPA agrees with this determination with respect to Douglas, Hopedale and Upton, it does not appear that the Northbridge WWTP contribution is negligible. Northbridge's current flow, effluent DIN concentration and DIN loads are higher than those of Uxbridge, and while Northbridge discharges to a tributary, it is less than 200 yards from the mainstem of the Blackstone River, so the tributary is unlikely to substantially reduce the delivery of nitrogen to the Blackstone River. For these reasons EPA is including Northbridge in its updated load allocation analysis. The revised load analysis, which excludes the Millbury WWTF but includes Northbridge, is set forth in Table 5.

As shown in Table 5, the load allocation target is not met if Northbridge discharges at design flow at its current DIN levels, but would be met if Northbridge had an effluent limit similar to that proposed for Grafton and Uxbridge.

**Table 5. Updated Load Analysis at State Line Using RIDEM Methodology**

						At MA/RI State Line	
Point Source	Design flow (MGD)	90% of Design Flow (MGD) <sup>1</sup>	Proposed total N permit limit (mg/l)	DIN component of permit limit (mg/l) <sup>2</sup>	Initial DIN load (lb/day)	Final DIN load at MA/RI state line	Delivery (%) <sup>3</sup>
UBWPAD	56	50.4	5	3	1261	1165	92%
Grafton WWTF	2.4	2.16	8	6	108	99	92%
Uxbridge WWTF	2.5	2.25	8	6	113	111	98%
<i>Alternatives for Northbridge discharge:</i>							
1. Northbridge at current concentration				Current DIN from DMR			
Northbridge	2	1.8	--	11.3	170	155	92%
Total WWTF						1530	
2. Northbridge with permit limit of 8 mg/l			N limit	DIN component			
Northbridge	2	1.8	8	6	90	83	92%
Total WWTF						1458	

<sup>1</sup> Loads are calculated using 90% of design flow consistent with RIDEM's methodology in the 2004 RIDEM Report

<sup>2</sup> Non-DIN component of total N assumed to be 2 mg/l per the 2004 RIDEM Report.

<sup>3</sup> Delivery factors from the 2005 RIDEM RTC; for further discussion of delivery factors see Attachment

B

For the purposes of this permit, the analysis shows that the RIDEM load allocation can be met and that effluent limits on these discharges consistent with the RIDEM proposal are necessary in order to meet that load allocation. While the Millbury discharge has been tied into UBWPAD and therefore is accounted for in the UBWPAD load allocation, the need to account for the Northbridge discharge eliminates any load reduction that might be achieved eliminating an allocation for Millbury. Therefore it is EPA's intent that the permit limits in the Northbridge, Grafton and Uxbridge reissued permits will be consistent with the load allocation analysis above.

## b. Water Quality Analysis

EPA is also obligated to ensure that the proposed effluent limits will achieve a level of water quality that complies with the applicable water quality standards. Since the load allocation analysis discussed above is not from an approved TMDL or waste load allocation, EPA as the permitting authority must independently demonstrate that this standard is met. In doing so, EPA draws from the analysis set forth in connection with the issuance of the UBWPAD permit. See U.S.EPA, *Fact Sheet, Upper Blackstone Water Pollution Abatement District*, NPDES No. MA0102369 (2006); U.S.EPA, *Response to Comments, Upper Blackstone Water Pollution Abatement District*, NPDES No. MA010 (2008); *In re Upper Blackstone Water Pollution Abatement District*, 14 E.A.D. \_\_ (2010).

### (1) Loading rate to meet water quality standards

In the UBWPAD permit issuance, EPA concluded that an overall loading rate from all facilities (MA and RI) equivalent to the “6.5X” MERL experiment gradient under current flows, or 1,624 lbs/day<sup>7</sup> was appropriate to ensure that water quality standards in the Seekonk River were met. This conclusion was based on guidance documents, studies of the Seekonk and Providence Rivers and Narragansett Bay, and on an analysis of the application of the MERL experiment results to the Seekonk River. See *Response to Comments, UBWPAD*, at 28-29 and documents cited. It should be noted that the effluent limit established to meet that water quality target was challenged by both the UBWPAD (as too stringent) and by the Conservation Law Foundation (as too lenient) and was upheld on appeal by the Environmental Appeals Board. 14 E.A.D. \_\_ (slip op. at 23).

EPA’s application of the MERL experiments to determine an acceptable loading for the Seekonk River is based on its conclusion that those experiments provide a suitable analog to the actual river system. As EPA noted in the UBWPAD Response to Comments:

The basic relationship demonstrated by the MERL tank experiments between the primary causal and response variables relative to eutrophication corresponds to what is actually occurring in the Providence/Seekonk River system. Both the MERL tank experiments and the data from the Providence/Seekonk River system indicate a clear correlation between nitrogen loadings, dissolved oxygen impairment and chlorophyll *a* levels.

*Response to Comments, UBWPAD* at 29; see also *Id.* at 47-49.

EPA has also noted that the MERL experiments do not perfectly replicate the physical system, and accounted for that fact in applying the MERL loading analysis to determine a water quality target. This also was discussed in connection with the UBWPAD permit:

EPA recognized, however, that the MERL tank experiments cannot completely simulate the response of chlorophyll *a* and dissolved oxygen to nitrogen loadings in a complex, natural setting such as the Providence/Seekonk River system, and thus does not yield a

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<sup>7</sup> Calculated from the 1X MERL load of  $4.032 \times 10^{-5}$  kg/m<sup>2</sup>/day, times the area of the Seekonk River ( $2.81 \times 10^6$  m<sup>2</sup>), times the conversion factor (2.2046 lbs/kg), times 6.5. See 2004 RIDEM Report.

precise level of nitrogen control required to restore uses in the system. For example, dissolved oxygen in Narragansett Bay is influenced by stratification, which was not simulated in the MERL tank experiment, in which waters were routinely mixed. In a stratified system there is little vertical mixing of water, so sediment oxygen deficits are exacerbated, due to the lack of mixing with higher DO waters above. In addition, the flushing rate used in the MERL tanks is not the same as seen in the Bay. Because the physical model does not generate a definitive level of nitrogen control that can be applied to a real world discharge, but instead a range of loading scenarios which are subject to some scientific uncertainty, EPA was required to exercise its technical expertise and scientific judgment based on the available evidence when translating these laboratory results and establishing the permit limit.

*Response to Comments, UBWPAD* at 49. Thus, while RIDEM has suggested that the MERL experiments might indicate a 4X condition as a goal for the Seekonk River, 2004 RIDEM Report at 25, EPA concluded that the differences between the MERL experiments and the actual physical system, particularly the difference in flushing rates, indicated that the 6.5X target was appropriate.

EPA continues to believe that the water quality target established in the UBWPAD permit development represents an appropriate level of water quality to ensure that standards are met in the Seekonk and Providence River, based on the best available current information. Therefore, EPA applies the 6.5X load target to determine whether the load allocation will comply with water quality standards.

## (2) Effluent limits required to meet water quality standards

To determine whether the proposed effluent limits will meet the 6.5X target under current flows, EPA calculates the total load to the Seekonk River assuming that effluent concentrations are at the permit limits and flows are equal to the 2007 to 2009 May to October flows from the facilities' DMR submissions. Current flows are used in this analysis consistent with the analysis of the UBWPAD permit limit that has been upheld on appeal. See *In re Upper Blackstone Water Pollution Abatement District*, 14 E.A.D. \_\_ (2010). A delivery factor is applied to account for attenuation in the Blackstone River (and the Ten Mile River for Attleboro and North Attleboro) before discharge to the Seekonk River; the derivation of these delivery factors is discussed in Attachment B. The contribution of each facility and the total load to the Blackstone River is shown in Table 6.

Given the water quality target loading of 1,624 pounds per day, this analysis indicates that loads would be above the water quality target of at current flows with no effluent limit on the Northbridge WWTF. With an effluent limit on Northbridge equivalent to that of Grafton and Uxbridge, the water quality target would be met at current flows.

**Table 6. Effluent limits to meet water quality standard**

Source	Current Flow (MGD)	Limit (mg/l)	DIN component (mg/l)	DIN (lbs/day)	Delivery factor <sup>1</sup>	DIN load to Seekonk River (lbs/day)
UBWPAD	33.5	5	3	838	87%	729
Woonsocket	6.3	3	1	53	96%	50
Bucklin	17.9	5	3	448	100%	448
Attleboro	3.8	8	6	190	61%	116
North Attleboro	3.42	8	6	171	61%	104
Grafton WWTF	1.74	8	6	87	90%	78
Uxbridge WWTF	0.8	8	6	40	94%	38
<i>Alternatives for Northbridge Discharge</i>						
1. Northbridge at current concentration			Current DIN from DMR			
Northbridge	0.88	---	11.3	83	91%	75
<b>Total DIN load at mouth of Blackstone:</b>						<b>1639</b>
2. Northbridge with permit limit of 8 mg/l			DIN component of limit			
Northbridge	0.88	8	6	44	91%	40
<b>Total DIN load at mouth of Blackstone:</b>						<b>1604</b>
<sup>1</sup> For Blackstone River delivery factors, see Appendix A; Attleboro and North Attleboro delivery factors from 2004 RIDEM Report						

### c. Nitrogen Effluent Limit

As demonstrated above, an effluent limit of 8 mg/l on the Northbridge discharge is necessary to satisfy both the RIDEM load allocation and the water quality target identified by EPA in the UBWPAD permit proceedings. Therefore, the draft permit includes a limit of 8 mg/l total nitrogen.

## 4. Toxic Pollutants

EPA has reviewed the facility's effluent data for toxic pollutants as submitted in DMRs and in the permit reapplication and WET test reports to determine whether the discharge has a reasonable potential to cause or contribute to an exceedance of a water quality standard with respect to those pollutants. The previous permit reissuances included a determination that the facilities discharge has a reasonable potential with respect to lead, zinc and copper and the draft permit maintains permit limits for those parameters, with corrections to the lead and zinc limits. The copper limit has been reevaluated and modified as a result of the MassDEP's adoption of site specific criteria for the Blackstone River, as discussed below. The facility's current effluent data also indicates a reasonable potential to cause an exceedance of criteria for aluminum and cadmium, and effluent limits have been added for those pollutants.

### a. Lead and Zinc

The permit limits in the current permit were based on an incorrect criteria calculation and are corrected in this permit reissuance. In addition, the limits have been updated to account for recent hardness data and new data for receiving water concentrations.

The criteria used as the basis for the current permit limits were calculated using a hardness dependent equation:

$$[\text{criterion}] = e^{(X [\ln(h)] + Y)}$$

at a hardness of 50. 2006 Fact Sheet, Attachment B. X and Y are chronic and acute coefficients that differ for each specific criterion. While the 2006 fact sheet included the correct coefficients, the Fact Sheet incorrectly characterized this equation as providing the dissolved fraction of the metals. Water quality criteria for these metals are expressed in terms of the dissolved form of the metal, which forms only part of the total recoverable metal in a water sample. Lab results, however, are based on the total recoverable metal and that is the measure used in setting permit limits.

The equation used in the fact sheet does not give the criteria in dissolved form. In fact, the dissolved fraction is obtained by multiplying the result of the above equation by a conversion factor (ranging from 0.92 to 0.986 for the different criteria). EPA, *National Recommended Water Quality Criteria 2002* (EPA-822-R-02-047), Appendix B. The 2006 Fact Sheet therefore adjusted the criteria upward in order to translate from dissolved to total recoverable metal, when the initial calculation was already in total recoverable terms. This resulted in an overstatement of the criteria and an incorrect permit limit.

In correcting this error, EPA is also updating the analysis to account for new hardness information and data on concentrations in the receiving water. Analytical data submitted with the facility's WET test reports indicate that the median hardness of the effluent is 40 mg/l, and the receiving water hardness is 19 mg/l. **Table 7.** Under 7Q10 stream flow conditions, calculated for the current permit as 0.36 MGD, and facility design flow the hardness downstream of the facility will average 37 mg/l, and this value is used for the criteria calculation as follows:

$$[\text{criterion in dissolved form}] = e^{(X [\ln(h)] + Y)} \text{ CF}$$

	<u>Zinc</u>		<u>Lead</u>	
	<u>Chronic</u>	<u>Acute</u>	<u>Chronic</u>	<u>Acute</u>
Where: X =	0.8473	0.8473	1.273	1.273
Y =	0.884	0.884	-4.705	-1.46
CF =	0.986	0.978	1.46203-[ln(h)](0.145712)	

h = hardness = 37 mg/l as CaCO<sub>3</sub>

The resulting criteria are 50.5 (chronic) and 50.9 (acute) ug/l for zinc; 0.8 (chronic) and 21.6 (acute) ug/l for lead. In the previous permit EPA concluded that there was no reasonable



potential for an exceedance of the acute criterion for lead based on the facility's data and this remains true under the recalculated criteria. See Table 1 (all lead samples below detection limit). Therefore permit limits are calculated on a monthly average and daily maximum basis for zinc and a monthly average basis only for lead.

To calculate effluent limits the criteria are first converted to total recoverable metal. The necessary effluent limit is then calculated using a mass balance equation assuming the receiving water is at 7Q10 flow and with a median concentration from the WET data (Table 7, attached):

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

$$\begin{aligned} C_r &= \text{Target concentration in receiving water (set at criteria/total recoverable form)} \\ \text{Zinc chronic} &= 50.5/0.986 = 51.6 \text{ ug/l} \\ \text{Zinc acute} &= 50.9/.978 = 51.6 \text{ ug/l} \\ \text{Lead chronic} &= 0.8/.936 = 0.9 \text{ ug/l} \end{aligned}$$

$$\begin{aligned} Q_s &= 7Q10 \text{ streamflow upstream of discharge (0.36 MGD)} \\ C_d &= \text{Allowable concentration in discharge (to be set as effluent limit)} \\ Q_d &= \text{Design flow of facility (2.0 MGD)} \\ C_s &= \text{Median concentration in receiving water upstream of discharge} \\ &\quad \text{Zinc: 14 ug/l; Lead 0.7 ug/l} \end{aligned}$$

The resulting effluent limits are 58 ug/l for the monthly average and daily maximum for zinc, and 0.9 ug/l monthly average for lead.

## **b. Copper**

The limits for copper in the existing permit were calculated based on the chronic and acute criteria set forth in the 1998 *National Recommended Water Quality Criteria*, pursuant to the Massachusetts Water Quality Standards in effect when the existing permit was issued in 2002. Since that time the Commonwealth of Massachusetts has issued, and EPA has approved, site-specific water quality criteria for copper for the Blackstone 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"),<sup>8</sup> and an acute criterion of 25.7 ug/l(d). The draft permit contains effluent limits of 22 ug/l(total recoverable "tr")(monthly average) and 32 ug/l(tr)(maximum daily), which are the limits necessary to attain the site-specific criteria. The derivation of these limits is set forth below.

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<sup>8</sup> Water quality criteria for copper are expressed in terms of dissolved metals. However, permit limitations for copper are expressed in terms of total recoverable metals in accordance with the requirements of 40 CFR § 122.45(c). As such, conversion factors are used to develop total recoverable limits from dissolved criteria. The conversion factor reflects how the discharge of a particular metal partitions between the particulate and dissolved form after mixing with the receiving water. In the absence of site-specific data describing how a particular discharge partitions in the receiving water, a default assumption equivalent to the criteria conversion factor is used in accordance with the *Metal Translator Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (USEPA 1996 [EPA-823-B96-007]). Therefore, a conversion factor of 0.960 was used to convert between total recoverable and dissolved copper concentrations. Dissolved concentrations are denoted ug/l(d), while total recoverable concentrations are denoted ug/l(tr)

## 1. Standard for determining effluent limitations under revised water quality standard

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

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

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

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

*Anti-backsliding:* The reissuance of a permit with less stringent effluent limits must meet the requirements of the Clean Water Act’s anti-backsliding provision, § 402(o), which allows relaxation of water quality based standards only if they comply with CWA § 303(d)(4), and only if the revised limit meets current effluent guidelines and will not cause a violation of water quality standards.<sup>9</sup> The Massachusetts antidegradation policy is set forth in 314 CMR § 4.04, providing, *inter alia*, “[i]n all cases existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.”

The analysis under the site-specific protocol addresses the antibacksliding 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

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<sup>9</sup> The anti-backsliding rule also contains a number of exceptions that are not applicable here. See CWA § 402(o)(2); 40 CFR § 122.44(l).

revised criteria or worsening water quality in the receiving water, and the antidegradation requirement will be met.

## 2. Determination of Effluent Limitations

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 a mass-balance equation that incorporates the relevant flows (7Q10 for the receiving water and design flow for the facility) and the background concentration in the receiving water (based on receiving water data from the facility WET reports). The equation is

$$Q_r C_r = Q_d C_d + Q_s C_s$$

Which was rearranged as:

$$C_d = (Q_r C_r - Q_s C_s) / Q_d$$

Where:

$Q_s$  = receiving water flow upstream of the discharge (7Q10 flow) = 0.36 MGD

$C_s$  = copper concentration upstream of the discharge = 2 µg/l(tr)

$Q_r$  = receiving water flow downstream from the discharge =  $Q_r = Q_d + Q_s = 2.36$  MGD

$C_r$  = copper concentration downstream from the discharge = set equal to criteria

$Q_d$  = design flow of the facility = 2.0 MGD

$C_d$  = copper concentration in the discharge = effluent limit (being solved for)

$C_r$  = Chronic criterion = 18 µg/l (dissolved); 18.9 µg/l (total recoverable)

$C_r$  = Acute criterion = 25.7 µg/l (dissolved); 26.8 µg/l (total recoverable)

Monthly average (chronic):

$$C_d = [(2.36 \text{ MGD})(18.9 \text{ µg/l}) - (0.36 \text{ MGD})(2 \text{ µg/l})] / 2.0 \text{ MGD}$$

$$C_d = 22 \text{ µg/l(tr)}$$

Maximum daily (acute):

$$C_d = [(2.36 \text{ MGD})(26.8 \text{ µg/l}) - (0.36 \text{ MGD})(2 \text{ µg/l})] / 2.0 \text{ MGD}$$

$$C_d = 32 \text{ µg/l(tr)}$$

*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 two year period from December 2009 through November 2011, using the methodology set forth in the Technical Support Document for Water

Quality-based Toxics Control, EPA/505/2-90-001 (March 1991) (Appendix E). The average monthly and maximum daily limits are based on the 95th and 99th percentile of a lognormal distribution, based on the facility's monthly average effluent data as shown in Attachment B. These calculations indicate that limits based solely on past performance would result in a monthly average limit of 26 µg/l and a maximum daily limit of 34 µg/l.

*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 limits are more stringent, so these effluent limits have been included in the draft permit, which are as follows:

Monthly average: 22 µg/l(tr)

Maximum daily: 32 µg/l(tr)

### c. Cadmium

The water quality criteria for cadmium are hardness dependent and are calculated using a hardness of 37 based on data from the effluent and receiving water using the equation:

$$[\text{criterion in dissolved form}] = e^{(X [\ln(h)] + Y)} \text{CF}$$

	<u>Chronic</u>	<u>Acute</u>
Where: X =	0.7409	1.0166
Y =	-4.719	-3.924
CF =	1.101672-[(ln hardness)(0.041838)]	1.136672-[(lnhardness)(0.041838)]

h = hardness = 37 mg/l as CaCO<sub>3</sub>

The resulting chronic and acute criteria are 0.12 and 0.77 ug/l(d), respectively. Translated to total recoverable metal units these are 0.13 and 0.78 ug/l(tr). Between 2009 and 2011 the Northbridge facility had two samples exceed the chronic criterion for cadmium based on the WET test reports: a concentration of 0.32 ug/l in April 2009 and 0.6 ug/l in October 2009. Given the low dilution available to this discharge these data indicate a reasonable potential to cause an exceedance of the water quality criteria and an effluent limit must be set. Since the receiving water has predominantly undetectable concentrations of cadmium the full dilution factor of 1.2 is used, resulting in an average daily limit of 0.16 ug/l and a maximum daily limit of 0.94 ug/l.

### d. Aluminum

Table 7 shows the facility's aluminum discharges as reported with the WET test reports. Fifteen out of nineteen samples are above the chronic water quality criterion of 87 ug/l, with the highest concentration (718 ug/l) close to the acute water quality criterion of 750 ug/l. The receiving water (the unnamed tributary to the Blackstone River) is also above the chronic water quality criterion, as the receiving waters samples range between 140 and 610 ug/l, all above the chronic criterion.

The receiving water does not provide dilution for discharges of aluminum with respect to the chronic criterion, so the draft permit includes a monthly average effluent limit set at the chronic criterion of 87 ug/l. For the acute criterion, the maximum daily effluent limit is calculated using a mass balance equation assuming the receiving water is at 7Q10 flow and with a median concentration of 227.5 ug/l:

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

$C_r$  = Target concentration in receiving water (set at criteria = 750 ug/l)

$Q_s$  = 7Q10 streamflow upstream of discharge (0.36 MGD)

$C_d$  = Allowable concentration in discharge (to be set as effluent limit)

$Q_d$  = Design flow of facility (2.0 MGD)

$C_s$  = Median concentration in receiving water upstream of discharge (227.5 ug/l)

The resulting effluent limit is 844 ug/l, maximum daily limit.

EPA recognizes that the new permit limits may require process adjustments and anticipates issuing an Administrative Order setting an appropriate compliance schedule.

#### **4. Whole Effluent Toxicity**

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

Based on the potential for toxicity resulting from domestic 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 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 *Technical Support Document for Water Quality-Based Toxics Control*). 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 which requires toxicity testing for all major dischargers such as the Northbridge WWTP (*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 Northbridge WWTP does not discharge combinations of toxic compounds into the

Blackstone River via the unnamed tributary in amounts which 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 1.2 was calculated for this facility in connection with the reissuance of the current permit based on a 7Q10 flow of 0.36 MGD. 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 > 83 %). The C-NOEC calculations are as follows:

$$(1/\text{dilution factor} * 100) = (1/1.2 * 100) = 83 \text{ percent.}$$

Under the current permit the permittee has conducted WET tests using the fathead minnow, *Pimephalas promelas*, and there have been no violations of the toxicity limits during the permit term. For the draft permit, EPA has modified the test species to require the use of the daphnid, *Ceriodaphnia dubia*, instead of the fathead minnow. *Ceriodaphnia dubia* is generally more sensitive to metals toxicity than the fathead minnow, and the facility is discharging a range of metals as discussed in the previous section. Toxicity testing must be performed in accordance with the EPA Region I test procedures and protocols specified in **Attachment A** of the draft permit (Freshwater Chronic Toxicity Procedure and Protocol), and the tests will be conducted four times a year. EPA and the 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.

## **VII. Sewer System Operation and Maintenance**

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

EPA regulations also specify a standard condition to be included in all NPDES permits that specifically imposes on permittees a "duty to mitigate." *See* 40 CFR § 122.41(d). This condition is specified in Part II.B.3 of the draft permit and it requires permittees to take all reasonable steps – which in some cases may include operations and maintenance work - to minimize or prevent any discharge in violation of the permit which has the reasonable likelihood of adversely affecting human health or the environment.

Proper operation of collection systems is critical to prevent blockages and equipment failures that would cause overflows of the collection system (sanitary sewer overflows, or SSOs), and to limit the amount of non-wastewater flow entering the collection system (inflow and infiltration

or I/I<sup>10</sup>). I/I in a collection system can pose a significant environmental problem because it may displace wastewater flow and thereby cause, or contribute to causing, SSOs. Moreover, I/I could reduce the capacity and efficiency of the treatment plant and cause bypasses of secondary treatment. Therefore, reducing I/I will help to minimize any SSOs and maximize the flow receiving proper treatment at the treatment plant. MassDEP has stated that the inclusion in NPDES permits of I/I control conditions is a standard State Certification requirement under Section 401 of the CWA and 40 CFR § 124.55(b).

Therefore, specific permit conditions have been included in Part I.B., I.C., and I.D. 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 draft permit are not included in the current permit, including collection system mapping, and preparation of a collection system operation and maintenance plan. EPA has determined that these additional requirements are necessary to ensure the proper operation and maintenance of the collection system and has included schedules for completing these requirements in the draft permit.

### **VIII. Sewage Sludge Information and Requirements**

According to its permit application, the Northbridge WWTP generates about 400 dry metric tons of sludge per year. The sludge is aerated and then sent through a gravity thickener. This processed sludge is hauled to the Synagro site in Woonsocket, Rhode Island where it is dewatered and incinerated. In February 1993, the Environmental Protection Agency (EPA) promulgated standards for the use and disposal of sewage sludge. The regulations were promulgated under the authority of §405(d) of the Clean Water Act (CWA). Section §405(f) of the CWA requires that these regulations be implemented through permits. This permit is intended to implement the requirements set forth in the technical standards for the use and disposal of sewage sludge, commonly referred to as the Part 503 regulations. Section 405(d) of the CWA requires that sludge conditions be included in all municipal permits. The sludge conditions in the draft permit satisfy this requirement and are taken from EPA's Standards for the Disposal of Sewage Sludge at 40 CFR Part 503. These conditions are outlined in the draft permit.

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<sup>10</sup> "Infiltration" is groundwater that enters the collection system through physical defects such as cracked pipes, or deteriorated joints. "Inflow" is extraneous flow entering the collection system through point sources such as roof leaders, yard and area drains, sump pumps, manhole covers, tide gates, and cross connections from storm water systems.

## **IX. Essential Fish Habitat Determination (EFH)**

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 EFH such as: waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. § 1802 (10)). Adversely impact means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. § 600.910 (a)). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

EFH 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. A review of the relevant essential fish habitat information provided by NMFS indicates that EFH has been designated for 33 managed species within the NMFS boundaries encompassing Narragansett Bay, which the Blackstone River discharges to, via the Seekonk River and the Providence River. *See* NOAA, Summary of Essential Fish Habitat, Narragansett Bay, RI (<http://www.nero.noaa.gov/hcd/ri1.html>). It is possible that a number of these species utilize the downstream Rhode Island waters for spawning, while others are present seasonally.

Based on the relevant information examined, EPA finds that the reissuance of this permit will adequately protect EFH for the following reasons:

- The Northbridge discharge is located more than 35 miles upstream of designated EFH habitat;
- The effective dilution of the discharge in the area of EFH designated habitat will be greater than 65 to 1 under 7Q10 conditions (based on 7Q10 at the Woonsocket gage);
- The draft permit contains new nitrogen limits to ensure that the discharge does not contribute to nutrient-related water quality violations in the Seekonk and Providence River;
- The permit is designed to ensure that all water quality standards are met in the receiving water, both in Massachusetts and Rhode Island.

EPA believes that the draft permit limits adequately protect all designated EFH, and therefore additional mitigation is not warranted. If adverse impacts to EFH are detected as a result of this permit action, or if new information is received that changes the basis for our conclusion, NOAA Fisheries will be notified and an EFH consultation will be initiated.

## **X. Endangered Species Act**

Section 7(a) of the Endangered Species Act (ESA) of 1973, as amended 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 U.S. Fish and Wildlife Service (USFWS) typically administers Section 7 consultations for bird, terrestrial, and freshwater aquatic species. The National Marine Fisheries Service (NMFS) typically administers Section 7 consultations for marine species and anadromous fish.

EPA has reviewed the list of federal endangered or threatened species of fish, wildlife, and plants to see if any such listed species might potentially be impacted by the reissuance of this NPDES permit and has not found any such listed species in the vicinity of the discharge. Therefore, EPA does not need to formally consult with NMFS or USFWS in regard to the provisions of the ESA.

## **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 includes new provisions related to Discharge Monitoring Report (DMR) submittals to EPA and the State. The Draft Permit requires that, no later than one year after the effective date of the permit, the permittee submit all monitoring data and other reports required by the permit to EPA using NetDMR, unless the permittee is able to demonstrate a reasonable basis, such as technical or administrative infeasibility, that precludes the use of NetDMR for submitting DMRs and reports (“opt-out request”).

In the interim (until one year from the effective date of the permit), the permittee may either submit monitoring data and other reports to EPA in hard copy form, or report electronically using NetDMR.

NetDMR is a national web-based tool for regulated Clean Water Act permittees to submit discharge monitoring reports (DMRs) electronically via a secure Internet application to U.S. EPA through the Environmental Information Exchange Network. NetDMR allows participants to discontinue mailing in hard copy forms under 40 CFR § 122.41 and § 403.12. NetDMR is accessed from the following url: <http://www.epa.gov/netdmr>. Further information about NetDMR, including contacts for EPA Region 1, is provided on this website.

EPA currently conducts free training on the use of NetDMR, and anticipates that the availability of this training will continue to assist permittees with the transition to use of NetDMR. To participate in upcoming trainings, visit <http://www.epa.gov/netdmr> for contact information for Massachusetts.

The Draft Permit requires the permittee to report monitoring results obtained during each calendar month using NetDMR, no later than the 15th day of the month following the completed reporting period. All reports required under the permit shall be submitted to EPA as an

electronic attachment to the DMR. Once a permittee begins submitting reports using NetDMR, it will no longer be required to submit hard copies of DMRs or other reports to EPA and will no longer be required to submit hard copies of DMRs to MassDEP. However, permittees must continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP.

The Draft Permit also includes an “opt-out” request process. Permittees who believe they cannot use NetDMR due to technical or administrative infeasibilities, or other logical reasons, must demonstrate the reasonable basis that precludes the use of NetDMR. These permittees must submit the justification, in writing, to EPA at least sixty (60) days prior to the date the facility would otherwise be required to begin using NetDMR. Opt-outs become effective upon the date of written approval by EPA and are valid for twelve (12) months from the date of EPA approval. The opt-outs expire at the end of this twelve (12) month period. Upon expiration, the permittee must submit DMRs and reports to EPA using NetDMR, unless the permittee submits a renewed opt-out request sixty (60) days prior to expiration of its opt-out, and such a request is approved by EPA.

Until electronic reporting using NetDMR begins, or for those permittees that receive written approval from EPA to continue to submit hard copies of DMRs, the Draft Permit requires that submittal of DMRs and other reports required by the permit continue in hard copy format. Hard copies of DMRs must be postmarked no later than the 15th day of the month following the completed reporting period.

## **XII. State Certification Requirements**

EPA may not issue a permit unless the Massachusetts Department of Environmental Protection 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.

## **XIII. 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.

#### **XIV. EPA and MassDEP Contacts**

Requests for additional information or questions concerning the draft permit may be addressed Monday through Friday, between the hours of 9:00 a.m. and 5:00 p.m., to:

Susan Murphy  
U.S. Environmental Protection Agency  
5 Post Office Square, Suite 100 (OEP06-1)  
Boston, MA 02109  
Telephone: (617) 918-1534 Fax: (617) 918-0534  
Email: [murphy.susan@epa.gov](mailto:murphy.susan@epa.gov)

Claire A. Golden  
Massachusetts Department of Environmental Protection  
Surface Water Permitting Program  
205B Lowell Street  
Wilmington, MA 01887  
Telephone: (978) 694-3244 Fax: (978) 694-3498  
Email: [claire.golden@state.ma.us](mailto:claire.golden@state.ma.us)

\_\_\_\_\_  
Date

Stephen Perkins, Director  
Office of Ecosystem Protection  
U.S. Environmental Protection Agency



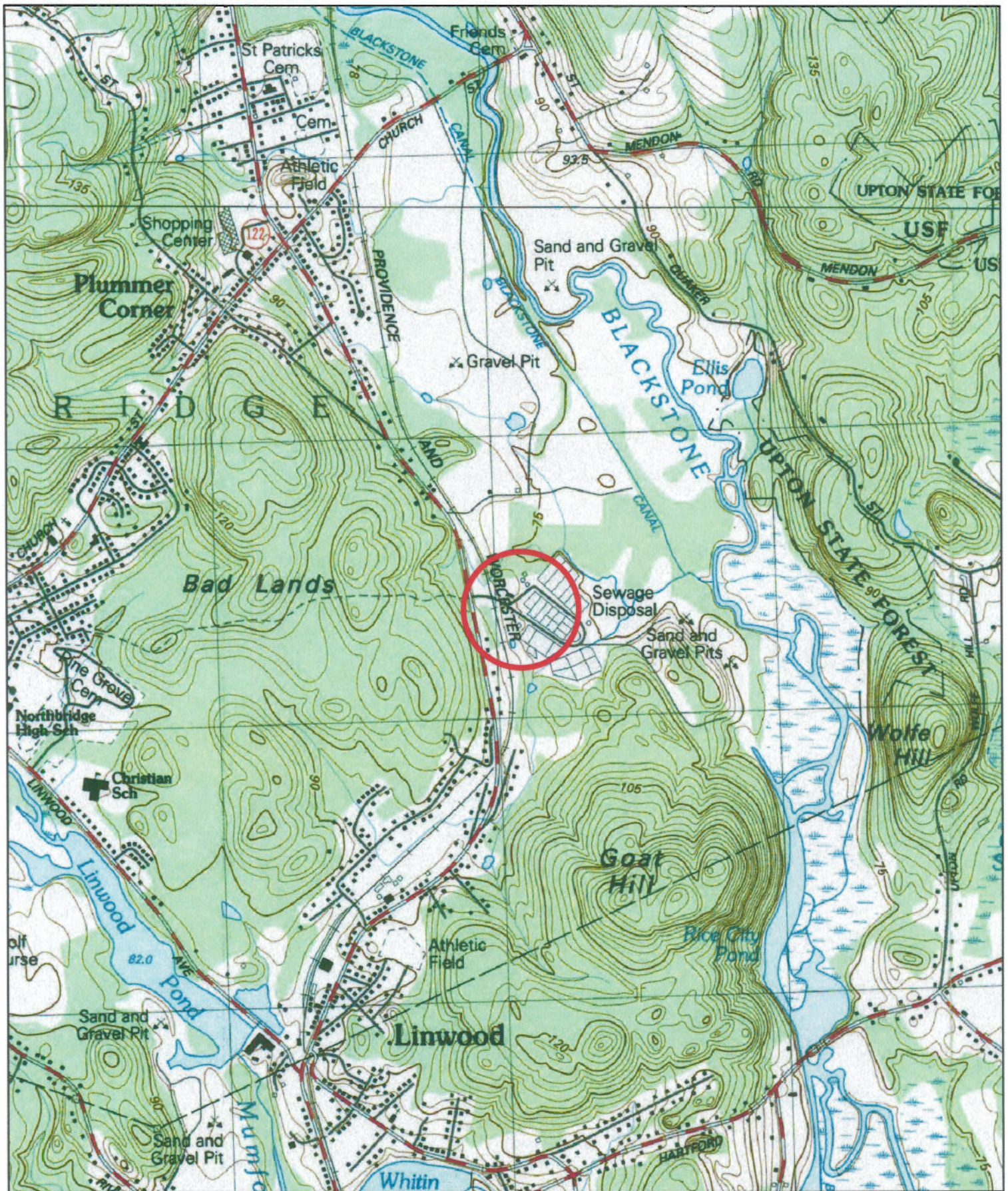
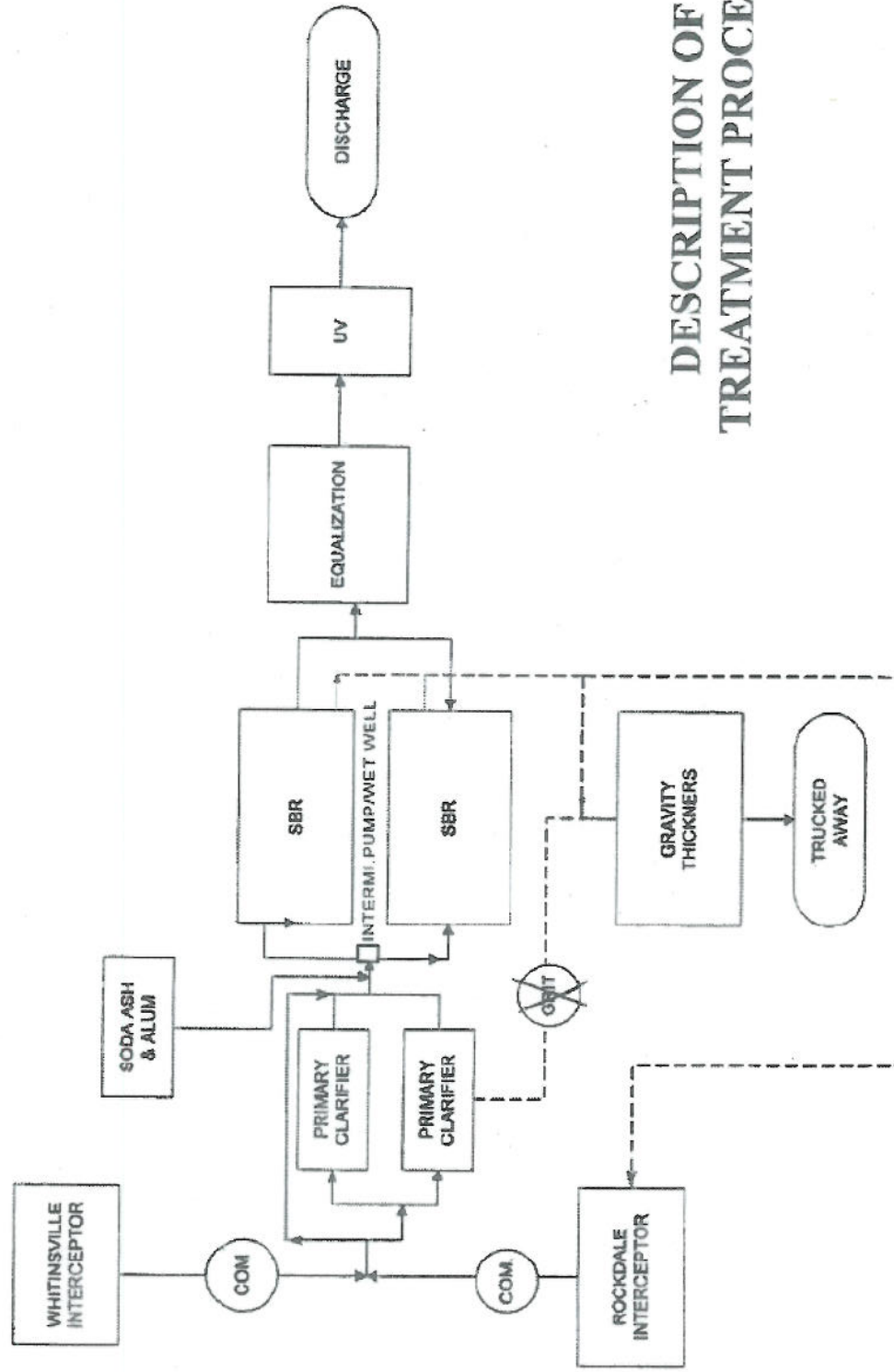


Figure 1. Location Map  
 Northbridge WWTP  
 NPDES No. MA0100722





Figure 2



## DESCRIPTION OF TREATMENT PROCESS

Northbridge Wastewater Treatment Plant  
NPDES Permit No. MA 0100722

Table 1 (page 1 of 2)  
Two year facility DMR Data

	Flow (MGD)			BOD (mg/l)			TSS (mg/l)			fecal coliform (cfu/100 ml)			pH		DO (mg/l)
	12mo avg	daily max	Report	mo avg	wkly avg	% removal	mo avg	wkly avg	% removal	mo avg	daily max	min	max		
	15.5			10	10	85%	10	10	85%	200	400	6.5	8.3		
Effluent Limit:										400	800				
Sampling Frequency:	CONTINUOUS			3/week			3/week								
January 2010	1.1	2.2		5	5.3	97.3	1.5	2.3	99.1	1.23	3	6.4	7.1		
February	1.1	3.8		5.9	6.3	97.4	1.6	3.3	99.4	6.9	132	6.3	7.1		
March	2.2	5.7		5	5.6	94	1.4	2	98.3	3.3	45	6	7.4		
April	1.61	3.5		10	18	92.5	2.33	5	98	6.12	70	5.8	8.4	5.71	
May	0.9	1.7		5.5	6.3	98	1.2	1.6	99	1.1	40	6.7	7.5	7.3	
June	0.8	0.9		5.5	6.3	98	1.5	1.5	99	5.8	82	6.4	8.5	6.48	
July	0.77	1.4		5.5	5.6	97	1	2	99	5.3	181	6.7	7.3	6.7	
August	0.71	1.44		6.5	8	97	1.5	2	99	2.8	10	6.7	8.4	6.2	
September	0.71	0.8		6	6.6	97.3	1	1	97	5.07	62	6.4	7.2	5.5	
October	0.74	1.75		6.7	8	97	2.2	3.6	99	3.85	43	6.5	8.2	6.84	
November	0.79	0.9		6.4	6.5	97	2.17	3	99	3.2	129	6.5	6.9		
December	0.86	1.9		6.3	8.6	97	3	6	99	8.7	8.7	6.5	7		
January 2011	0.8	1.6		6.6	8	97.5	3.3	3.7	98.4	101.3	270	6.5	7.1		
February	0.97	1.7		7.5	8.3	93	3.6	4.6	97	8.75	67	6.5	7.1		
March	2	4.8		6.87	8.3	93	2	3.3	97	2.83	207	6.5	7		
April	1.3	2		6.7	7.3	97	1.5	2	99	1.3	3	6.5	7	6.7	
May	1	1.2		6	6.3	98	1.7	2	99	1.27	11	6.5	7.2	6	
June	0.91	1.82		6.5	6.5	98	2.2	3	99	3.16	113	6.6	7.7	6.8	
July	0.72	1.51		6.3	7	98	2.5	3.6	98	30.54	207	6.6	7.5	6.6	
August	1	5		5.6	6	98	1.8	3	99	53.1	230	6.5	7.3	6.1	
September	1.2	3.5		5.8	6	98	1.4	2	99	3.9	25	6	6.9	6.3	
October	1.2	2.6		5.5	8	98	1.5	2	99	70	299	6.6	7	5.3	
November	1.29	2.5		5.7	7	98	1.47	2	98	123	830	6.7	7.1		
December															
Average	1.07	2.36		6.2	7.4	96.8	1.89	2.8	98.6	19.67478	133	6.5	7.4	6.3	
Max	2.2	5.7		10	18	98	3.6	6	99.4	123	830	6.7	8.5	7.3	



Ammonia N (mg/l)			Copper (µg/l)		Lead (µg/l)		Zinc (µg/l)		P, Total (mg/l)		P, Ortho (mg/l)		Nitrate+nitrite (mg/l)		TKN (mg/l)	
mo avg	wk avg	dly max	mo avg	dly max	mo avg	dly max	mo avg	dly max	mo avg	dly max	mo avg	dly max	mo avg	dly max	mo avg	dly max
0.04	0.04	0.08	0	0	0	0	0	0	0.5		0.4	0.46	7.1	7.1	0.53	0.53
0.03	0.03	0.05	29.7	29.7	0	0	84.6	84.6	0.7		0.6	0.6	3.2	3.2	1.9	1.9
0.15	0.15	0.54	20.5	20.5	0	0	104	104	0.39		0.32	0.33	3.1	3.1	0.69	0.69
0.29	0.29	0.97	0	0	0	0	0	0	0.15				3.1	3.1	2.2	2.2
0.03	0.03	0.09	0	0	0	0	0	0	0.1				5.8	5.8	1	1
0.18	0.18	0.85	0	0	0	0	62.1	62.1	0.16				6.8	6.8	0	0
0.4	0.4	0.7	15.5	15.5	0	0	0	0	0.19				6.6	6.6	0.6	0.6
0.02	0.04	0.04	0	0	0	0	54.1	54.1	0.22				13	13	0	0
0.01	0.01	0.03	12	12	0	0	0	0	0.2				11	11	0	0
0.5	0.5	0.19	0	0	0	0	57	57	0.13				12	12	0.39	0.39
0.13	0.13	0.6	24	24	0	0	85	85	0.17				12	12	0.86	0.86
0.02	0.02	0.06	17.5	17.5	0	0	104	104	0.24				6.7	6.7	1.3	1.3
0.12	0.12	0.27	0	0	0	0	122	122	0.5				9.7	9.7	0.63	0.63
0.07	0.07	0.19	15.8	15.8	0	0	78.7	78.7	0.57				16	16	0.56	0.56
0.05	0.05	0.09	0	0	0	0	106	106	0.13		0.05	0.07	3.8	3.8	1.2	1.2
0.15	0.15	0.27	0	0	0	0	82	82	0.16				2.5	2.5	0.78	0.78
0.08	0.08	0.19	0	0	0	0	77.9	77.9	0.2				8.3	8.3	0.41	0.41
0.04	0.04	0.05	0	0	0	0	52	52	0.19				5.3	5.3	1.5	1.5
0.08	0.08	0.1	0	0	0	0	66	66	0.2				8.3	8.3	0	0
0.05	0.05	0.07	12.3	12.3	0	0	0	0	0.2				18	18	0	0
0.03	0.03	0.04	0	0	0	0	0	0	0.19				7.9	7.9	0	0
0.03	0.03	0.04	25	25	0	0	75	75	0.17				8.8	8.8	0.9	0.9
0.11	0.11	0.29	0	0	0	0	0	0	0.36		0.31	0.56	7.3	7.3	0.36	0.36
0.11	0.11	0.25	7.5	7.5			52.6		0.26		0.30	0.34	8.1		0.69	
0.5	0.5	0.97	29.7	29.7			122	122	0.7		0.6	0.6	18	18	2.2	2.2

	Effluent Analytical Data (ug/l)							Ambient Analytical Data (ug/l)								
	Hardness	Al	Cd <sup>1</sup>	Cr	Cu	Ni	Pb <sup>1</sup>	Zn	Hardness	Al	Cd <sup>1</sup>	Cr	Cu	Ni	Pb <sup>1</sup>	Zn
4/9/2007	36	37	ND-1	ND-1	24.0	2.0	ND-1	71	16	183	1	ND-1	ND-1	ND-1	ND-1	14
7/9/2007	40	718		ND-1	6.0	1.0	ND-1	46	16	277		ND-1	2	ND-1	5	6
10/1/2007	48	181	ND-1	ND-1	8.0	4.0	ND-1	58								
1/14/2008	50.6	74	ND-0.5	ND-1	11.0	2.0	ND-0.5	130	28	289	ND-0.5	ND-1	2	1	ND-0.5	39
4/7/2008	40.4	109	ND-0.5	ND-1	8.0	ND-1	ND-2	37	13	227	ND-0.5	ND-1	3	1	ND-2	15
7/21/2008	41.6	248	ND-0.5	ND-1	1.0	2.0	ND-1	39	16	428	ND-0.5	ND-1	ND-1	ND-1	3	14
10/6/2008	35.6	411	ND-0.5	ND-1	8.0	3.0	ND-0.5	53	20	186	ND-0.5	ND-1	2	1	ND-0.5	19
1/5/2009	35.9	238	ND-0.25	ND-0.5	7.6	1.2	1	37	24	228	ND-0.25	ND-0.5	2.2	6	1.4	16.3
4/13/2009	42.1	123	0.32	ND-0.5	5.1	1.8	ND-0.5	67	28	234	0.26	1.7	9.8	4.3	0.7	34.7
7/6/2009	47.2	106	ND-0.5	ND-1	4.0	2.0	ND-0.5	49	20	306	ND-0.5	ND-1	2	ND-1	2.2	13
10/5/2009	37.1	168	0.6	0.6	15.8	9.9	ND-0.5	35	28	173	0.7	0.8	1.9	1.4	1.3	11
1/11/2010	35.8	29	ND-0.5	ND-1	7.0	1.0	ND-0.5	55	16	143	ND-0.5	ND-1	ND-1	ND-1	ND-0.5	10
4/12/2010	39.8	260	ND-0.25	ND-0.5	8.6	1.9	ND-0.5	55.6	20	198	ND-0.25	ND-0.5	2.8	1.1	0.5	12.2
7/12/2010	38	40	ND-0.5	ND-1	8.0	ND-5	ND-0.5	25								
10/4/2010	37	144	ND-0.5	ND-1	7.0	ND-5	0.7	38								
1/3/2011	42	90	ND-0.5	ND-1	6.0	ND-5	0.5	52	16	190	ND-0.5	ND-1	ND-3	ND-5	0.8	20
4/4/2011	46	110	ND-0.5	ND-1	12.0	6	ND-0.5	52.7	18	180	ND-0.5	ND-1	12	ND-5	ND-0.5	14
7/11/2011	36	220	ND-0.5	ND-1	ND-3	1	ND-0.5	10	22	610	ND-0.5	ND-1	11	ND-5	ND-0.5	32
10/3/2011	36	141	ND-0.5	ND-1	8.0	ND-5	ND-0.5	38	14	235	ND-0.5	---	ND-3	ND-5	0.9	11
Median	40	141	ND-0.5	ND-1	8	2	ND-0.5	49	19	228	ND-0.5	ND-1	2		0.7	14
Max		718	ND-1	ND-1	24	9.9	1	130		610	ND-0.5	1.7	12	6	5.0	39

<sup>1</sup> Non-detects noted as "ND - [minimum detection level]"





## ATTACHMENT A

### **CALCULATION OF MAXIMUM ALLOWABLE LOADS FROM CONCENTRATION-BASED LIMITS**

Calculations of maximum allowable loads for average monthly and average weekly CBOD<sub>5</sub>, BOD<sub>5</sub>, TSS, ammonia, phosphorus, nitrogen and metals were calculated based on the following equation:

$$L = C \times Q_D \times 8.34 \text{ where:}$$

L = Maximum allowable load in lbs/day

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

(Reporting periods are average monthly, average weekly, and daily maximum.)

Q<sub>D</sub> = Design flow of facility in MGD = 2.0 MGD

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

Therefore:

BOD, TSS:

$$(\text{Concentration limit}) [10] \times 8.34 (\text{Constant}) \times 2.0 (\text{design flow}) = 167 \text{ lbs/day}$$

Ammonia:

$$(\text{Concentration limit}) [2] \times 8.34 (\text{Constant}) \times 2.0 (\text{design flow}) = 33.4 \text{ lbs/day}$$

$$(\text{Concentration limit}) [4] \times 8.34 (\text{Constant}) \times 2.0 (\text{design flow}) = 66.7 \text{ lbs/day}$$

$$(\text{Concentration limit}) [9] \times 8.34 (\text{Constant}) \times 2.0 (\text{design flow}) = 150 \text{ lbs/day}$$

$$(\text{Concentration limit}) [18] \times 8.34 (\text{Constant}) \times 2.0 (\text{design flow}) = 300 \text{ lbs/day}$$

Total phosphorus:

$$(\text{Concentration limit}) [.2] \times 8.34 (\text{Constant}) \times 2.0 (\text{design flow}) = 3.34 \text{ lbs/day}$$

$$(\text{Concentration limit}) [1] \times 8.34 (\text{Constant}) \times 2.0 (\text{design flow}) = 16.7 \text{ lbs/day}$$

Total nitrogen:

$$(\text{Concentration limit}) [8] \times 8.34 (\text{Constant}) \times 2.0 (\text{design flow}) = 133 \text{ lbs/day}$$





## **ATTACHMENT B**

### **Delivery Factors**

In order to determine the appropriate delivery factors in the Blackstone River, EPA reviewed the available evidence from the RIDEM studies and other sources. In the 2004 RIDEM Report, RIDEM applied a delivery factor of 87% (i.e. 13% of the nitrogen is removed by uptake or denitrification) to both the UBWPAD and Woonsocket nitrogen loadings in calculating the resulting loads in the Seekonk River. This figure was based on RIDEM sampling in 1995 and 1996 as compared to monthly average WWTF monitoring data. 2004 RIDEM Report at 18.

Subsequent studies have produced conflicting evidence as to the extent of attenuation in the Blackstone River. A URI study based on biweekly sampling in the lower Blackstone River between April and August 2004 found “no direct evidence of DIN attenuation or removal in the lower Blackstone,” with about a 20% increase in DIN that was not accounted for by WWTF discharges. The team also concluded that “[n]or can the results of a mass balance analysis unequivocally exclude DIN removal processes in the river itself,” as non-WWTF inputs such as atmospheric deposition, individual septic system inputs or other sources could be in excess of the 20% increase and mask in-stream removal processes. Nixon, et al., “Investigation of the Possible Attenuation of Dissolved Inorganic Nitrogen and Phosphorus in the Lower Blackstone River” (April 2005), in *Anthropogenic Nutrient Inputs to Narragansett Bay - A Twenty Five Year Perspective* (2005), Appendix B. In contrast, the 2005 RIDEM RTC reported attenuation rates derived from a Qual2E water quality model, modified as part of a dissertation project at URI, that predicted an attenuation rate of 8% from the UBWPAD discharge to the state line, and an additional 21% from the state line to the mouth of the river, for a combined 27% attenuation. Total attenuation of the Woonsocket discharge was predicted to be 14%. 2005 RIDEM RTC, citing Michaelis, *Dissolve Oxygen Dynamics in a Shallow Stream System*, Dissertation in Civil and Environmental Engineering at the University of Rhode Island (2005).

Additional insight into the issue is provided in a regional study conducted by the U.S. Geological Service, which indicates that there is no significant attenuation of nitrogen in New England rivers with discharges greater than 2.83 m<sup>3</sup>/s (100 cfs) or in reservoirs. Moore, et al., *Estimation of Total Nitrogen and Phosphorus in New England Streams Using Spatially Referenced Regression Models*, USGS Scientific Investigations Report 2004-5012. This study applied a water-quality model called SPARROW (Spatially Referenced Regressions on Watershed Attributes), a “spatially detailed, statistical model that uses regression equations to relate total nitrogen and phosphorus (nutrient) stream loads to nutrient sources and watershed characteristics.” The regression analysis utilized a wide array of data sources, including nitrogen monitoring data from 65 sites, to derive coefficients in-stream loss as well as for source loading from particular land uses, point and atmospheric sources and for land-to-water delivery. As applied to the Blackstone River, the SPARROW model predicts no attenuation on an annual average basis based on its average annual flow.

The UBWPAD permit analysis was based on an estimated attenuation rate for the UBWPAD discharge of 13%, and EPA continues to believe that this represents the most reasonable and appropriate estimate of attenuation in the Blackstone River. While the 2005 RIDEM RTC



suggests a higher rate, that modeling indicated that uptake of nitrogen decreased as phosphorus to the system are reduced. This would indicate that attenuation rates will be lower under the new UBWPAD permit limit of 0.1 mg/l total P (as well as new limits on other WWTFs), as opposed to the limit of 0.75 mg/l total P that was used in the model. On the other hand, while the Nixon and USGS studies indicate there may be less than 13% attenuation even under current conditions, both studies leave open the possibility that some level of attenuation is occurring. The Nixon Report specifically notes that the results do not exclude the existence of in-stream removal processes, while the USGS study does not specifically address the potential for attenuation during occasional periods when river flow falls below the 100 cfs threshold (in the Blackstone, this occurs approximately 20% of the time at Northbridge and less than 3% of the time at Woonsocket, based on USGS gage data from those locations). The attenuation rate of 13% is thus squarely within the range of the possible values based on currently available information.

For these reasons, EPA has applied delivery factors to each discharge that are consistent with 13% attenuation of the UBWPAD discharge. In the absence of other information, we assume that attenuation is proportional to the distance traveled, as calculated in Table B.1. The resulting delivery factors are applied to determine the load to the Seekonk River.

**Table B.1. Delivery Factors**

Calculated from:  $A_i = A_{UB} * R_{m_i}/R_{M_{UB}}$

Source	River Mile	Attenuation	Delivery Factor
UBWPAD	44.4	13.0%	87%
Millbury	40.6	11.9%	88%
Grafton	35.4	10.4%	90%
Northbridge	29.2	8.5%	91%
Uxbridge	22.0	6.4%	94%
Woonsocket	12.4	3.6%	96%

**Northbridge Wastewater Treatment Plant - Response To Comments**

On September 25, 2012, the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) public noticed a Draft Permit (MA0100722) for the Northbridge Wastewater Treatment Plant.

EPA received comments from the Town of Northbridge, the Blackstone River Coalition, and the Rhode Island Department of Environmental Management. The following are responses to all significant comments received and descriptions of any changes made to the public-noticed permit as a result of those comments.

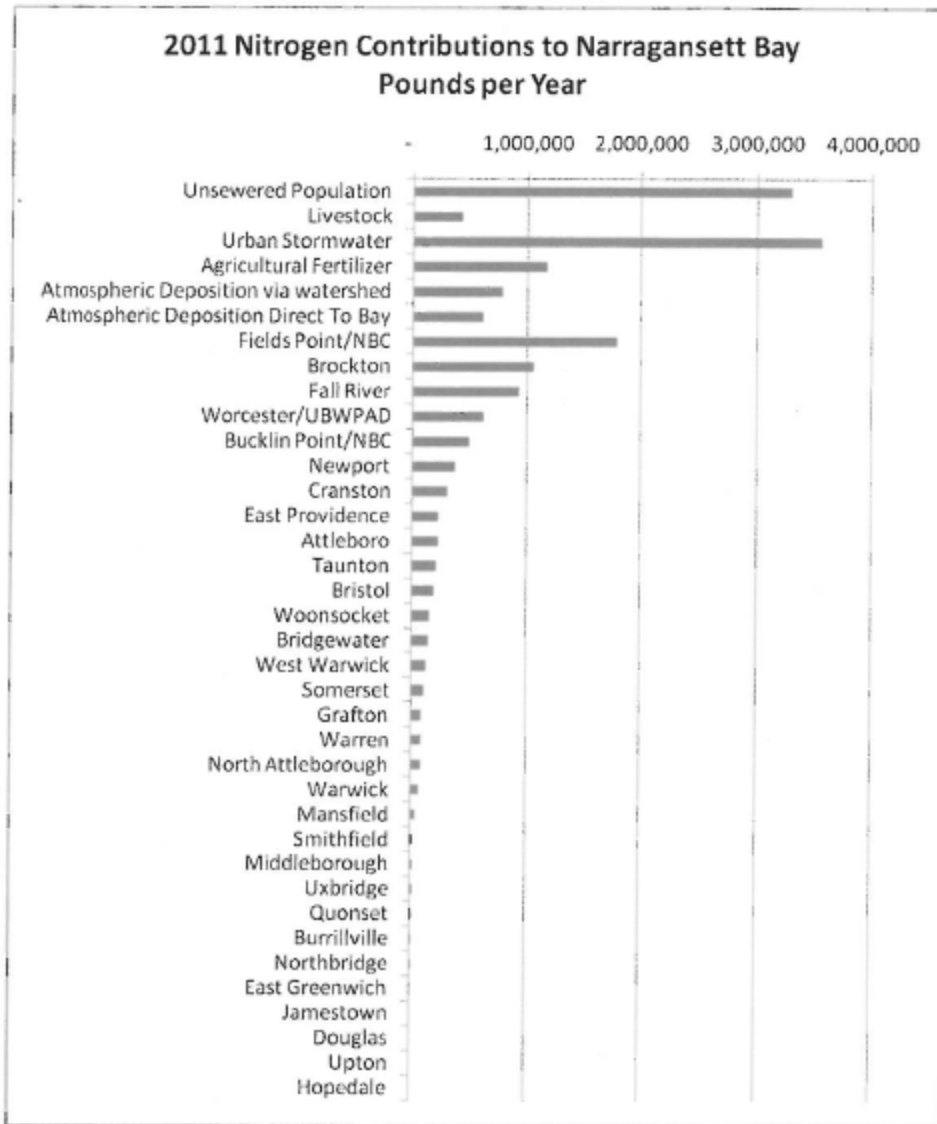
**A. The following comments were received from the Town of Northbridge in a letter and attached comments dated November 21, 2012:**

**Comment A1.** This permit is a renewal of a permit that was last reissued in 2006. The permit imposes limits on nutrients (nitrogen and phosphorus) that will result in significant costs to the Town, both operating and construction. The purpose of these limits is to control excessive plant growth in the Narragansett Bay and the Blackstone River. Our preliminary estimates indicate that the construction costs may approach as much as \$12 million. Our operating cost may also increase.

**Response to Comment A1.** EPA is aware of the significant burden and cost imposed by the new nitrogen limit in this permit. EPA does not expect that the facility will be able to comply with the new permit limit immediately, but expects to work with the facility to develop a compliance schedule for meeting the new limit that will be included in a administrative order. The compliance schedule will take into account cost and affordability, based on more complete cost information and on the median household income of the ratepayers, among other factors. EPA, *Interim Economic Guidance for Water Quality Standards*, EPA-823-B-95-002 (March 1995). However, the cost of compliance is not a permissible consideration in the *setting* of water quality based permit limits. *Upper Blackstone Water Pollution Abatement District v. U.S. EPA*, \_\_\_ F.3d \_\_\_ (August 3, 2012); *U.S. Steel Corp. v. Train*, 556 F.2d 822, 838 (7<sup>th</sup> Cir. 1977).

*Changes to permit: none.*

**Comment A2.** We have reviewed a variety of documents associated with these new nitrogen and phosphorus limits. We understand that the reduction in nitrogen and phosphorus in Narragansett Bay and the Blackstone River required of Northbridge is a tiny fraction of the overall nutrient load on the Bay and River. For example, according to EPA studies, the Bay receives approximately 17,400,000 pounds of nitrogen a year. The Northbridge plant now discharges about 15,000 pounds per year of nitrogen, or about 0.1 % of the total Bay loading. The attached graphic clearly demonstrates that our nitrogen contribution is a tiny portion of the loading to the Bay. A similar conclusion can be reached concerning phosphorus, using information from the Upper Blackstone Water Pollution Abatement District's study of the river.



**Response to Comment A2.** EPA agrees that the Northbridge plant in some respects is a relatively small discharge, although it is a “major discharger” under EPA’s permitting regulations (defined as POTWs with design flow  $\geq 1.0$  MGD). This is why EPA’s permitting approach in the Blackstone River basin has focused on the implementation of stringent permit limits on the Upper Blackstone Water Pollution Abatement District (UBWPAD) treatment facility first, while the Woonsocket, RI plant has upgraded to meet a permit limit of 3 mg/l pursuant to its RIPDES permit. EPA recognized that until these larger reductions were achieved, the incremental improvement to be obtained from permit limits on the Northbridge WWTP would likely be indiscernible. However, POTW discharges remain the largest source of nitrogen to the Providence/Seekonk Rivers and an even more dominant source under dry weather conditions. See Table 1 (from the “EPA study” cited in the comment: Industrial Economics, *Narragansett Bay Sustainability Pilot, Phase 1 Report*, Appendix A (March 2012)).

**EXHIBIT A-7. ESTIMATED NITROGEN LOADINGS IN THE NARRAGANSETT BAY WATERSHED IN 2011, BY NITROGEN LOADING AREA AND SOURCE CATEGORY**

NITROGEN LOADING AREA	ANNUAL NITROGEN LOADINGS (THOUSAND KG)							
	SEWERED POPULATION	NON-SEWERED POPULATION	ANIMALS (LIVESTOCK)	URBAN STORMWATER	AGRICULTURAL FERTILIZER	ATMOSPHERIC DEPOSITION		TOTAL
						VIA WATERSHED (NON-URBAN)	DIRECT TO BAY*	
Blackstone Above Manville (RI Portion)	73	31	5	76	48	38	0	27
Blackstone Above Millville (MA Portion)	312	183	46	220	37	59	0	85
Lower Bay	196	350	33	197	82	31	0	88
Pawtuxet	102	99	10	100	63	59	0	43
Small Watersheds	398	253	34	251	78	50	0	1,06
Taunton Above Bridgewater	599	192	27	284	100	58	0	1,26
Mid/Lower Taunton	180	198	25	236	61	37	0	73
Upper Bay	1,558	192	16	253	63	23	0	2,10
Total	3,419	1,499	195	1,617	533	356	276	7,89
Note:								
* Loadings in this category are not divided by nitrogen loading area because they are deposited directly from the atmosphere to Narragansett Bay.								

Table 1. From Industrial Economics *Narragansett Bay Sustainability Pilot, Phase I Report*, Appendix A (March 2012).

The graphic cited in the comment is somewhat misleading in the context of this permit action as it includes all sources to the entire Narragansett Bay/Mount Hope Bay estuary system. As the Fact Sheet for the public-noticed permit makes clear, the permit limit for total nitrogen is based on meeting loading targets to achieve water quality standards in the Providence and Seekonk Rivers. These are the tidal extensions of the Blackstone River and are not directly impacted by the majority of discharges listed in the commentor's graphic. Similarly, the scale of nonpoint sources in the graphic reflects loadings to the entire Narragansett Bay/Mount Hope Bay estuary system, which covers approximately 147 square miles and dwarfs the limited tidal river area that receives the most impact from Blackstone River discharges.

In addition, the graphic gives a misleading impression of the nature of source categories such as "urban stormwater" by lumping all urban stormwater sources into one category while POTW sources are disaggregated by individual facilities. While Northbridge's discharge may well be dwarfed by the sum of urban stormwater sources over a 500+ square mile watershed, urban stormwater is not a monolithic source, such that a reduction in this category would somehow be more efficient or effective than permit limits on a "small" wastewater treatment plant. For example the achievement of reductions in nitrogen loads from urban stormwater requires an enormous number of individual projects targeting individual sites of impervious area (e.g., parking lots, roadways). The incremental benefit of even a substantial investment in such projects is far less than what can be achieved via permit limits at a wastewater treatment plant. See Response To Comment A6.

With respect to phosphorus, EPA's analysis of the need for a water quality-based phosphorus limit is based specifically on conditions at the point where Northbridge's discharge enters the Blackstone River. While the permittee may view its discharge as small in the context of overall phosphorus loads to the entire system, EPA's analysis of



the localized impacts of the discharge indicates that the Northbridge discharge would cause an exceedance of the 0.1 mg/l Gold Book target under low flow conditions without stringent phosphorus limits. This is primarily because the vast majority of flow in the Blackstone River under low flow conditions is effluent from upstream treatment plants, which do not provide any dilution for nutrients from Northbridge's discharge. Indeed, even with a permit limit of 0.2 mg/l Northbridge's load is slightly higher than nonpoint source loads under design flow and low flow conditions. Baseflow under 7Q10 conditions is 9.3 mgd at a concentration of 0.04 mg/l, giving a load of 3.1 lb/d, compared to Northbridge's 3.3 lb/d permit limit.

*Changes to permit: none.*

**Comment A3.** While we are prepared to do our share to update the facility, we are concerned that the money we will spend to meet these limits will never bear fruit unless other nitrogen sources such as urban stormwater and unsewered populations are also addressed in a timely manner. The fact sheet claims that other sources of nutrients are being addressed. But that claim rings hollow, because we know of no comprehensive plan for the Blackstone River or the Narragansett Bay that has been developed to address all sources in a coordinated manner. It appears, from their "List of Impaired Waters"<sup>1</sup> that the Massachusetts Department of Environmental Protection (MassDEP) will not develop a plan for its section of the Blackstone River until 2013 and that Rhode Island will not do so until 2018 for phosphorus in the Blackstone River, and 2016 for nitrogen in the Narragansett Bay.

**Response to Comment A3.** EPA agrees that there is a need for comprehensive planning for the Blackstone River and Narragansett Bay. However, this does not obviate EPA's regulatory requirements to incorporate effluent limits in NPDES permits. These are mandated by the Clean Water Act and EPA's regulations and EPA does not have discretion to defer the imposition of permit limits until TMDLs are developed. Some aspects of nonpoint source nutrient loading are in fact being addressed, such as reduction in phosphates in household products, phosphorus fertilizer bans (see Massachusetts General Court, Chapter 262 of the Acts of 2012), reduction in atmospheric nitrogen contributions through Clean Air Act requirements (see, e.g., Chesapeake Bay TMDL, Appendix L. Setting the Chesapeake Bay Atmospheric Nitrogen Deposition Allocations), and stormwater management requirements pursuant to EPA's General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s), but there remains a need for TMDLs to address all sources in a coordinated manner.

Unfortunately, as the permittee notes, TMDLs are not forthcoming. MassDEP has informed EPA that there is no realistic prospect of that TMDL being completed in 2013. MassDEP has not provided a projected timeframe for completion, and the TMDL is not actively being worked on.

As the NPDES permitting authority in Massachusetts, it would certainly be EPA's strong preference that approved TMDLs be available when establishing NPDES effluent limits.

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<sup>1</sup> See <http://www.dem.ri.gov/pubs/303d/303d12.pdf> for the RI plan and <http://www.mass.gov/dep/water/resources/12list2.pdf> for the Massachusetts list.

As the permittee notes, the TMDL process provides for a more comprehensive watershed-wide assessment of pollutant sources, impacts and reductions than is possible in individual permitting actions, especially with respect to addressing the role of nonpoint sources. From a permitting perspective, TMDLs would relieve the extensive individualized technical analyses, requirements of reassessment of technical analyses with each permit issuance, and piecemeal litigation of individual permits, that has characterized nutrient permitting in Massachusetts. However, EPA is not the lead agency for developing TMDLs. Rather, this role has been given to the state under the Clean Water Act. Where a TMDL has not been completed for an impaired water and a permit to the affected receiving water has expired, EPA has little choice but to proceed with permit issuance nonetheless.

EPA's regulations are quite clear: where a discharge pollutant "will cause, have reasonable potential to cause, or contribute to" a water quality violation, EPA must include effluent limits designed to ensure that the discharge does not cause or contribute to water quality violations. When issuing a permit, EPA does not have authority to wait for a TMDL to be completed prior to setting water quality-based permit limits for such pollutants.

*Changes to permit: none.*

**Comment A4.** Because of the uncertainty on the timing of control of other sources, we request that the EPA adopt one or all of the following approaches:

- Require us to operate our treatment facility to "reduce the discharge of nutrients to the maximum extent possible using all available treatment equipment in place at the facility". We would work with you to define what constitutes an appropriate "maximum extent possible". This strategy, currently used for nitrogen by RIDEM in the Burrillville, RI treatment plant, would provide for some nutrient reductions, but would put off major construction until the coordinated plans are developed, and everyone understands the benefit of the invested dollars. When the plan is developed, the permit can be reissued with the coordinated limits.
- Incorporate a schedule of compliance in the permit, as is allowed by Massachusetts and Rhode Island regulations. Our recommended schedule is contained in the attached comments. This would make the limits effective at some time in the future, so that the permit can be modified, if the plans being developed by the States require limits different than the ones contained in the current permit.
- Agree that no permit renewal issued in the next 15 years will modify the nutrient limits contained in this permit, unless a coordinated plan for nutrient reduction has been developed and accepted by the EPA, MassDEP and RIDEM.

Regardless of the approach adopted, we urge the EPA to begin the process of developing these coordinated plans. We need to know what levels of control of all sources will be required in the future, so we can best plan to meet your water quality objectives. We are greatly concerned that

failure on the part of the agencies to develop coordinated plans will result in the next round of permits being issued with even lower nutrient limits, simply because it is the easiest thing to do.

We have already seen this happen in the case of several local wastewater agencies: Attleboro MA, the Narragansett Bay Commission and the Upper Blackstone Water Pollution Abatement District. This leads to the situation where one plant upgrade is immediately followed by another. This is very costly and confusing to the public and frustrating to local officials, who spin from one project to the next with no apparent end in sight.

Most importantly, in these difficult economic times, with local financial resources scarce, we need to carefully weigh each investment. Getting the permit limits “right the first time” will assure the public that its money is being spent wisely.

**Response to Comment A4.** The uncertainty on the timing on control of other sources is not a basis for deferring permit limits in a NPDES permit. With respect to the specific approaches suggested, the differences between the Northbridge WWTP and the Burrillville, RI facility are discussed in Response to Comment A6. EPA cannot incorporate a compliance schedule in the permit for limits based on Rhode Island water quality standards, as discussed in Response to Comment A10. With respect to agreements to a 15-year period with no modification of permit limits, EPA’s regulations provide for NPDES permit limit terms of five years. EPA does not expect to modify these permit limits in the next permit reissuance in the absence of a TMDL and barring unforeseen circumstances.

EPA understands the desire for certainty in making the large investments necessary to meet permit limits, but EPA’s governing statutes and regulations are clear that uncertainty is not a basis for delay in instituting permit limits. Moreover, a level of scientific uncertainty is inherent in projecting the impacts of such large scale reduction of nutrient inputs on a dynamic, watershed-scale system, even if the most sophisticated and data-rich models are available. EPA recognizes the difficulty of having nutrient limits lowered in successive permitting rounds and has sought to establish nutrient limits that are stringent enough to ensure that Northbridge’s discharge achieves water quality standards (i.e., getting the permit limits “right the first time”). However, given the inherent uncertainty, EPA encourages facility designs that are compatible with achieving even more stringent nutrient limitations, in order that more stringent limits can be achieved without major reconstruction should further reductions prove necessary.

*Changes to permit: none.*

**Comment A5.** Lastly, when these coordinated plans are developed, we urge you to consider sustainability in the selection of the most appropriate plan. Most of the technologies available today to meet these limits rely heavily on energy and chemicals, and result in expanded carbon and nitrogen footprints. We need to seriously consider these environmental effects in the development of nutrient control strategies.

**Response to Comment A5.** EPA agrees with the permittee that sustainability is an important consideration in designing the treatment process, and notes that substantial

progress being made in achieving more sustainable nutrient reduction and recovery processes. EPA encourages the permittee to closely evaluate these processes in selecting technologies necessary to achieve the permit effluent limits. Permit limit decisions, however, are based solely on water quality considerations and not the overall environmental footprint of the treatment process. See Response to Comment A1.

*Changes to permit: none.*

**Comment A6. [Nitrogen]** The proposed permit imposes a total nitrogen limit of 8 mg/l for the period May through October, and a loading limit expressed in pounds of 133 pounds per day. These limits would result in a reduction of our average effluent concentration of 2.3 mg/l (from present 10.3 mg/l in the summer season [to] 8 mg/l), and a reduction in loading of approximately 17 pounds per day (from approximately 78 pounds per day in the summer season presently to 60 pounds per day). The summer reduction, extrapolated to the whole year, amounts to approximately 6,000 pounds per year.

According to recent studies conducted on behalf of the Agency<sup>2</sup>, the total annual nitrogen load on Narragansett Bay is approximately 17.4 million pounds per year, and on the Providence and Seekonk Rivers, almost 4.8 million pounds per year. Our nitrogen load is an insignificant fraction of these overall loads, and is dwarfed by the contributions from unsewered properties, atmospheric deposition, livestock, agricultural fertilizer and urban runoff. Until such time as the Agency has developed plans to deal with these much larger, and apparently more problematic sources, we suggest that chasing small sources such as our discharge is a futile, and likely unproductive, effort.

Postponing the imposition of these limits on small discharges would appear to be consistent with the practices of the State of Rhode Island. The Rhode Island Department of Environmental Management (RIDEM) has recently reissued a RIPDES discharge permit for the Town of Burrillville, RI.<sup>3</sup> Burrillville has a 1.5 mgd treatment plant discharging to a tributary of the Blackstone River. That permit contains no numeric limit on Total Nitrogen. Rather, it requires the Town to “operate the treatment facility to reduce the discharge of Total Nitrogen to the maximum extent possible using all available treatment equipment in place at the facility”. We request that the proposed numeric limit in our NPDES permit be replaced with the language used by the Rhode Island regulators in the Burrillville permit.

**Response to Comment A6.** The comment understates Northbridge’s current nitrogen discharges and therefore the reduction that will be achieved through permit limits. While the Northbridge WWTP has in some periods achieved total nitrogen concentrations at or below 10 mg/l, the average summer concentration over the past three years was 11.5 mg/l, with an average of 15.7 mg/l in May to November 2012. See table below. The average load in 2012 was 109 lb/day. With a concentration of 15.7 mg/l the load reduction from the 8 mg/l limit is over 50 lb/day (18,250 lb/yr) at 2012 flows and 129 lb/day (47,085 lb/yr) at design flow.

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<sup>2</sup> See <http://www.epa.gov/research/waterscience/water-nutrients.htm>

<sup>3</sup> Copy attached.

		Effluent concentration (mg/l)			Load (lb/day)			Seasonal average TN	
		NO2+NO3	TKN	TN	NO2+NO3	TKN	TN	mg/l	lb/day
May	2010	5.8	1	6.8	43.5	7.5	51	9.0	47.8
June		6.8	0	6.8	38.6	0	38.6		
July		6.6	0.6	7.2	6.6	3.5	10.1		
October		13	0	13	75	0	75		
November		11	0	11	64.2	0	64.2		
May	2011	8.3	0.41	8.71	69	3.4	72.4	9.9	80.1
June		5.3	1.5	6.8	39.7	11.2	50.9		
July		8.3	0	8.3	48.4	0	48.4		
October		18	0	18	150	0	150		
November		7.9	0	7.9	79	0	79		
May	2012	13	1.5	14.5	97.5	11.2	108.7	15.7	108.7
June		12	0	12	90	0	90		
July		13	2.1	15.1	97.5	15.7	113.2		
October		19	0	19	126.7	0	126.7		
November		18	0	18	105	0	105		
Average								11.5	78.9

EPA is also aware that nonpoint source and stormwater nitrogen sources should receive further attention and analysis in this watershed, and that they are likely significant sources of nitrogen particularly in wet weather. However, the Narragansett Bay Sustainability Pilot findings indicate that as of 2011, even with the implementation of nitrogen reduction at all the Rhode Island facilities, significant reductions from UBWPAD, and nitrogen limits on the Attleboro and North Attleboro plants, the “Sewered Population” **remains the single largest source of annual nitrogen loads** to the Narragansett Bay/Mount Hope Bay estuary system at over 3.4 million kilograms per year, and larger than the **combined** loads of the next two largest categories, “Unsewered Population” and “Urban Stormwater” (totaling just over 3.1 million kilograms per year). See *Narragansett Bay Sustainability Pilot, Phase 1 Report*, Exhibit A-7 (Table 1 in Response to Comment A1). In dry weather, treatment plant discharges are an even more dominant nitrogen source, and eutrophication impacts are greatest during the dry summer season.

The permittee’s characterization of other sources as “larger, and apparently more problematic” misunderstands the nature of these sources. Every category of sources identified in the Narragansett Bay study represents a multitude of individual locations and activities that individually represent even smaller increments of total nitrogen loads than the Northbridge WWTP. As noted in Response to Comment A2, the incremental benefit of even a substantial investment in nitrogen reduction projects from such sources is far

less than what can be achieved via permit limits at a wastewater treatment plant. For example, based on cost estimates developed in connection with the Chesapeake Bay TMDL, the median annualized cost of nitrogen reduction from urban stormwater BMPs in that watershed is more than \$300 per pound per year. Thus to achieve an equivalent nitrogen reduction to that resulting from this permit limit, even at current flows (50 pounds per day, or 18,250 lbs/year), the cost from urban stormwater reductions would be upwards of an annualized \$5.4 million dollars per year, with a 20 year present value of over \$88 million (assuming a 2% SRF loan interest rate). While EPA recognizes the significant investment required from the Town of Northbridge, it is clearly only a fraction of the cost of an equivalent urban stormwater load reduction. See, Stearns & Wheeler and CDM. 2008. *Engineering Feasibility & Cost Analyses of Nitrogen Reduction from Selected POTWs in Massachusetts* at page 3-34 (20 year present value of cost to achieve 8 mg/l reduction at Northbridge WWTP projected at \$7.8 million); Town of Northbridge comment (projecting possible capital cost of \$12 million). Moreover, urban stormwater reduction calculations are based on assumed removal efficiencies from BMPs, and it is extremely difficult and costly to monitor these loads to ensure that the projected reductions are being achieved. While cost is not a consideration in setting NPDES permits, the permittee should be aware that wastewater treatment plant upgrades are among the most cost-effective, certain and reliable nutrient load reduction approaches.

With respect to Burrillville, RIDEM states that the basis for the permit conditions on the Burrillville POTW is its lower design flow of 1.5 mgd (operating at 0.85 mgd at last reissuance). RIDEM's position is that at that small flow, a reduction in nitrogen would not be that significant in pounds per day. (*Personal communication, Joseph Habarak, RIDEM, March 4, 2013*). Based on the Burrillville DMR data, this appears to be the case. Burrillville's average total nitrogen concentration in the summers of 2010 to 2012 was 9 mg/l (the highest of the three years was 2010, with a seasonal average of 10.2 mg/l). An equivalent permit limit of 8 mg/l TN would achieve a 1 mg/l reduction, or 12.5 lb/day at Burrillville's design flow. In comparison, as discussed above, the reduction in Northbridge's discharge at design flow is as much as 129 lb/day, or ten times the Burrillville reduction. This is a significant difference and is a reasonable basis for differing treatment of the two facilities in the permitting process.

*Changes to permit: none.*

**Comment A7. [Phosphorus.]** The Town of Northbridge is in a rather unique position with respect to the phosphorus limit contained in this permit. We have, over the past 3 years, consistently achieved the effluent limit for phosphorus (we have only exceeded the limit twice in 3 years), even though we do not use effluent filtration. Improvements underway at the treatment plant to improve our sludge thickening process will likely make the facility even more reliable.

We recognize that our performance might be considered atypical and that effluent filtration is commonly required to consistently achieve a limit of 0.2 mg/l total phosphorus; we also understand that filtration is the presumptive technology used in developing Massachusetts' "Highest and Best Practicable Treatment Technology" limit of 0.2 mg/l. However, since we are reliably meeting 0.2 mg/l even prior to our ongoing sludge handling improvements, operation of

effluent filters now, as a protective measure, will increase our costs significantly without any commensurate benefit.

This is especially true if, as the fact sheet says, that a “high level of control of phosphorus from all sources” is required to achieve water quality standards in the Blackstone, and that controls on stormwater and other sources appear to be off into the future. We expect that the specific nature of that “high level of control” and the level of control ultimately required for the Northbridge discharge will not be known until the Massachusetts Department of Environmental Protection undertakes a TMDL study of the Blackstone River. Based on their “Integrated Waters List”, this is not expected to start until 2013 at the earliest.

Our goal is to:

- Continue to meet the permit with our current operating strategy
- Defer an investment in filtration (or similar facilities) that would return no material benefit in the short run.
- And at the same time to avoid fines and penalties if we should slip into noncompliance.

It seems to us that if the permit were written to require that we operate the treatment facility to reduce the discharge of phosphorus to the maximum extent possible using all available treatment equipment in place at the facility, in a manner similar to that suggested for Nitrogen, that these objectives could be accomplished. If we start to exhibit noncompliance, or if the TMDL requires us to do more (or less), we could then take corrective action. We believe this approach represents a strategy that keeps our phosphorus loadings low, in a practical and cost effective manner, and avoids the potential that we might be spending significant sums of money on effluent filtration that might not materially benefit the river. We request that you modify the permit accordingly.

**Response to Comment A7.** The permittee does not present any valid basis for backsliding from an existing numeric water quality based limit in favor of a more imprecise and difficult to enforce narrative condition. See 40 CFR 122.44(l) (Antibacksliding).

While the permittee correctly notes that most facilities are expected to need effluent filtration capability to meet a 0.2 mg/l total phosphorus limit, the permit does not mandate a specific technology. Where the particular process used at a facility (here, a sequencing batch reactor process) proves capable of achieving a permit limit, the construction of additional facilities is not required by the permit. The permittee may continue with its current process for phosphorus removal if, as stated by the permittee, it continues to be able to meet the permit limit. (EPA notes that process changes will nonetheless be required in connection to achieve compliance with the new aluminum limit.) On the other hand, if additional facilities are needed to provide consistency in operation to avoid the permitting “slip[ping] into noncompliance,” EPA will not change the permit limits simply to allow the permittee to defer such an investment.

*Changes to permit: none.*

**Comment A8. [Rolling Average Limits]** We request that the limits for phosphorous and nitrogen be changed to 60 day rolling average values. We are concerned that unintended problems in compliance, even if they are corrected rather quickly, will lead to extreme difficulties in meeting the limits for that month. Using a 60 day rolling average will mitigate against this problem, while ensuring long term compliance. We believe that our small size relative to other sources, and the fact that limits have been set for low flow periods indicates that a 60 day rolling average should not pose any threat to the environment.

**Response to Comment A8.** Monthly average limits are a regulatory standard in NPDES permits for POTWs and longer averaging periods are used only where there is a demonstrated basis for their use. 40 CFR 122.45(d)(2). With respect to the nutrient limits in the Draft Permit, EPA's experience has been that permit limits of 0.2 mg/l TP and 8 mg/l TN are achievable on a monthly average basis. The impact of short-term problems should be muted by the frequency of sampling of 2 per week. The monthly average is retained in the Final Permit.

*Changes to Permit: none.*

**Comment A9. [Aluminum]** The permit imposes a limit on total aluminum of 87 ug/l as a monthly average and 844 ug/l as a maximum day value. Aluminum has not been in any of our prior permits.

As is shown in Table 7 of the fact sheet, the concentration of Aluminum in the unnamed brook at a point above our discharge consistently exceeds the national ambient water quality criteria, and is higher than the concentration of aluminum found in our effluent. The Massachusetts Water Quality Standards, 314 CMR 4.05(e) say:

Toxic Pollutants. All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife. For pollutants not otherwise listed in 314 CMR 4.00, the *National Recommended Water Quality Criteria: 2002, EPA 822R-02-047, November 2002* published by EPA pursuant to Section 304(a) of the Federal Water Pollution Control Act, are the allowable receiving water concentrations for the affected waters, unless the Department either establishes a site specific criterion *or determines that naturally occurring background concentrations are higher. Where the Department determines that naturally occurring background concentrations are higher, those concentrations shall be the allowable receiving water concentrations.* (emphasis supplied)

It is our understanding that the Upper Blackstone Water Pollution Abatement District has requested that the Department of Environmental Protection (DEP) determine that the naturally occurring levels of aluminum in the headwaters of the Blackstone are elevated above the criteria included in EPA 822R-02-047. We believe that the data included in Table 7 of the fact sheet confirms that the levels in our region of the Blackstone River watershed are also elevated. Accordingly, we are requesting, by this comment letter, that DEP make a similar determination



as it applies to Northbridge. Once such a determination is made by DEP, we expect that the aluminum limit will be modified to reflect the DEP's determination.

We should also note that our effluent is consistently non-toxic. The LC50 values reported as part of our whole effluent toxicity testing are consistently >100%, indicating that acute toxicity is not present, and our chronic no observed effects concentration always meets the limit of >83%, and is almost always 100%. This would appear to confirm the observation made in footnote S of the current national recommended water quality criteria that indicates “. . . EPA is aware of field data indicating that many high quality waters in the U.S contain more than 87 [u]g aluminum/L, when either total recoverable or dissolved is measured.”

**Response to Comment A9.** EPA recognizes the challenges presented by aluminum limits given the widespread use of aluminum compounds for phosphorus removal. However, the need to remove phosphorus is not a justification for allowing exceedances of state water aquatic life quality criteria for aluminum, just as the need for disinfection does not obviate the requirement for permit limits on toxic chlorine discharges. The problem is inherent in the selection of a toxic pollutant as a treatment compound. A permit limit on such a toxic pollutant is both reasonable and necessary.

Massachusetts' SWQS do permit MassDEP to make a “determination” that a higher concentration than the adopted criterion is “naturally occurring” in a particular receiving water, and identify an alternate naturally occurring concentration. Any such determination would be part of a Water Quality Standards process, not an individual permit issuance. No such determination has been made by MassDEP for the Blackstone River or its tributaries, and no evidence has been provided that would indicate that the aluminum concentrations currently found upstream of Northbridge are naturally occurring. The watershed upstream of Northbridge includes major roadways that are likely sources of stormwater metals pollution. Furthermore, aluminum impairments in receiving waters that are not influenced by point sources have been linked to acid rain, which is due to human activity and therefore does not constitute a naturally occurring condition. See, e.g., ENSR, *Evaluation of potential causes of aluminum-impairment in 21 New Hampshire Ponds* (2007) (Appendix E to *Determination of Total Maximum Daily Load (TMDL) for 158 Acid Impaired and 21 Aluminum Impaired New Hampshire Ponds*). The available information therefore does not support application of a higher “naturally occurring” criterion, and the 87 ug/l criterion must be used.

EPA is aware that MassDEP has indicated its intent to develop site specific criteria for aluminum, and a change in the water quality standards during the permit term would be grounds to request a permit modification pursuant to 40 CFR § 122.62(a)(3)(i)(B). Such a change would be based on whether there is a higher concentration of aluminum that can be maintained in the river without causing toxicity.

With respect to the bioassays cited in the comment, these permit limits are independent and whole effluent toxicity testing is not an allowable substitute for limits on specific pollutants that contribute to exceedances of a numeric criterion. Northbridge's toxicity testing results may provide some indication that a higher threshold for toxicity can be

established for this receiving water, but significant further analysis will be required to support the establishment of site specific criteria.

*Changes to permit: none.*

**Comment A10. [Schedules of Compliance]** As allowed by regulation<sup>4</sup>, we request that the proposed NPDES permit be modified to include a compliance schedule. The proposed nitrogen and phosphorus permit limits will require that we conduct planning to select appropriate technologies, develop design plans of the selected alternative, and finally to bid and award construction contracts to install the new components. Based on our understanding of the project as it now stands, we suggest that the following be included as milestone schedules for the project:

Complete Planning to meet Permit Requirements	December 2013
Begin Design to meet new Permit Requirements	March 2014
Complete Design of New Facilities	March 2015
Award Construction of New Facilities	July 2015
Commence Operation of New Facilities	May 2017

**Response to Comment A10.** EPA recognizes that a compliance schedule is both reasonable and necessary in the context of the new nutrient limits. However, Rhode Island water quality standards do not provide for compliance schedules to be included within NPDES permits, and EPA is required to ensure that permit limits conform to water quality requirements of other affected States. 40 CFR § 122.44(d)(4). EPA anticipates such a schedule being provided in an enforcement order to be issued following issuance of this Final Permit. EPA typically discusses the schedules in enforcement orders with permittees prior to issuance.

While Rhode Island's regulations governing NPDES permit issuance contain a provision regarding compliance schedule, authorization for such schedules must be contained within a state's water quality standards to be effective under EPA's regulations. *In The Matter of Star-Kist Caribe, Inc.*, 3 E.A.D. 172, 175, 177 (1990). Accordingly RIDEM does not include compliance schedules within its RIPDES permits but in enforcement orders.

*Changes to permit: none.*

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<sup>4</sup> See <http://www.dem.ri.gov/pubs/regs/regs/water/ripdes03.pdf>, Rule 20 and 314 CMR 4.03(b).

**B. The following comments were received from the Blackstone River Coalition in a letter dated November 26, 2012:**

**Comment B1.** The Blackstone River Coalition strongly supports the recently proposed draft permit limits for the Northbridge Sewage Treatment Plant. The new nutrient limits will provide significant water quality improvements for the Blackstone River, its downstream impoundments and ultimately the Narragansett Bay.

Northbridge is not alone in facing new limits for nitrogen and phosphorous. Every treatment plant along the river in both Massachusetts and Rhode Island is, or soon will be, forced to upgrade the quality of their discharges. Detailed scientific studies and years of citizen monitoring all report excessive nutrient levels that continue to plague the Blackstone. It is not EPA that tells us there are too many nutrients in the River; it is our noses. It is not arcane scientific models, but our eyes that can see excessive vegetation smothering downstream impoundments, and have witnessed fish kills in the Narragansett Bay.

Unfortunately, much like global warming, scientists can argue interminably as to what sources contribute how much, or how long it will take to achieve critical levels, or even what those levels are; but no one can disagree that there are simply way too many nutrients in the Blackstone River. Yes, regulators need to consider the effects of stormwater runoff and the existence of historic sediments; but at times of critical low flows in the summer, sewage treatment plants are the dominating factor affecting water quality.

Treatment at the end of the pipe is critical and necessary, but in all likelihood even the proposed limits will not be sufficient to achieve a “Fishable/Swimmable Blackstone”. The Blackstone River Coalition is committed to work with homeowners and businesses, cities and towns, federal and state agencies to restore a river we can be proud to call our home.

**Response to Comment B1.** EPA notes the support of the Blackstone River Coalition for the nutrient limits. EPA appreciates the commitment of the Blackstone River Coalition to work with stakeholders for the restoration of the Blackstone River.

*Changes to permit: none.*

**C. The following comments were received from the RIDEM in a letter dated November 19, 2012:**

**Comment C1.** The draft permit includes summer e-coli limits, to meet the Massachusetts water quality standards, and year round enterococci limits, to meet the Rhode Island water quality standards. The enterococci limits account for die-off when assigning permits limits that will meet the Rhode Island standards at the state line. These permit also include a condition that, after a minimum of 1 year, the permittee may request a reduction to only require enterococci monitoring in the winter if it is determined that “e.coli control is adequate to ensure control of enterococcus”. Although RIDEM is willing to accept the reduction to the enterococci monitoring, this reduction should only be made if it is demonstrated that compliance with the

e.coli limit will also ensure compliance with the enterococci limit. Therefore, RIDEM is requesting that the following change be made to footnote 7 of the permit:

7. *The E. coli limits are State certification requirements. The enterococci limits are a requirement of the EPA permit and are not a requirement of the Massachusetts Department of Environmental Protection (MassDEP) permit.*

*The enterococci sample shall be collected concurrently with one of the E.coli samples during the April to October period. After a minimum of one year, the permittee may request reduction of enterococci monitoring to winter only, if the monitoring data demonstrates that compliance with the E.coli limit is adequate to ensure compliance with the enterococcus limit. The request shall be made in writing to EPA and shall include all concurrent monitoring data collected by the permittee. The permittee shall continue sampling for both E.coli and enterococci between April and October until receiving written approval of its request from EPA.*

**Response to Comment C1.** EPA agrees that the revised language is consistent with the intent of the original language in the Draft Permit and more clearly states the showing that is required for EPA approval of a reduction in monitoring. The Final Permit has been modified accordingly.

*Changes to permit: Footnote 7 has been modified as set forth in the comment above.*