

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION I  
1 CONGRESS STREET - SUITE 1100  
BOSTON, MASSACHUSETTS 02114

FACT SHEET

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

NPDES PERMIT NO.: **MA0100412**

NAME AND ADDRESS OF APPLICANT:

**Westborough Treatment Plant Board  
238 Turnpike Road  
Westborough, Massachusetts 01581**

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

**Westborough Wastewater Treatment Plant  
238 Turnpike Road  
Westborough, Massachusetts 01581**

RECEIVING WATER: **Assabet River** (Concord Basin)  
**USGS Hydrologic code: 01070005**

CLASSIFICATION: **Class B**

**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 and industrial wastewater and septage. The discharge from this advanced secondary wastewater treatment facility is to the Assabet River. The Towns of Westborough and Shrewsbury are included as co-permittees for Section D (Unauthorized Discharges, Section E (Operation and Maintenance of the Sewer System), and Section F (Alternate Power Source).

**II. Description of Discharge**

A quantitative description of the wastewater treatment plant discharge in terms of significant effluent parameters based on recent monitoring data is shown on Table 1.

### **III. Permit Limitations and Conditions**

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

### **IV. Permit Basis and Explanation of Effluent Limitation Derivation**

The Town of Westborough's and Shrewsbury's Wastewater Treatment Plant (WWTP) is a 7.68 million gallon per day (MGD) advanced secondary wastewater treatment facility located in Westborough, Massachusetts, serving a population of about 35,000, including portions of the Town of Hopkinton. The facility also accepts septage from Westborough, Hopkinton and Shrewsbury. There are currently 12 industrial users contributing wastewater to this facility.

This facility employs an advanced oxidation ditch for biological treatment between the primary and secondary clarification stages. Disinfection is achieved with the addition of chlorine and dechlorination is conducted with sodium bisulfite. Ferric chloride is used for phosphorus removal.

Under Section 301(b)(1)(C) of the Clean Water Act (CWA), discharges are subject to effluent limitations based on water quality standards. The limitations in this permit are established to assure that the water quality uses of the receiving water as designated in the Massachusetts Surface Water Quality Standards (MASWQS) [314 CMR 4.00] are protected and maintained or attained.

According to 40 CFR 122.44(l), when a permit is reissued, effluent limitations, standards or conditions must be at least as stringent as the final effluent limitations, standards or conditions in the previous permit unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued.

### **Waterbody Classification and Usage**

The Assabet River at the point of discharge is classified in 314 CMR 4.00 as a Class B water body by the Massachusetts Department of Environmental Protection (MA DEP). Class B waters are designated as a habitat for fish, other aquatic life and wildlife and for primary and secondary contact recreation. These waters shall have consistently good aesthetic value. Where designated, they shall be suitable as a source of public water supply with appropriate treatment. They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses.

### **Conventional Pollutants**

Under Section 301(b)(1)(B) of the CWA, POTWs must have achieved effluent limitations based upon **secondary treatment** by July 1, 1977. The secondary treatment requirements are set forth at 40 CFR Part 133. EPA is required to consider both minimum technology-based controls and water quality requirements when developing effluent limitations. EPA regulations require NPDES permits to contain effluent limits more stringent than technology-based limits where more stringent limits are necessary to maintain or achieve federal or state water quality standards in accordance with Section 301(b)(1)(C) of the Clean Water Act (“CWA”). Effluent limitations for April through October for Biochemical Oxygen Demand (BOD<sub>5</sub>) and Total Suspended Solids (TSS) are water quality based limits and are the same as in previous permits. See **Attachment A** for a mass limit calculation for TSS. Effluent limitations for November through March for CBOD<sub>5</sub> and TSS are based on secondary treatment requirements. Effluent limitations for pH and fecal coliform are based on water quality standards and State Certification requirements for Publicly Owned Treatment Works (POTW) under Section 401(d) of the CWA, 40 CFR 124.53 and 124.55.

There have been no violations for BOD or TSS concentration limits during the period of 5/01 through 12/03. The BOD and TSS removal percentages have both averaged 99% with no violations of the 85% minimum removal requirements.

The permittee discharged a range of monthly average flows of 4.0 to 8.1 MGD to the Assabet River during the period of 5/01 through 12/03. The highest maximum daily discharge flow during this period of 13.0 MGD indicates that the facility is subject to significant quantities of infiltration and inflow (I/I) into the sewer system. The flow limit of 7.68 MGD reflects the facility design flow and has been maintained in the permit, expressed as an annual average. The permit includes new language for the control of I/I and clarifies the responsible parties. The permittee and co-permittees are responsible for ensuring that the I/I control program is sufficient to ensure that high flows do not cause an exceedance of the discharge limits and the co-permittees are responsible for ensuring that the I/I control program is sufficient to ensure that there are no unauthorized discharges from the separate sewer system.

### **Change in 7Q10 Flow**

To calculate certain permit limits the 7Q10 flow, which represents the 7 day low flow over a 10 year period, is required. For the previous permit, a 7Q10 flow analysis was completed based on the most recent 30 year record of the Maynard USGS flow gage. A graphical analysis of these data indicated a 7Q10 of approximately 14 cfs at the Maynard gage. In order to estimate the upstream wastewater flows contributing to the 7Q10 flow at the Maynard gage, and to use them in estimating the 7Q10 flow at the point of discharge, flow data from the three upstream POTW facilities for the low flow period of July through September were used for the previous 10 years. The average discharge flow for this permittee during this period was 6.0 cfs. The Maynard gage has a drainage area of 109 square miles excluding the headwaters impoundment which has no outflow during low flow conditions. A base flow of 0.024 cfs/square mile was calculated by subtracting upstream POTW flow from the 7Q10 flow at the Maynard gage and dividing by the drainage area. Since the Westborough

discharge is in close proximity to the headwaters impoundment (<1 square mile drainage area), the upstream 7Q10 flow available for dilution is essentially equal to zero.

### Phosphorus

It has been documented that most reaches of the Assabet River suffer from eutrophication, a condition caused primarily by excessive nutrients entering the river. Phosphorus and other nutrients promote the growth of nuisance algae and aquatic plants. When these plants and algae undergo their decay processes, they generate strong odors, result in lower dissolved oxygen levels in the river, and impair the benthic habitat. This phosphorus-driven eutrophication of the Assabet River prevents attainment of the designated uses as defined in the MASWQS. These uses include habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation.

There are several applicable water quality criteria which are not being met in the Assabet River due to phosphorus discharges and resulting eutrophication. They include numeric water quality criteria, e.g., dissolved oxygen, and narrative water quality criteria including aesthetics (314 C.M.R. § 4.05(5)(a)), bottom pollutants and alterations (314 C.M.R. § 4.05(5)(b)), and nutrients 314 C.M.R. § 4.05(5)(c).<sup>1</sup>

Although some phosphorus is introduced into the river from storm water runoff, the majority of phosphorus entering the river is from the four main POTWs discharging to the Assabet. These are the Westborough/ Shrewsbury, Marlborough Westerly, Hudson, and Maynard facilities. Another factor that compounds the eutrophication situation is the relatively high level of treated sanitary wastewater discharged to the Assabet from these four facilities during the low flow periods of summer and early fall. There are times when the Assabet River is composed almost entirely of wastewater effluent. In addition, the numerous impoundments on the Assabet River exacerbate the eutrophication effects of the phosphorus enrichment and create a sink for phosphorus that accumulates in the sediments. A significant amount of this phosphorus in the sediments recycles into the water column during the critical growing period.

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<sup>1</sup> An additional requirement related to cultural eutrophication exists at 314 C.M.R. § 4.04(5), as part of the state's antidegradation provisions. This section requires any existing point source discharge containing nutrients in a concentration that encourages eutrophication to apply the "highest and best practical treatment." In the case of the Assabet River, EPA and DEP have concluded that the technology-based requirement of "highest and best practical treatment," which the state had determined to be "0.2 mg/l" in the previously issued permits, will not be sufficient to address the water quality standards violations discussed above, and that a water quality based effluent limit is necessary to meet water quality standards.

The DEP has developed a Total Maximum Daily Load (TMDL) analysis for phosphorus in the Assabet River. The TMDL is based on a water quality model that was used to evaluate the maximum amount of a pollutant that may be introduced into a waterbody so that water quality standards will be met and maintained over the long term. The TMDL identifies a combination of point source phosphorus reduction and sediment remediation as the preferred scenario for achieving the phosphorus reduction necessary to achieve standards. The preferred scenario includes a reduction in point source discharges of total phosphorus to 0.1 mg/l in combination with a 90% reduction in the phosphorus loading from the sediments in the impoundments.

The seasonal total phosphorus limit of 0.1 mg/l is in effect from April through October. This limit is defined as a 60 day rolling average limit. The 60 day average value for each day in a given month, beginning on the 60<sup>th</sup> day after April 1, must be calculated and the highest 60 day average value for that month must be reported on the monthly discharge monitoring report (DMR). In addition, the maximum daily value must be reported for each month. The permit also requires that the permittee at all times operate and maintain the facility so as to minimize effluent phosphorous loadings.

In addition to the seasonal total phosphorus limit of 0.1 mg/l, the permit contains a winter period total phosphorus limit of 1.0 mg/l during November through March. The winter period limitation on total phosphorus is necessary to ensure that the higher levels of phosphorus discharged in the winter period do not result in the accumulation of phosphorus in the sediments. The limitation assumes that the vast majority of the phosphorus discharged will be in the dissolved fraction and that dissolved phosphorus will pass through the system given the short detention time of the impoundments and the lack of plant growth during the winter period. If future evaluations indicate that phosphorus may be accumulating in the impoundments, the winter period phosphorus limit may be reduced in future permit actions. The agencies will pursue the necessary resources in order to conduct the evaluation. If necessary, the permittee may be asked to conduct the analysis through the authority of Section 308 of the Clean Water Act.

The permit contains a compliance schedule for meeting the total phosphorus limits (see Section I.H. of the permit.) The schedule contains several interim milestones and reporting requirements relative to the steps necessary to complete the design and construction of facilities necessary to meet the final limits. By June 30, 2008, the Permittee must complete construction and initiate operation of the facility improvements. Final compliance with the total phosphorus limits must be achieved by April 1, 2009. The permit establishes an April through October seasonal interim total phosphorus limit of 0.75 mg/l that is in effect until the final compliance date noted above. The permit also establishes a November through March interim total phosphorus requirement to optimize phosphorus removal with a goal of achieving a discharge total phosphorus concentration of 1.0 mg/l or less.

### **Ammonia Nitrogen**

The previous permit included seasonal limits for ammonia nitrogen which were based on dissolved oxygen modeling completed by MA DEP in 1986. These limits are 1 mg/l for a monthly average and 1.5 mg/l for a daily maximum for the period of June through October. These limits are still appropriate and will remain in the permit. There were no violations of any of the ammonia nitrogen limits between 5/01 and 12/03.

A discharge limit for the period of November through May has been established to ensure that the ambient water quality criteria for ammonia toxicity is not exceeded. The applicable ambient chronic criteria for November through March is 7.9 mg/l based on a receiving water pH of 7.0, a receiving water temperature of 10 degrees Celsius and the absence of early life stages of the most sensitive species used to derive the criteria (see EPA 1999 Update of Ambient Water Quality Criteria for Ammonia). The applicable ambient criteria for April through May is 5.9 mg/l based on the same receiving water pH and temperature, and the presence of early life stages. A review of November through May flow data from the Maynard gage indicates that the lowest flow in recent years occurred in November of 2001 when the monthly average flow was 35.4 cfs. This is a factor of 2.5 times the annual 7Q10 value, and, even assuming some flow from the 16 square mile drainage area of the headwater impoundment, indicates minimal dilution at the point of discharge. A monthly average limit of 8.0 mg/l has been established for November through May to ensure that the ambient chronic criteria are met. The lower ambient criteria for April and May based on the presence of early life stages are expected to be met as a result of the significantly higher historical flows measured at the Maynard gage for April and May as compared to the November through March time period.

### **pH**

The permit requires the effluent pH to be maintained in the range of 6.5 s.u. to 8.3 s.u. consistent with MASWQS. This represents a change from the current permitted range of 6.0 s.u. to 8.3 s.u. reflecting the lack of dilution in the receiving water. The permittee has had several violations of the current permitted range, all on the lower end of the range.

### **Bacteria Limitations**

The Fecal Coliform limits are a geometric mean of no more than 200 colony forming units (cfu) per 100 ml and a daily maximum of 400 cfu per 100 ml. These limits are consistent with Class B water requirements of the MASWQS. There have been no violations for the period 5/01 through 12/03.

### **Total Residual Chlorine (TRC)**

Chlorine and chlorine compounds produced by the chlorination of wastewater can be extremely toxic to aquatic life. Effluent limits are based on water quality criteria for TRC which are specified in the water quality criteria document, often referred to as the EPA Goldbook. The criteria states that the average TRC in the receiving water should not exceed 11 ug/l for protection from chronic toxicity

and the maximum TRC should not exceed 19 ug/l for protection from acute toxicity. Effluent TRC limits have generally been less than the detection level of 50 ug/l, except for one reading during the period of 5/01 through 12/03 of 185 ug/l. A new detection level of 20 ug/l has been established in this permit.

The 7Q10 dilution and plant design flow are necessary to calculate the appropriate TRC limits. The 7Q10 dilution multiplied by the chronic and acute fresh water criteria provide the appropriate TRC limits. As shown in **Attachment B**, the calculated limits are 11 ug/l and 19 ug/l and these will be maintained as the permit limits.

The permit also includes a requirement that the chlorination and dechlorination systems include alarms for indicating system interruptions or malfunctions and that interruptions or malfunctions be reported with the monthly compliance reports. This requirement is intended to supplement the grab sampling requirements for chlorine and bacteria and is a recognition of the limitations of a grab sampling program for determining consistent compliance with permit limits.

### **Metals**

The MASWQS include requirements for the regulation and control of toxic constituents and also require that EPA criteria established pursuant to Section 304(a) of the CWA shall be used unless site specific criteria are established.

Calculations in **Attachment C** show the chronic and acute limits for copper and lead. The limitations for copper are the same as in the previous permit and the limit for lead is based on the reasonable potential for exceedances of the chronic criteria calculated in Attachment C. Effluent discharge levels for lead have ranged from less than detection to 20 ug/l. The permit limits for copper are 9.3 and 14 ug/l for monthly average and daily maximum, respectively, and the permit limit for lead is 3.0 ug/l. Effluent data for zinc indicate that there is not a reasonable potential to exceed the calculated criteria. Zinc effluent data has ranged from 5 ug/l to 79 ug/l. A monitor only requirement for zinc has been included in the permit. An instream hardness value of 100 mg/l, reflecting the high hardness level of the discharge, was used to calculate the metals limits.

### **Whole Effluent Toxicity**

National studies conducted by the U.S. 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, and in accordance with EPA regulation and policy, the draft permit includes acute and chronic 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, March 1991). EPA Region I has developed a toxicity control policy. The policy requires wastewater treatment facilities to perform toxicity bioassays on their effluents. Pursuant to EPA Region I policy, discharges having a dilution of less than 10:1 require acute and chronic toxicity testing four times per year. The principal advantages of biological techniques are: (1) the effects of complex discharges of many known and unknown constituents can be measured only by biological analyses; (2) bio-availability of pollutants after discharge is best measured by toxicity testing including any synergistic effects of pollutants; and (3) pollutants for which there are inadequate chemical analytical methods or criteria can be addressed. Therefore, toxicity testing is being used in conjunction with pollutant specific control procedures to control the discharge of toxic pollutants.

The draft permit requires that the Westborough WTF continue to conduct WET testing for the Outfall 001 effluent four times per year and that each test include the use of the daphnid, Ceriodaphnia dubia only, as this species was previously found to be more sensitive than the fathead minnow in previous test results. EPA Region I test protocols found in permit Attachment A shall be followed. The permittee has previously received authorization to use alternate dilution water for its toxicity tests because of difficulties it has been experiencing in obtaining valid Assabet River samples for test purposes. However, the permittee is still required to include a receiving water control test with each round of testing. For the time period noted above, the LC50 was 100% or greater for all occasions except for one, with a value of 71%, which was a violation of the permit limit.

The C-NOEC is the highest effluent concentration at which No Observed Chronic Effect (e.g. growth, reproduction, mortality) will occur at continuous exposure to test organisms in a life-cycle or partial life-cycle test. The "100% or greater" limit is defined as a sample which is composed of 100% effluent. This is a maximum daily limit based on the dilution factor of 1.0. Between 5/01 and 12/03, the C-NOEC has averaged 75%, with 5 violations of the permit requirement.

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

The Westborough WTP sludge is sent to be incinerated at the City of Fitchburg's wastewater treatment facility. The permit prohibits any discharge of sludge. Section 405(d) of the Clean Water Act (CWA) requires that sludge conditions be included in all POTW permits. Technical sludge standards required by Section 405 of the CWA were finalized on November 25, 1992 and published on February 19, 1993. The regulations went into effect on March 21, 1993.

#### **VI. Pretreatment Program**

The permittee is required to administer a pretreatment program based on the authority granted under 40 CFR §122.44(j), 40 CFR Part 403 and section 307 of the Act. The permittee's pretreatment

program received EPA approval on June 30, 1989 and, as a result, appropriate pretreatment program requirements were incorporated into the previous permit which were consistent with that approval and federal pretreatment regulations in effect when the permit was issued.

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

The permittee has completed a report entitled Local Limits Evaluation Report which is under review by EPA. However, the permittee is required to complete permit Attachment B in order to determine whether or not the proposed limits need to be revised to reflect current conditions.

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

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

Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855(b) (1) (A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999.

EPA has determined that a formal EFH consultation with NMFS is not required because the proposed discharge will not adversely impact EFH.

### **VIII. State Certification Requirements**

EPA may not issue a permit unless the Massachusetts Department of Environmental Protection certifies that the effluent limitations contained in the permit are stringent enough to assure that the discharge will not cause the receiving water to violate State Water Quality Standards. The staff of the Massachusetts Department of Environmental Protection has reviewed the draft permit and advised EPA that the permit is adequate to protect water quality. EPA has requested permit certification by the State pursuant to 40 CFR 124.53 and expects that the draft permit will be certified.

### **IX. Public Comment Period and Procedures for Final Decision**

All persons, including applicants, who believe any condition of the draft 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 the U.S. EPA, Office of Ecosystem Protection (SPA), 1 Congress Street, Suite 1100, Boston, Massachusetts 02114-2023. 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 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 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 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.

### **X. EPA and MADEP Contacts**

Additional information concerning the draft permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays, from the EPA and DEP contacts below:

David Pincumbe, USEPA Office of Ecosystem Protection  
One Congress Street, Suite 1100 - Mailcode CPE

Boston, MA 02114-2023  
Telephone: (617) 918-1695 FAX: (617) 918-1505

Paul Hogan, Massachusetts Department of Environmental Protection  
Division of Watershed Management, Surface Water Discharge Permit Program  
627 Main Street, 2nd Floor Worcester, Massachusetts 01608  
Telephone: (508) 767-2796 FAX: (508) 791-4131

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Date

Linda M. Murphy, Director  
Office of Ecosystem Protection  
U.S. Environmental Protection Agency

**TABLE 1 - OUTFALL 001 CHARACTERISTICS** <sub>1</sub>

<u>Parameter</u>	<u>Monthly Average</u>	<u>High Daily Maximums</u>	<u>Number of Violations</u> <sup>2</sup>
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Flow, MGD	Range: 4.0 - 8.1	13.0	0
BOD <sub>5</sub> , mg/l (April - Oct)	1.4	6, 5	0
CBOD <sub>5</sub> , mg/l (Nov - March)	1.5	4, 3	0
TSS, mg/l (April - Oct)	1.4	8.5, 6	0
TSS, mg/l (Nov - March)	1.0	3, 2	0
pH Range, S.U.	Range:	5.2 - 7.7	6
Fecal Coliform, cfu/100 ml	Range:	3 - 73	0
Phosphorus, mg/l, (April - Oct)	0.67	1.4, 1.3	3
(Nov - March)	3.7	6.1, 5.8	---
D.O. range, mg/l	Range:	6.0 - 6.9	0
Total Residual Chlorine, mg/l,	-----	185 <sup>4</sup>	1
Copper, Total, ug/l	8.7	16.6, 15.6	16
Zinc, Total, ug/l	Range:	0 - 72	---
BOD Removal, %	99	98, 99 <sup>3</sup>	0
TSS Removal, %	99	98, 98 <sup>3</sup>	0
LC50, daphnid, %	97	100, 71 <sup>3</sup>	1
NOEC, daphnid, %	75	50, 25 <sup>3</sup>	5

1. Data from Discharge Monitoring Reports (DMRs) for the period of May 2001 to December 2003.
2. These are NPDES effluent limitation violations for the period.
3. These are the low values for the period.
4. This was the only non-zero value for this parameter during the period of November through April.

**ATTACHMENT A**

**CONVENTIONAL POLLUTANT CALCULATION**

Receiving Water: Assabet River (Class B)

Plant Design Flow: 7.68 MGD

Parameter: Total Suspended Solids (TSS)

Secondary wastewater treatment requirement:

Monthly average = 30 mg/l

To convert to a mass limit, must multiply by the design flow and a conversion factor.

$$30 \text{ mg/l (7.68 MGD) (8.345) = 1920 lbs/day}$$

Conversion  
factor

Therefore, the monthly average (winter season) mass limit for TSS will be established at 1920 lbs/day. The other TSS and BOD mass limits were calculated similarly.

ATTACHMENT B

WATER QUALITY BASED EFFLUENT LIMIT DERIVATION

Parameter: Chlorine, Total Residual (TRC)

Water Quality Criteria: Fresh water - Chronic, Acute

0.011 mg/l, 0.019 mg/l

Instream 7Q10 flow: 0 MGD

Plant Design Flow: 7.68 MGD

Design Flow Dilution:

$$\frac{\text{Design flow} + 7\text{Q10 flow}}{\text{Design flow}}$$

$$\frac{7.68 + 0}{7.68} = 1$$

Effluent Limitations:

Monthly Average:

$$1.0 (.011 \text{ mg/l}) =$$

**0.011 mg/l**

Daily Maximum:

$$1.0 (0.019 \text{ mg/l}) =$$

**0.019 mg/l**

ATTACHMENT C

METALS LIMITS DERIVATION

Water Quality Criteria: Hardness dependent; See equation below.

Values calculated are in terms of the total metal.

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

		<u>Copper</u>	
Where:		Chronic	Acute
X =	0.8545		0.9422
Y =	-1.702		- 1.700

		<u>Lead</u>	
		Chronic	Acute
X=	1.273		1.273
Y=	-4.705		-1.460

		<u>Zinc</u>	
		<u>Chronic</u>	<u>Acute</u>
X=	0.8473		0.8473
Y=	0.884		0.884

h = Hardness = 100 mg/l as CaCO<sub>3</sub>

ln = natural logarithm

Thus; Copper

$$e^{(0.8545 [(\ln 100)] - 1.702)} \quad e^{(0.9422 [(\ln 100)] - 1.70)} =$$

9.3 ug/l                      14 ug/l

Lead

$$e^{(1.273 [(\ln 100)] - 4.705)} \quad e^{(1.273 [(\ln 100)] - 1.460)} =$$

3.2 ug/l                      81.6 ug/l

Zinc

$$e^{(0.8473 [(\ln 100)] + 0.884)} \quad e^{(0.8473 [(\ln 100)] + 0.884)} =$$

120 ug/l                      120 ug/l

Dilution Factor: 1.0

Water Quality Based Effluent Limitations:

Copper

Chronic	Acute
1.0 (9.3) =	1.0 (14) =
<b>9.3 ug/l</b>	<b>14 ug/l</b>

Lead

Chronic	Acute
1.0 (3.2) =	1.0 (81.6) =
<b>3.2 ug/l</b>	<b>81.6 ug/l</b>

Zinc

Chronic	Acute
1.0 (120.0) =	1.0 (120.0) =
<b>120.0 ug/l</b>	<b>120.0 ug/l</b>