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 shall become effective on **(See ** below)**

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 day of

_____	_____
Stephen S. Perkins, Director	David Ferris, Director
Office of Ecosystem Protection	Massachusetts Wastewater Management Program
Environmental Protection Agency	Department of Environmental Protection
Boston, MA	Commonwealth of Massachusetts
	Boston, MA

****** This permit will become effective on the date of signature if no comments are received during public notice. If comments are received during public notice, this permit will be made effective no sooner than 30 days after signature

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 **001** to an unnamed tributary to the Blackstone River. Such discharges shall be limited and monitored by the permittee as specified below.

EFFLUENT CHARACTERISTIC	**EFFLUENT LIMITS**					**MONITORING REQUIREMENTS**[2]	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE**[3] **TYPE**
FLOW[1]	****	****	2.0 MGD	****	Report MGD	CONTINUOUS	RECORDER
FLOW[1]	****	****	Report MGD	****	*****	CONTINUOUS	RECORDER
BOD_5 [3]	167 lbs/Day	167 lbs/Day	10 mg/l	10 mg/l	Report mg/l	3/WEEK	24-HR COMPOSITE[4]
TSS [3]	167 lbs/Day	167 lbs/Day	10 mg/l	10 mg/l	Report mg/l	3/WEEK	24-HR COMPOSITE[4]
pH RANGE[5]	6.5 - 8.3 SU (SEE PERMIT PARAGRAPH I.A.1.b.)					1/DAY	GRAB
ESCHERICHIA COLI [5, 6] (April 1 to October 31)	****	*****	126 cfu/100 ml	****	409 cfu/100 ml	3/WEEK	GRAB
ENTEROCOCCI [6,7]	****	*****	108 cfu/100 ml	****	350 cfu/100 ml	1/WEEK	GRAB
TOTAL COPPER	****	*****	22 ug/l	****	32 ug/l	1/MONTH	24-HR COMPOSITE[4]
TOTAL ZINC	****	*****	58 ug/l	****	58 ug/l	1/MONTH	24-HR COMPOSITE[4]
TOTAL LEAD[8]	****	*****	0.9 ug/l	****	Report ug/l	1/MONTH	24-HR COMPOSITE[4]
TOTAL CADMIUM[8]	****	*****	0.16 ug/l	****	0.94 ug/l	1/MONTH	24-HR COMPOSITE[4]
TOTAL ALUMINUM	****	*****	87 ug/l	****	844 ug/l	1/MONTH	24-HR COMPOSITE[4]
WHOLE EFFLUENT TOXICITY [9, 10, 11,12]	Acute $LC_{50} \geq 100\%$ Chronic C-NOEC $\geq 83\%$					4/YEAR	24-HR COMPOSITE[4]

CONTINUED FROM PREVIOUS PAGE

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EFFLUENT CHARACTERISTIC	**EFFLUENT LIMITS**					**MONITORING REQUIREMENTS[2]**	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE[3] TYPE**
DISSOLVED OXYGEN (April 1st-October 31st)	NOT LESS THAN 5.0 mg/l					1/DAY	GRAB
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[4]
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[4]
TOTAL PHOSPHORUS[13] (April 1 - October 31)	3.3 lbs/Day	****	0.2 mg/l	****	Report mg/l	2/WEEK	24-HR COMPOSITE[4]
TOTAL PHOSPHORUS[13] (November 1 - March 31)	16.7 lbs/Day	****	1.0 mg/l	****	Report mg/l	2/MONTH	24-HR COMPOSITE[4]
ORTHO PHOSPHORUS[13] (November 1 - March 31)	Report lbs/Day	****	Report mg/l	****	Report mg/l	2/MONTH	24-HR COMPOSITE[4]
TOTAL NITROGEN[14] (May 1 - October 31)	133 lbs/Day	****	8 mg/l	****	Report mg/l	1/WEEK	24-HR COMPOSITE[4]
TOTAL KJELDAHL NITROGEN	Report lbs/Day	****	Report mg/l	****	Report mg/l	1/WEEK	24-HR COMPOSITE[4]
TOTAL NITRATE + NITRITE	Report lbs/Day	****	Report mg/l	****	Report mg/l	1/WEEK	24-HR COMPOSITE[4]

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

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 3. 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 currently with one of the E.coli samples during the April to October period. After a minimum of one year, the permitee may request reduction of enterococci monitoring to winter only, if the monitoring data establishes that E.coli control is adequate to ensure control of enterococcus. 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 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 satisfy this requirement.

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_{50} 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_{50}**	**Chronic Limit C-NOEC**
January April July October	February 28 May 31 August 31 November 30	*Ceriodaphnia dubia* (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_{50} is the concentration of effluent which causes mortality to 50% of the test organisms. Therefore, a 100% limit means that a sample of 100% effluent (no dilution) shall cause no more than a 50% mortality rate.

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. Chemical data of the receiving water samples must be included in the whole effluent toxicity (WET) report. The analytical results for the effluent from the WET tests for copper, lead and zinc may be used to satisfy the monitoring requirements for those parameters for the months that WET testing is conducted.

13. These limits are monthly average limits. The maximum daily value must be reported for each month. The monthly average mass loading shall also be reported. 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.

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[1] 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
   - Pollutant limitations
   - Operational Standards (pathogen reduction requirements and vector attraction reduction requirements)

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1 As defined at 40 CFR §122.2, which references the definition at 40 CFR §403.3

- 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.[2]

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

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

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

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

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

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2 This guidance document is available upon request from EPA Region 1 and may also be found at: http://www.epa.gov/region1/npdes/permits/generic/sludgeguidance.pdf

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, 2nd 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 15th 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, 2nd 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.

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 – November 26, 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:

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_5), 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 colonies/100 ml**	$\frac{175}{0.50}$ = **350 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 Massachusetss 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.[1] 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).[2]

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:

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

Where

Q_r = receiving water flow downstream of the discharge (Σ Qd + Qs)
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[3]
C_s = phosphorus concentration in baseflow, from sampling upstream of all POTWs = 0.04 mg/l

Solving for C_r yields:

$$C_r = \frac{\Sigma\ Q_d C_d + Q_s C_s}{Qr}$$

[1] Grafton's permit limit is based on the recently issued Draft Permit for that facility.

[2] 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.

[3] 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 orthophoshorus 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[4] 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

[4] 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[5], 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).[6] 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).

[5] 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.

[6] 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 $mg/m^2/day$, representing the average nutrient loading in the Narragansett Bay as a whole. The 2X was twice that (80.6 $mg/m^2/day$) 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^2/day. This compares to a "1X" loading in the MERL experiments of 40.3 mg/m^2/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 1 (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.

			At MA/RI state line	
Point Source	Initial Load at end of pipe (lb/day)	Final Load at MA/RI state line (lb/day)	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

						At MA/RI State Line	
Point Source	Design flow (MGD)	90% of Design Flow (MGD)[1]	Proposed total N permit limit (mg/l)	DIN component of permit limit (mg/l)[2]	DIN load discharged at limit (lb/day)	DIN load at MA/RI state line	Delivery Factor (%)[3]
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%

[1] Loads are calculated using 90% of design flow consistent with RIDEM's methodology in the 2004 RIDEM Report

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

[3] 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

	May-Oct, 2007 to 2009 DMR data		
POTW	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[1]	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

[1] 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)[1]	Proposed total N permit limit (mg/l)	DIN component of permit limit (mg/l)[2]	Initial DIN load (lb/day)	Final DIN load at MA/RI state line	Delivery (%)[3]
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%
Alternatives for Northbridge discharge:							
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	

[1] Loads are calculated using 90% of design flow consistent with RIDEM's methodology in the *2004 RIDEM Report*

[2] Non-DIN component of total N assumed to be 2 mg/l per the *2004 RIDEM Report*.

[3]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[7] 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

[7] Calculated from the 1X MERL load of 4.032×10^{-5} kg/m^2/day, times the area of the Seekonk River ($2.81 * 10^6$ m^2), 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[1]	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
Alternatives for Northbridge Discharge						
1. Northbridge at current concentration			Current DIN from DMR			
Northbridge	0.88	---	11.3	83	91%	75
				Total DIN load at mouth of Blackstone:		**1639**
2. Northbridge with permit limit of 8 mg/l			DIN component of limit			
Northbridge	0.88	8	6	44	91%	40
				Total DIN load at mouth of Blackstone:		**1604**

[1] 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:

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

	Zinc		Lead	
	Chronic	Acute	Chronic	Acute
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 CaCO3

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):

$(Q_d + Q_s) * (C_r) = (C_d * Q_d + C_s * Q_s)$; where

C_r = Target concentration in receiving water (set at criteria/total recoverable form)
Zinc chronic = 50.5/0.986 = 51.6 ug/l
Zinc acute = 50.9/.978 = 51.6 ug/l
Lead chronic = 0.8/.936 = 0.9 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
Zinc: 14 ug/l; Lead 0.7 ug/l

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"),[8] 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.

[8] 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 TotalRecoverable 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.[9] 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

[9] 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

$$QrCr = QdCd + QsCs$$

Which was rearranged as:

$$Cd = (QrCr – QsCs)/Qd$$

Where:

Qs = receiving water flow upstream of the discharge (7Q10 flow) = 0.36 MGD
Cs = copper concentration upstream of the discharge = 2 µg/l(tr)
Qr = receiving water flow downstream from the discharge = Qr = Qd + Qs = 2.36 MGD
Cr = copper concentration downstream from the discharge = set equal to criteria
Qd = design flow of the facility = 2.0 MGD
Cd = copper concentration in the discharge = effluent limit (being solved for)
Cr = Chronic criterion = 18 ug/l (dissolved); 18.9 ug/l (total recoverable)
Cr = Acute criterion = 25.7 ug/l (dissolved); 26.8 ug/l (total recoverable)

Monthly average (chronic):
Cd = [(2.36 MGD)(18.9 µg/l)- (0.36 MGD)(2 µg/l)] /2.0 MGD
Cd = 22 µg/l(tr)

Maximum daily (acute):
Cd = [(2.36 MGD)(26.8 µg/l) - (0.36 MGD)(2 µg/l)] /2.0 MGD
Cd = 32 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:

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

		Chronic	Acute
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 CaCO3

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:

$(Q_d + Q_s) * (C_r) = (C_d * Q_d + C_s * Q_s)$; 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/dilution factor * 100) = (1/1.2 * 100) = 83 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[10]). 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.

[10] "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

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

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Date

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

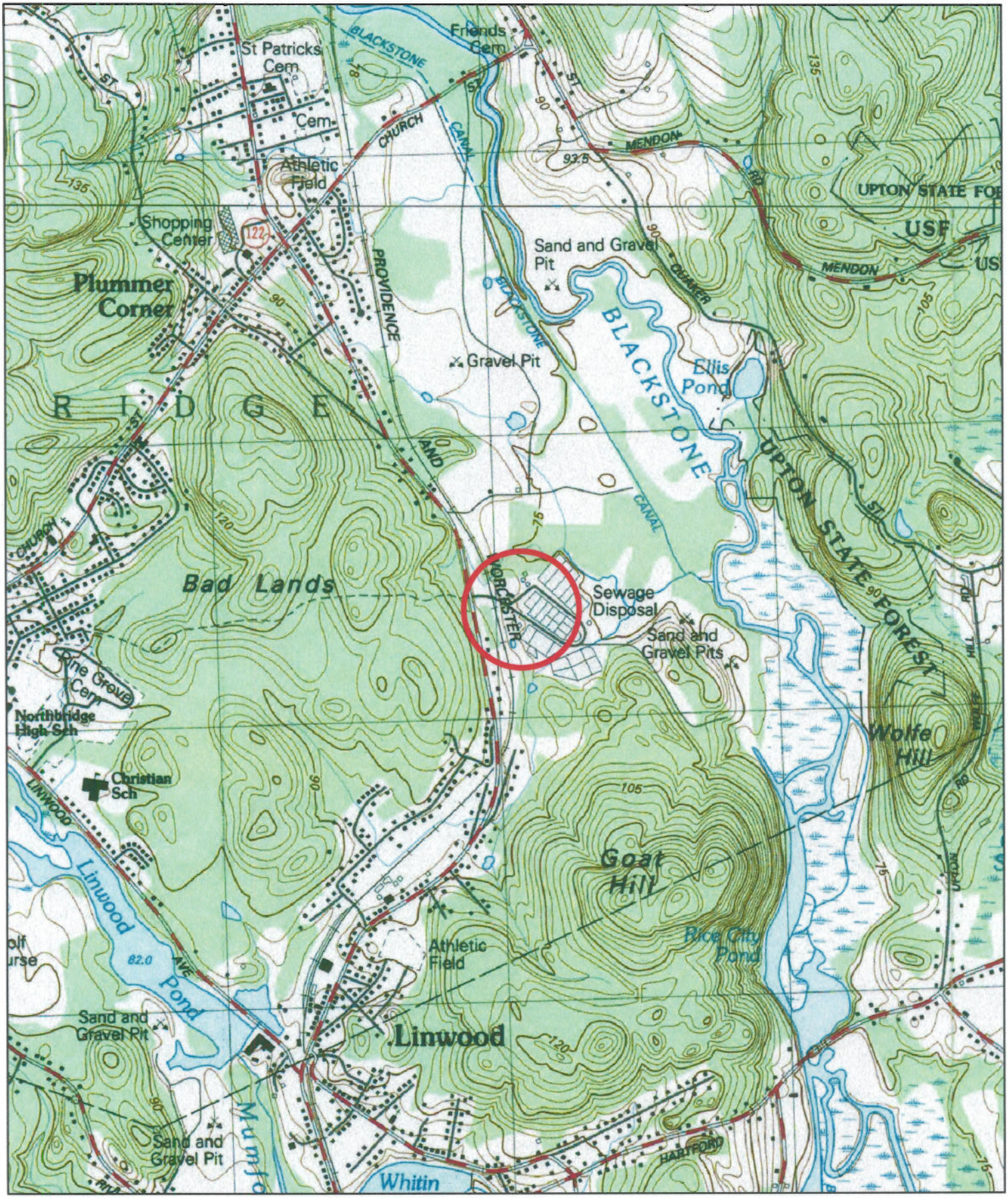
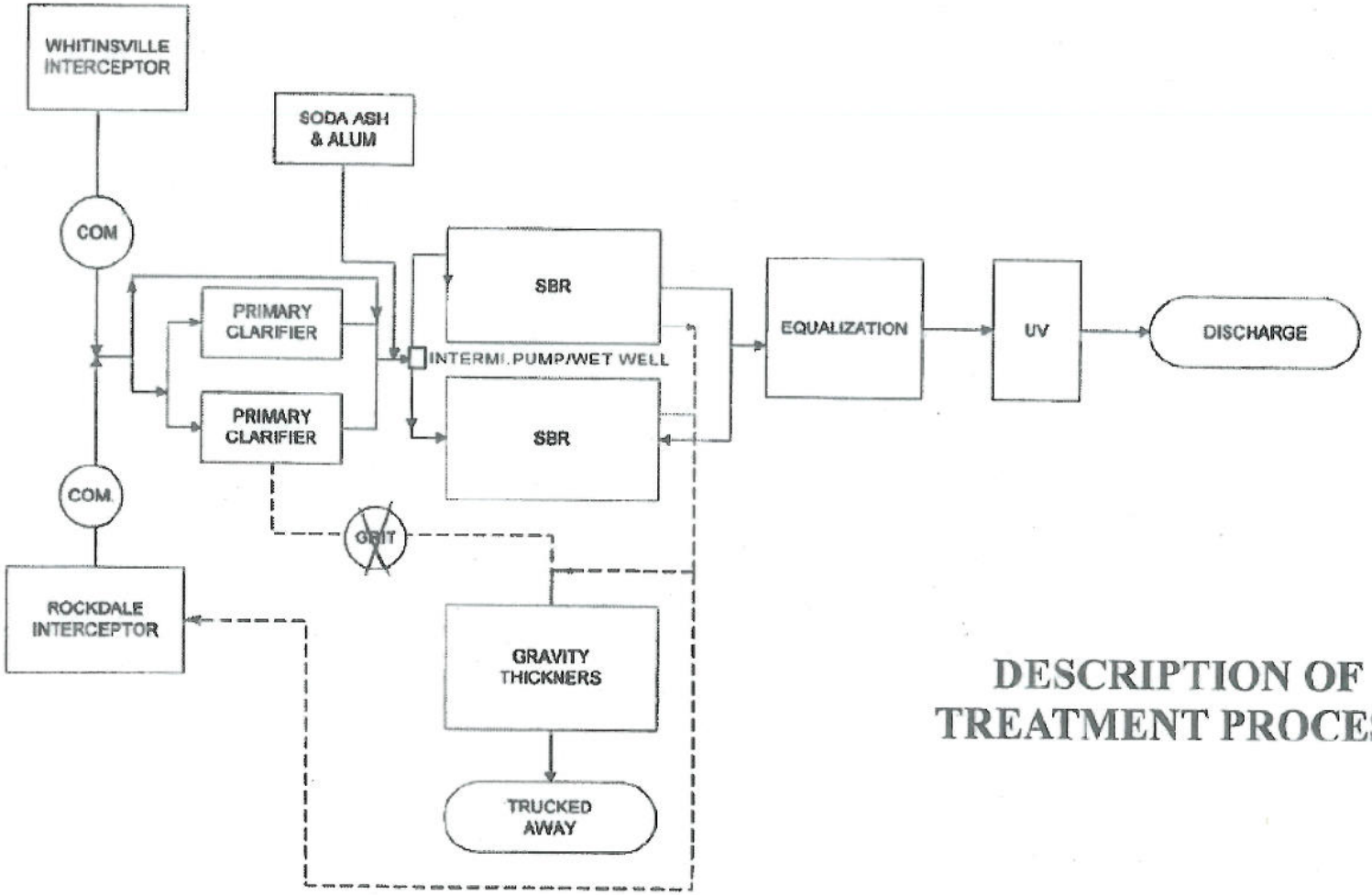


Figure 1. Location Map
Northbridge WWTP
NPDES No. MA0100722

Figure 2


WHITINSVILLE INTERCEPTOR
SODA ASH & ALUM
COM
PRIMARY CLARIFIER
PRIMARY CLARIFIER
SBR
INTERMI. PUMP/WET WELL
SBR
EQUALIZATION
UV
DISCHARGE
COM.
GRIT
ROCKDALE INTERCEPTOR
GRAVITY THICKNERS
TRUCKED AWAY
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	mo avg	wkly avg	% removal	mo avg	wkly avg	% removal	mo avg	daily max	min	max	min
Effluent Limit:	15.5	Report	10	10	85%	10	10	85%	200	400	6.5	8.3	
									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

Northbridge Wastewater Treatment Plant
NPDES Permit No. MA 0100722

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

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	0.2			3.1	3.1	2.2	2.2
0.03	0.03	0.09	0	0	0	0	0	0	0.1	0.2			5.8	5.8	1	1
0.18	0.18	0.85	0	0	0	0	62.1	62.1	0.16	0.21			6.8	6.8	0	0
0.4	0.4	0.7	15.5	15.5	0	0	0	0	0.19	0.2			6.6	6.6	0.6	0.6
0.02	0.04	0.04	0	0	0	0	54.1	54.1	0.22	0.36			13	13	0	0
0.01	0.01	0.03	12	12	0	0	0	0	0.2	0.2			11	11	0	0
0.5	0.5	0.19	0	0	0	0	57	57	0.13	0.17			12	12	0.39	0.39
0.13	0.13	0.6	24	24	0	0	85	85	0.17		0.11	0.11	12	12	0.86	0.86
0.02	0.02	0.06	17.5	17.5	0	0	104	104	0.24		0.17	0.17	6.7	6.7	1.3	1.3
0.12	0.12	0.27	0	0	0	0	122	122	0.5		0.4	0.4	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		0.3	0.4	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	0.2			2.5	2.5	0.78	0.78
0.08	0.08	0.19	0	0	0	0	77.9	77.9	0.2	0.2			8.3	8.3	0.41	0.41
0.04	0.04	0.05	0	0	0	0	52	52	0.19	0.2			5.3	5.3	1.5	1.5
0.08	0.08	0.1	0	0	0	0	66	66	0.2	0.23			8.3	8.3	0	0
0.05	0.05	0.07	12.3	12.3	0	0	0	0	0.2	0.3			18	18	0	0
0.03	0.03	0.04	0	0	0	0	0	0	0.19	0.2			7.9	7.9	0	0
0.03	0.03	0.04	25	25	0	0	75	75	0.17	0.21			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			0	52.6		0.26	0.22	0.30	0.34	8.1		0.69	
0.5	0.5	0.97	29.7	29.7		0	122	122	0.7	0.36	0.6	0.6	18	18	2.2	2.2

Northbridge Wastewater Treatment Plant
NPDES Permit No. MA 0100722

Table 7
Metals Effluent and Ambient Data

	Effluent Analytical Data (ug/l)								Ambient Analytical Data (ug/l)							
	Hardness	Al	Cd[1]	Cr	Cu	Ni	Pb[1]	Zn	Hardness	Al	Cd[1]	Cr	Cu	Ni	Pb[1]	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

[1] 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 $CBOD_5$, BOD_5, TSS, ammonia, phosphorus, nitrogen and metals were calculated based on the following equation:

$L = C \times Q_D \times 8.34$ 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_D = 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:
(Concentration limit) [10] X 8.34 (Constant) X 2.0 (design flow) = 167 lbs/day
Ammonia:
(Concentration limit) [2] X 8.34 (Constant) X 2.0 (design flow) = 33.4 lbs/day
(Concentration limit) [4] X 8.34 (Constant) X 2.0 (design flow) = 66.7 lbs/day
(Concentration limit) [9] X 8.34 (Constant) X 2.0 (design flow) = 150 lbs/day
(Concentration limit) [18] X 8.34 (Constant) X 2.0 (design flow) = 300 lbs/day
Total phosphorus:
(Concentration limit) [.2] X 8.34 (Constant) X 2.0 (design flow) = 3.34 lbs/day
(Concentration limit) [1] X 8.34 (Constant) X 2.0 (design flow) = 16.7 lbs/day
Total nitrogen:
(Concentration limit) [8] X 8.34 (Constant) X 2.0 (design flow) = 133 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^3/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: $A_i = A_{UB} * Rm_i/RM_{UB}$

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%

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
COMMONWEALTH OF MASSACHUSETTS
1 WINTER STREET
BOSTON, MASSACHUSETTS 02108

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ECOSYSTEM PROTECTION
REGION I
BOSTON, MASSACHUSETTS 02109

JOINT PUBLIC NOTICE OF A DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE INTO THE WATERS OF THE UNITED STATES UNDER SECTIONS 301 AND 402 OF THE CLEAN WATER ACT, AS AMENDED, AND UNDER SECTIONS 27 AND 43 OF THE MASSACHUSETTS CLEAN WATERS ACT, AS AMENDED, AND REQUEST FOR STATE CERTIFICATION UNDER SECTION 401 OF THE CLEAN WATER ACT.

DATE OF NOTICE: September 25, 2012

PERMIT NUMBER: **MA0100722**

PUBLIC NOTICE NUMBER: MA-029-12

NAME AND MAILING ADDRESS OF APPLICANT:

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

NAME AND ADDRESS OF THE 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: **Class B – warm water fishery**

PREPARATION OF THE DRAFT PERMIT:

The U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) have cooperated in the development of a permit for the above identified facility. The effluent limits and permit conditions imposed have been drafted to assure compliance with the Clean Water Act, 33 U.S.C. sections 1251 et seq., the Massachusetts Clean Waters Act, G.L. c. 21, §§ 26-53, 314 CMR 3.00 and State Surface Water Quality Standards at 314 CMR 4.00. EPA has formally requested that the State certify this draft permit pursuant to Section 401 of the Clean Water Act and expects that the draft permit will be certified. However, sludge conditions in the draft permit are not subject to State certification

requirements.

INFORMATION ABOUT THE DRAFT PERMIT:

A fact sheet (describing the type of facility; type and quantities of wastes; a brief summary of the basis for the draft permit conditions; and significant factual, legal and policy questions considered in preparing this draft permit) and the draft permit may be obtained at no cost at http://www.epa.gov/region1/npdes/draft_permits_listing_ma.html or by writing or calling EPA's contact person named below:

Susan Murphy
U.S. Environmental Protection Agency – Region 1
5 Post Office Square, Suite 100 (OEP06-1)
Boston, MA 02109-3912
Telephone: (617) 918-1534

The administrative record containing all documents relating to this draft permit is on file and may be inspected at the EPA Boston office mentioned above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except holidays.

PUBLIC COMMENT AND REQUEST FOR PUBLIC HEARING:

All persons, including applicants, who believe any condition of this draft permit is inappropriate, must raise all issues and submit all available arguments and all supporting material for their arguments in full by **October 24, 2012**, to the U.S. EPA, 5 Post Office Square, Boston, Massachusetts 02109-3912. Any person, prior to such date, may submit a request in writing to EPA and the State Agency for a public hearing to consider this draft permit. Such requests shall state the nature of the issues proposed 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 this draft permit, the Regional Administrator will respond to all significant comments and make the responses available to the public at EPA's Boston office.

FINAL PERMIT DECISION:

Following the close of the comment period, and after a public hearing, if such hearing is held, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice.

DAVID FERRIS, DIRECTOR
MASSACHUSETTS WASTEWATER MANAGEMENT PROGRAM
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

STEPHEN S. PERKINS, DIRECTOR
OFFICE OF ECOSYSTEM PROTECTION
ENVIRONMENTAL PROTECTION AGENCY – REGION 1