UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I – NEW ENGLAND
ONE CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

FACT SHEET

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

NPDES PERMIT No.: **MA0100153**

NAME AND ADDRESS OF APPLICANT:

Town of Lee
32 Main Street
P.O. Box 630
Lee, Massachusetts 01238

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Lee Wastewater Treatment Facility
379 Pleasant Street
Lee, Massachusetts 01238

RECEIVING WATER: **Housatonic River**

CLASSIFICATION: **B (Warm Water Fishery)**

Table of Contents

I. PROPOSED ACTION

The above named applicant has applied to the U.S. Environmental Protection Agency (EPA) for the re-issuance of its National Pollutant Discharge Elimination System (NPDES) permit to discharge into the designated receiving water, the Housatonic River. The current permit was issued on September 29, 2000 and expired on November 30, 2005. A timely re-application was submitted and the expired permit was administratively continued pursuant to 40 CFR § 122.6. Upon becoming effective, the draft permit and the authorization to discharge will expire at midnight, five (5) years from the last day of the month preceding the effective date.

II. TYPE OF FACILITY AND DISCHARGE LOCATION

The Lee Wastewater Treatment Facility (WWTF) has recently been upgraded from a secondary to an advanced wastewater treatment plant, which is engaged in the collection and treatment of municipal wastewater. The upgraded facility has a design flow of 1.5 million gallons per day (MGD), and serves a population of approximately 6,000. This facility does not currently serve any industrial users, nor does it anticipate serving any during the life of the re-issued permit. The entire collection system consists of separate sanitary sewers. Treated effluent is discharged through a single outfall (outfall number 001) to the Housatonic River (see **Figure 3**).

The facility's discharge outfall is listed below:

Outfall	Description of Discharge	Outfall Location
001	Advanced Wastewater Treatment Facility Effluent	42° 17' 11"/ 73° 14' 21"

III. RECENT PERMITTING HISTORY

- Current permit administratively continued
- Re-application for NPDES permit received by EPA in September 2005
- Current permit expired November 30, 2005
- Current permit issued September 29, 2000

IV. DESCRIPTION OF THE DISCHARGE

A quantitative description of the discharge in terms of significant effluent parameters based on recent monitoring data can be found in **Appendix A**, **B**, **C, and D** of this fact sheet.

V. LIMITATIONS AND CONDITIONS

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

VI. PERMIT BASIS AND EXPLANATION OF EFFLUENT LIMITATION DERIVATION

A. Process Description

The Lee Wastewater Treatment Facility (WWTF) was recently upgraded from an extended aeration activated sludge secondary wastewater treatment plant to an advanced wastewater treatment plant that utilizes sequencing batch reactors (SBRs) and a filtration system in order to provide a higher degree of wastewater treatment. The new facility has a design flow of 1.5 million gallons per day (MGD), which is a fifty percent increase over the design flow (1.0 MGD) of the previous plant. Information provided by the applicant states that a population of approximately 6,000 will be served by the facility. At the present time, the facility does not serve any industrial users. The entire collection system consists of separate sanitary sewers

Raw wastewater from the separate sanitary collection system is conveyed to the headworks of the facility by a twenty-four inch influent pipe. Physical and mechanical treatment of the wastewater at the headworks consists of screening and grit removal to remove larger objects from the wastewater that might damage equipment farther along the treatment process train. Wastewater is then pumped into one of four sequencing batch reactor (SBR) vessels.

Wastewater treatment employing SBRs generally consists of four stages: (1) fill, (2) aeration, (3) settling, and (4) decanting. During the “fill” stage, raw wastewater is pumped into one of the SBRs, where it comes into contact with activated sludge. The wastewater is aerated at this stage in the treatment process to facilitate the growth of the aerobic bacteria in the activated sludge, which reduce the organic load in the wastewater by converting it into energy and biomass, as well as the microorganisms which convert toxic ammonia to less toxic nitrite and nitrate through the process of nitrification. Aluminum sulfate (alum) is added to the SBR vessel during the aeration stage to enhance the removal of phosphorus from the wastewater through chemical precipitation. During the “settle” phase of treatment, aeration and mixing of the wastewater ceases, allowing for the settling of any suspended material including solids, bacteria, and the precipitate formed by the binding of phosphorus to the alum added during the previous stage. The settling out of suspended material contributes to the formation of sludge at the bottom of the SBR vessel. During the decant phase, the clarified effluent is transferred from the SBR to the post equalization tank. Because SBRs provide treatment of wastewater in batches, the post equalization tank is necessary to ensure that a constant flow of wastewater is maintained throughout the remainder of the treatment process. Wastewater flows from the post-equalization tank through a disk filtration system to remove any remaining suspended solids that might interfere with the disinfection process. The filtration step also serves to remove any precipitated phosphorus that was not removed in the settling stage, which results in the final effluent containing a very low concentration of phosphorus. The filtrate then undergoes ultraviolet (UV) disinfection before being discharged to the Housatonic River through outfall 001 (see **Figure 3**).

Screenings and grit removed during preliminary treatment are trucked off-site and landfilled. Waste activated sludge from the SBRs is pumped to a waste sludge holding tank. Septage that is disposed of at the facility is stored in a septage storage tank. Polymer is added to the waste sludge and the solids from septage for sludge conditioning. Thickened sludge is held in a storage tank until it is trucked off-site to the Mattabassett Wastewater Treatment Plant in Connecticut for incineration.

The facility's location is shown in **Figure 3.**

B. Statutory and Regulatory Authority

1. General Requirements

The Clean Water Act (CWA) prohibits the discharge of pollutants to waters of the United States without a National Pollutant Discharge Elimination System (NPDES) permit, unless such a discharge is otherwise authorized by the CWA. The NPDES permit is the mechanism used to implement technology and water quality-based effluent limitations and other requirements, including monitoring and reporting requirements. This draft NPDES permit was developed in accordance with the various statutory and regulatory requirements established pursuant to the CWA and any applicable State regulations. The regulations governing the EPA's NPDES permit program are generally found at 40 CFR Parts 122, 124, and 125.

When developing permit limits, EPA is required to consider (a) technology-based requirements, (b) water quality-based requirements, and (c) all limitations and requirements in the current/existing permit. These requirements are discussed further in the following paragraphs.

2. Technology-Based Requirements

Under Section 301(b)(1) of the Clean Water Act (CWA), publicly owned treatment works (POTWs) must have achieved effluent limitations based upon secondary treatment by July 1, 1977. The secondary treatment technology guidelines (effluent limits) for POTWs, which represent the minimum level of control that must be applied to POTWs, can be found at 40 CFR Part 133. Since all Clean Water Act statutory deadlines for meeting technology-based guidelines have expired, the deadline for compliance with technology-based effluent limits for a POTW is the date of permit issuance (40 CFR § 125.3(a)(1)). Extended compliance deadlines can not be authorized by a NPDES permit if statutory deadlines have passed.

3. Water Quality Standards and Designated Uses

Section 301(b)(1)(C) of the CWA requires water quality-based effluent limitations in NPDES permits when EPA and the State determine that effluent limits more stringent than technology-based effluent limits are necessary to achieve or maintain water quality. Receiving water requirements are established according to numerical and narrative standards adopted under state law. A water quality standard consists of three elements: (1) beneficial designated use(s) for a waterbody or segment of a waterbody; (2) a numeric or narrative water quality criterion sufficient to protect the designated use(s); and (3) an anti-degradation requirement to ensure that once a use is attained, it will be maintained.

Pursuant to 40 CFR § 122.44(d), permittees must achieve water quality standards established under Section 303 of the CWA, including State narrative criteria for water quality. Additionally, under

40 CFR § 122.44(d)(i), "limitations must control all pollutants or pollutant parameters (either conventional, non-conventional, or toxic) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." When determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criterion within a State water quality standard, the permitting authority shall use procedures which account for existing controls on point and non-point sources of pollution, the sensitivity of the species to toxicity testing and where appropriate, consider the dilution of the receiving water (40 CFR § 122.44(d)(ii)).

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 the CWA. EPA's anti-backsliding provisions restrict the relaxation of permit limits, standards, and conditions. Therefore, unless under certain limited circumstances, effluent limits in the reissued permit must be at least as stringent as those of the previous permit. Effluent limits based on technology, water quality, and state certification requirements must meet the antibacksliding provisions found under Section 402(o) and 303(d) of the CWA, and in 40 CFR § 122.44(l). The limitations and conditions contained within the draft permit satisfy the antibacksliding requirements of the CWA.

The Housatonic River originates from tributaries in the Towns of Peru, Windsor, and Hinsdale, Massachusetts, and flows in a southerly direction through the City of Pittsfield and the Towns of Lenox, Lee, Stockbridge, and Great Barrington prior to flowing into Connecticut. The segment of the Housatonic River into which the Lee WWTF discharges treated effluent (segment MA21-19) runs for approximately 20 miles from the outlet of Woods Pond in Lenox to the Risingdale impoundment dam in Great Barrington. This segment is classified as Class B (warm water fishery) by the State of Massachusetts (314 Code of Massachusetts Regulations (CMR) § 4.06 Table 2). Class B waters are described in 314 CMR § 4.05(3)(b) as having the following designated uses: (1) a habitat for fish, other aquatic life, and wildlife; (2) primary and secondary contact recreation; (3) a source of public water supply (i.e., where designated and with appropriate treatment); (4) suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses; and (5) will have consistently good aesthetic value.

A warm water fishery is defined in the Massachusetts Surface Water Quality Standards as "waters in which the maximum mean monthly temperature generally exceeds 68° F (20° C) during the summer months and are not capable of sustaining a year-round population of cold water stenothermal aquatic life" (314 CMR §4.02).

The <u>Housatonic River Watershed 2002 Water Quality Assessment Report</u> (MassDEP 2007) describes this entire segment of the river (MA21-19) as being in non-attainment of the aquatic life and fish consumption designated uses due to elevated PCB levels in edible fish tissue as a result of PCB contamination from the General Electric site (for both uses) as well as elevated total phosphorus levels (aquatic life use). The primary contact, secondary contact, and aesthetics designated uses are also assessed as impaired for the upper 9.2 miles of this segment (from the outlet of Woods Pond in Lenox to the Willow Mill Dam in South Lee, south of the Lee WWTF) as a result of objectionable algal growth (Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007)).

Sections 305(b) and 303(d) of the CWA require that States complete a water quality inventory and develop a list of impaired waters. Specifically, Section 303(d) of the CWA requires States to identify those water bodies that are not expected to meet surface water quality standards after the implementation of technology-based controls, and as such, require the development of a Total Maximum Daily Load (TMDL) for each pollutant that is prohibiting a designated use(s) from being attained. In Massachusetts, these two evaluations have been combined into an Integrated List of Waters. The integrated list format provides the status of all assessed waters in a single, multi-part list.

This segment of the receiving water (MA21-19) is listed as a Category 5 water (waters not meeting a designated use and requiring the development of a TMDL) in the approved Massachusetts Year 2006 Integrated List of Waters. The pollutants resulting in the non-attainment of designated uses and requiring a TMDL are listed as priority organics, pathogens, unknown toxicity, thermal modification, and turbidity (Massachusetts Year 2006 Integrated List of Waters). This listing was based, in part, on data and observations presented in the Housatonic River Basin 1997/1998 Water Quality Assessment Report (MassDEP 2000). Newer information and data reflecting the current water quality in the Housatonic River has become available since the Massachusetts Year 2006 Integrated List of Waters (MassDEP 2006) was drafted. In September 2007, MassDEP released the Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007), which incorporates and summarizes the results of chemical, physical, and biological assessments conducted in the mainstem, tributaries, and associated impoundments of the Housatonic River since the publishing of the Housatonic River Basin1997/1998 Water Quality Assessment Report (MassDEP 2000). The 2002 assessment report served as the foundation in the development of the proposed Massachusetts Year 2008 Integrated List of Waters (MassDEP 2008), which was submitted to EPA in April 2008. In this document, segment MA21-19 of the Housatonic River is listed as impaired (i.e., a category 5 water) due to excess algal growth, polychlorinated biphenyls (PCBs), phosphorus (total), and PCB in fish tissue (proposed Massachusetts Year 2008 Integrated List of Waters (MassDEP 2008)).

a. Available Dilution

Water quality-based effluent limitations are established based on a calculated dilution factor derived from the available dilution in the receiving water at the point of discharge. Massachusetts water quality regulations require that the available effluent dilution be calculated based upon the 7Q10 flow of the receiving water (314 CMR 4.03(3)(a)). The 7Q10 flow is the mean low flow over seven consecutive days, occurring every ten years. Use of the 7Q10 flow allows for the calculation of the available dilution under critical flow (worst-case) conditions, which in turn results in the derivation of conservative water quality-based effluent limitations.

The 7Q10 flow value used in the calculation of the available effluent dilution and dilution factor in the current permit was re-evaluated to account for any changes in flow that may have occurred since that permit was issued. Flow data for the Housatonic River collected from 1913-2006 by the United States Geological Survey (USGS) gauge located on the river in Great Barrington, MA

(USGS Gauge No. 0119755) was used to determine the 7Q10 flow at the gauge station using the DFLOW 3.1b flow analysis program. An analysis of the flow data collected by the USGS gauge showed that flows in the receiving water have remained relatively unchanged from 1913 to 2006, which is presumably due to the long-time regulation of instream flows by upstream power plants and reservoirs (www.waterdata.usgs.gov).

A 7Q10 flow factor was calculated by dividing the 7Q10 flow at the gage (74.2 cfs) by the drainage area at the gauge (282 square miles (mi^2). This flow factor was then multiplied by the estimated drainage area at the Lee WWTF discharge outfall (165 mi^2) to determine the approximate 7Q10 flow of the receiving water at the point of discharge (43.3 cfs) (**Table 1**).

Using the design flow of the facility (1.5 MGD = 2.325 cfs) and the estimated 7Q10 of the receiving water at the point of discharge (40.3 cfs), a dilution factor of 18 was calculated as shown in **Table 1**.

C. Effluent Limitation Derivation

In addition to the federal and State regulations described in the preceding paragraphs, data submitted by the permittee in their re-application, in monthly discharge monitoring reports (DMRs), and in whole effluent toxicity (WET) test reports from 2005 to 2007 were used to evaluate the discharge during the effluent limitation development process (see **Appendix A, B, C**, and **D.**).

Table 1 Calculation of 7Q10 at the Lee WWTF and Dilution Factor Derivation

	USGS Gauge 01197500 (Period of Record: 1913-2006)	**Lee WWTF Outfall 001**
Drainage Area (mi^2)	**282**	**165**
7Q10 (cfs)	**68.9 ~ 69**	**40.3**
Flow Factor (cfs/mi^2)	**0.2443**	**0.2443**
7Q10 at Lee WWTF = (0.2443 cfs/mi^2 * 165 mi^2) = 40.3 cfs Dilution Factor = ($7Q10_{LeeWWTF}$ + Design Flow (cfs)) / Design Flow (cfs) = (40.3 cfs + 2.325 cfs) /2.325 cfs = 18.3 ~ 18		

1. <u>Flow</u>

The 1.5 MGD average monthly flow limitation proposed in the draft permit is based upon the average design flow of the upgraded facility in accordance with the requirements of 40 CFR § 122.45(b). Flow is to be measured continuously. The limit is an annual average limit. The permittee shall report the annual average monthly flow using the rolling average method.

Additionally, the monthly average and maximum daily flows for each month shall also be reported.

2. Conventional Pollutants

a. Biochemical Oxygen Demand (BOD_5)

The draft permit contains average monthly and average weekly BOD_5 limitations of 20 mg/l and 30 mg/l, respectively. These limits meet the requirements of 40 CFR §133.102(a)(1) and (2), and are based on the mass limitations described in the following paragraph and the design flow of the new facility. These limitations were calculated as follows:

Average Monthly Concentration. Limit = 250 lbs/day / (1.5 MGD X 8.34) = 20 mg/l

Average Weekly Concentration Limit = 375 lbs/day / (1.5 MGD X 8.34) = 30 mg/l

Average monthly and average weekly BOD_5 mass limitations are proposed in the draft permit in accordance with the requirements set forth at 40 CFR § 122.45(f). The proposed mass limitations are based on a design flow of 1.0 MGD rather than 1.5 MGD to maintain the BOD_5 loadings authorized by the current permit (which were calculated using a design flow of 1.0 MGD), in accordance with the State's antidegradation requirements (314 CMR § 4.04). Mass limitations were calculated as follows:

Mass Limitations (lbs/day) = C X DF X 8.34

Where:

C = Concentration limit
DF = Design flow of the facility
8.34 = Factor to convert effluent limit in mg/l and design flow in MGD to a limit expressed in lbs/day

.

Average Monthly Mass Limit (lbs/day) = 30 mg/l X 1.0 MGD X 8.34 = 250 lbs/day

Average Weekly Mass Limit (lbs/day) = 45 mg/l X 1.0 MGD X 8.34 = 375 lbs/day

In addition, in accordance with the provisions set forth at 40 CFR § 133.102(3), the draft permit requires that the 30-day average percent removal of BOD_5 be no less than 85%.

b. Total Suspended Solids (TSS)

The draft permit contains average monthly and average weekly TSS limitations of 20 mg/l and 30 mg/l, respectively. These limits meet the requirements of 40 CFR §133.102(b)(1) and (2), and are based on the mass limitations described in the following paragraph and the design flow of the new facility. These limitations were calculated as follows:

<u>Average Monthly Concentration Limit</u> (mg/l) = 250 lbs/day / (1.5 MGD X 8.34) = 20 mg/l

<u>Average Weekly Concentration Limit</u> (mg/l) = 375 lbs/day / (1.5 MGD X 8.34) = 30 mg/l

Average monthly and average weekly TSS mass limitations are proposed in the draft permit in accordance with the requirements set forth at 40 CFR § 122.45(f). The proposed mass limitations are based on a design flow of 1.0 MGD rather than 1.5 MGD to maintain the TSS loadings authorized by the current permit (which were calculated using a design flow of 1.0 MGD), in accordance with the State's antidegradation requirements (314 CMR § 4.04). Mass limitations were calculated as follows:

<u>Mass Limitations</u> (lbs/day) = C X DF X 8.34

Where:

C = Concentration limit
DF = Design flow of the facility
8.34 = Factor to convert effluent limit in mg/l and design flow in MGD to a limit expressed in lbs/day

.

<u>Average Monthly Mass Limit</u> (lbs/day) = 30 mg/l X 1.0 MGD X 8.34 = 250 lbs/day

<u>Average Weekly Mass Limit</u> (lbs/day) = 45 mg/l X 1.0 MGD X 8.34 = 375 lbs/day

In addition, in accordance with the provisions set forth at 40 CFR § 133.102(3), the draft permit requires that the 30-day average percent removal of TSS be no less than 85%.

c. <u>pH</u>

The pH limitations in the draft permit are based upon State water quality standards and State certification requirements for POTWs in accordance with Section 401(d) of the CWA, 40 CFR § 124.53 and § 124.55. Specifically, the Massachusetts Water Quality Standards for Class B waters, as stated in 314 CMR § 4.05(3)(b)(3), require the pH to be within the range of 6.5 - 8.3 Standard Units (SU) and not more than 0.5 SU outside of the natural background range. There shall be no change from the natural background conditions that would impair any use assigned to this Class.

The pH limitations in the draft permit are the same as those in the current permit, in keeping with the antibacksliding requirement of 40 CFR § 122.44(l) and are at least as stringent as the pH limitations set forth at 40 CFR § 133.102(c). The permittee shall continue to monitor the pH of the effluent twice per week.

d. <u>*Escherichia coli (E. coli)*</u>

The fecal coliform limits that are in the current permit have been replaced by limits for *Escherichia coli* (*E. coli*). The *E. coli* limits are based upon the recently adopted *E. coli* criteria in the revised Massachusetts Surface Water Quality Standards for Class B waters that were promulgated on December 29, 2006 (314 CMR § 4.05(b)(4)) and approved by EPA on September 19, 2007. In the revised water quality standards, fecal coliform bacteria have been replaced by *E. coli* as the bacterial indicator organism.

The *E. coli* limitations proposed in the draft permit are a geometric monthly mean of 126 colony forming units per 100 ml (cfu/ml) and a maximum daily value of 409 cfu/100 ml (this is the 90% distribution of the geometric mean of 126 cfu/ml). The *E. coli* limits are seasonal, and the monitoring season has been extended from the bacterial indicator monitoring period in the current permit from April 1st - October 15th to April 1st - October 31st to ensure adequate protection of the receiving water during the entire season when the river is most likely to be used for recreational purposes, in support of the contact recreation designated uses. The permittee shall monitor the effluent for *E. coli* once per week.

2. Non-conventional Pollutants

a. Nitrogen

In December 2000, the Connecticut Department of Environmental Protection (CT DEP) completed a Total Maximum Daily Load (TMDL) for addressing nitrogen-driven eutrophication impacts in Long Island Sound. The TMDL included a Waste Load Allocation (WLA) for point sources and a Load Allocation (LA) for non-point sources.

The point source WLA for out-of-basin sources (Massachusetts, New Hampshire and Vermont wastewater treatment facilities discharging to the Connecticut, Housatonic, and Thames River watersheds) requires an aggregate 25% reduction from the baseline total nitrogen loading estimated in the TMDL.

The baseline total nitrogen point source loadings estimated for the Connecticut, Housatonic, and Thames River watersheds were 21,672 lbs/day, 3,286 lbs/day, and 1,253 lbs/day respectively (see table below). The estimated current point source total nitrogen loadings for the Connecticut, Housatonic, and Thames Rivers respectively are 13,836 lbs/day, 2,151 lbs/day, and 1,015 lbs/day, based on recent information and including all POTWs in the watershed. The following table summarizes the estimated baseline loadings, TMDL target loadings, and estimated current loadings:

The TMDL target of a 25 percent aggregate reduction from baseline loadings is currently being met, and the overall loading from MA, NH, and VT wastewater treatment plants discharging to the Connecticut River watershed has been reduced by about 36 percent.

Table 2: Estimated Nitrogen Loadings to the Connecticut, Housatonic, and Thames Rivers

Basin	Baseline Loading[1] lbs/day	TMDL Target[2] lbs/day	Current Loading[3] lbs/day
Connecticut River	**21,672**	**16,254**	**13,836**
Housatonic River	**3,286**	**2,464**	**2,151**
Thames River	**1,253**	**939**	**1,015**
Totals	**26,211**	**19,657**	**17,002**

1. Estimated loading from TMDL, (see Appendix 3 to CT DEP "Report on Nitrogen Loads to Long Island Sound", April 1998)
2. Reduction of 25% from baseline loading
3. Estimated current loading from 2004 – 2005 DMR data – detailed summary attached as **Appendix D**.

In order to ensure that the aggregate nitrogen loading from out-of-basin point sources does not exceed the TMDL target of a 25 percent reduction over baseline loadings, EPA intends to include a permit condition for all existing treatment facilities in Massachusetts and New Hampshire that discharge to the Connecticut, Housatonic, and Thames River watersheds, requiring the permittees to evaluate alternative methods of operating their treatment plants to optimize the removal of nitrogen, and to describe previous and ongoing optimization efforts. Facilities not currently engaged in optimization efforts will also be required to implement optimization measures sufficient to ensure that their nitrogen loads do not increase, and that the aggregate 25% reduction is maintained. Such a requirement has been included in this permit. We also intend to work with the State of Vermont to ensure that similar requirements are included in its discharge permits. The draft permit includes a requirement for the facility to be operated in such a way that discharges of total nitrogen are minimized. The draft permit also includes average monthly and maximum daily reporting requirements for total nitrogen (TN), ammonia nitrogen, total Kjeldahl nitrogen (TKN), total nitrite nitrogen (NO_2), and total nitrate nitrogen (NO_3).

From January 2005 to October 2007, the Lee WWTF's effluent contained the following minimum, maximum, and average monthly concentrations of nitrogen: (1) Ammonia nitrogen: 0.02 mg/l – 49.5 mg/l; Avg. 7.18 mg/l; (2) TKN: 0.05 mg/l - 25.7 mg/l; Avg. 8.61 mg/l; (3) NO_2: 0.01mg/l - 0.22 mg/l; Avg. 0.18 mg/l; (4) NO_3: 0.01 mg/l- 21.5 mg/l; Avg. 3.64 mg/l; and (5) TN: 4.81 mg/l – 36.47; Avg. 12.43 mg/l (see **Appendix B).** It is expected that the advanced wastewater treatment facility will meet or exceed the degree of nitrogen removal observed in the former facility's effluent.

b. <u>Phosphorus</u>

While phosphorus is an essential nutrient for the growth of aquatic plants, it stimulates rapid plant growth in freshwater ecosystems when it is present in high quantities. The excessive growth of aquatic plants and algae within freshwater systems negatively impacts water quality and can interfere with the attainment of designated uses by (1) increasing the oxygen demand within the water body (to support an increase in both plant respiration and the biological breakdown of dead organic (plant) matter); (2) causing an unpleasant appearance and odor; (3) interfering with navigation and recreation; (4) reducing water clarity; and (5) reducing the quality and availability of suitable habitat for aquatic life. Cultural (or accelerated) eutrophication is the term used to describe excessive plant growth in a water body that results from nutrients entering the system as a result of human activities. Discharges from municipal and industrial wastewater treatment plants, agricultural runoff, and stormwater are examples of human-derived (i.e., anthropogenic) sources of nutrients in surface waters.

The Massachusetts Water Quality Standards do not contain numerical criteria for phosphorus. The narrative criterion for nutrients, found at 314 CMR § 4.05(5)(c), states that nutrients "shall not exceed the site-specific limits necessary to control accelerated or cultural eutrophication". The Massachusetts Water Quality Standards also require that "any existing point source discharges containing nutrients in concentrations which encourage eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the highest and best practical treatment to remove such nutrients" (314 CMR § 4.05(5)(c)). The MassDEP has established that a monthly average total phosphorus limit of 0.2 mg/l represents the highest and best practical treatment for POTWs.

In the absence of numeric criteria for phosphorus, EPA uses nationally-recommended criteria and other technical guidance to develop effluent limitations for the discharge of phosphorus. EPA has published national guidance documents which contain recommended instream criteria for total phosphorus. EPA's 1986 Quality Criteria for Water (the "Gold Book") recommends that instream phosphorus concentrations not exceed 0.05 mg/l in any stream entering a lake or reservoir, 0.1 mg/l for any stream not discharging direly into lakes or impoundments, and 0.025 mg/l within the lake or reservoir.

More recently, EPA has released recommended ecoregional nutrient criteria, established as part of an effort to reduce problems associated with excess nutrients in water bodies in specific areas of the country. The published criteria represent conditions in waters within ecoregions that are minimally impacted by human activities, and thus free from the effects of cultural eutrophication. Lee is located within Ecoregion XIV, Eastern Coastal Plains. The recommended total phosphorus criterion for this Ecoregion, found in the Ambient Water Quality Criteria Recommendations: Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams in Ecoregion XIV (EPA December 2000) is 24 µg/l (0.024 mg/l).

EPA has decided to apply the Gold Book criteria (0.1mg/l) because it was developed from an effects-based approach rather than the reference conditions-based approach used in the derivation of the ecoregional criteria. The effects-based approach is preferred in this case because it is more directly associated with an impairment of a designated use (i.e., recreation). The effects-based approach provides a threshold value above which water quality impairments are likely to occur. It applies empirical observations of a causal variable (i.e., phosphorus) and a response variable (i.e., algal growth) associated with impairment of designated uses. Reference-based values are statistically derived from a comparison within a population of rivers in the same ecoregional class. They are a quantitative set of river characteristics (physical, chemical, and biological) that represent minimally impacted conditions.

Elevated concentrations of chlorophyll *a*, excessive algal and macrophyte growth, and low levels of dissolved oxygen are all effects of nutrient enrichment. The relationship between these factors and high instream total phosphorus concentrations is well documented in scientific literature, including guidance developed by EPA to address nutrient overenrichment (Nutrient Criteria Technical Guidance Manual – Rivers and Streams, EPA July 2000 [EPA-822-B-00-002]).

The impacts associated with excessive phosphorus inputs are well documented in this segment of the river (MA21-19) in the Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007). Observations of "dense algal growth on both the submerged plants and rocks" at the sampling station located approximately 300 feet downstream from the Lee WWTF outfall, as well as "heavy algal growth" immediately downstream of the Willow Mill Dam in South Lee are noted in the report (MassDEP 2000). Primary contact, secondary contact, and aesthetics designated uses are assessed as impaired for the upper 9.2 miles of this river segment (which encompasses the Lee WWTF discharge) due to the excessive algal growth observed during the 2002 survey (Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007)).

The results of the MassDEP's 2002 water quality analyses and the observations made during stream surveys documented in the recently-released Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007) were used to support the development of the proposed Massachusetts Year 2008 Integrated List of Waters (MassDEP 2008), which was submitted to EPA by MassDEP in April 2008. In the proposed list, phosphorus and excess algal growth are identified as causing impairment of designated uses in the segment of the river where the Lee WWTF discharge is located (MA21-19). Further downstream, chlorophyll *a,* nutrients/eutrophication, excessive algal growth, and taste/odor are listed as causing an impairment of recreational uses in Lake Lillinonah in the State of Connecticut's 2006 Integrated Water Quality Report to Congress (CT DEP 2006). Sources listed as potentially contributing these pollutants include agriculture, unspecified urban stormwater, non-point sources, and municipal point source discharges (Integrated Water Quality Report to Congress CT DEP 2006). The non-attainment of designated uses in the segment of the receiving water in the vicinity of the discharge in conjunction with the information contained in the Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007) clearly indicate that the river is experiencing the effects of nutrient enrichment. Additionally, Connecticut's 303(d) listing of Lake Lillinonah suggests that negative effects of upstream nutrient inputs are being observed in downstream impoundments (CT DEP 2006).

Water quality data from the Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007) for samples collected approximately 300 feet downstream from the Lee WWTF in May, June, July, and September of 2002 indicate that the instream total phosphorus concentrations on the sampling dates were as follows: May 2002: 0.25 mg/l; June 2002: 0.18 mg/l; July 2002: 0.319 mg/l; Sept. 2002: 0.504 mg/l. In comparison, the total phosphorus concentrations of samples collected upstream in Lenox and downstream in Stockbridge and Great Barrington during the same survey were as follows: (1) Lenox: May 2002: 0.04 mg/l and 0.05 mg/l; June 2002: 0.09 mg/l, and 0.08 mg/l; July 2002: 0.162 mg/l, and 0.151 mg/l; September 2002: 0.188 mg/l, and 0.190 mg/l; (2) Stockbridge: May 2002: 0.04 mg/l; June 2002: 0.07 mg/l; July 2002: 0.108 mg/l; Sept. 2002: 0.092 mg/l; (3) Great Barrington: May 2002: 0.05 mg/l; June 2002: 0.08 mg/l; July 2002: 0.086 mg/l; Sept. 2002: 0.081 mg/l; (Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007)) (see **Appendix F** and **Figure 1**). Instream flow data collected by two USGS gauges (No. 01197000, East Branch Housatonic River at Coltsville, MA and No. 01197500, Housatonic River near Great Barrington) as well as precipitation data collected by the Massachusetts Department of Conservation and Recreation (DCR) precipitation gauges near the USGS gauges show no correlation between precipitation and streamflow before or during the 2002 sampling events, and that flows were relatively close to the 7Q10 flows for these stations (Housatonic River Watershed 2002 Water Quality Assessment Report, Appendix B (MassDEP 2007)). Therefore, the data are representative of instream conditions during critical flow periods.

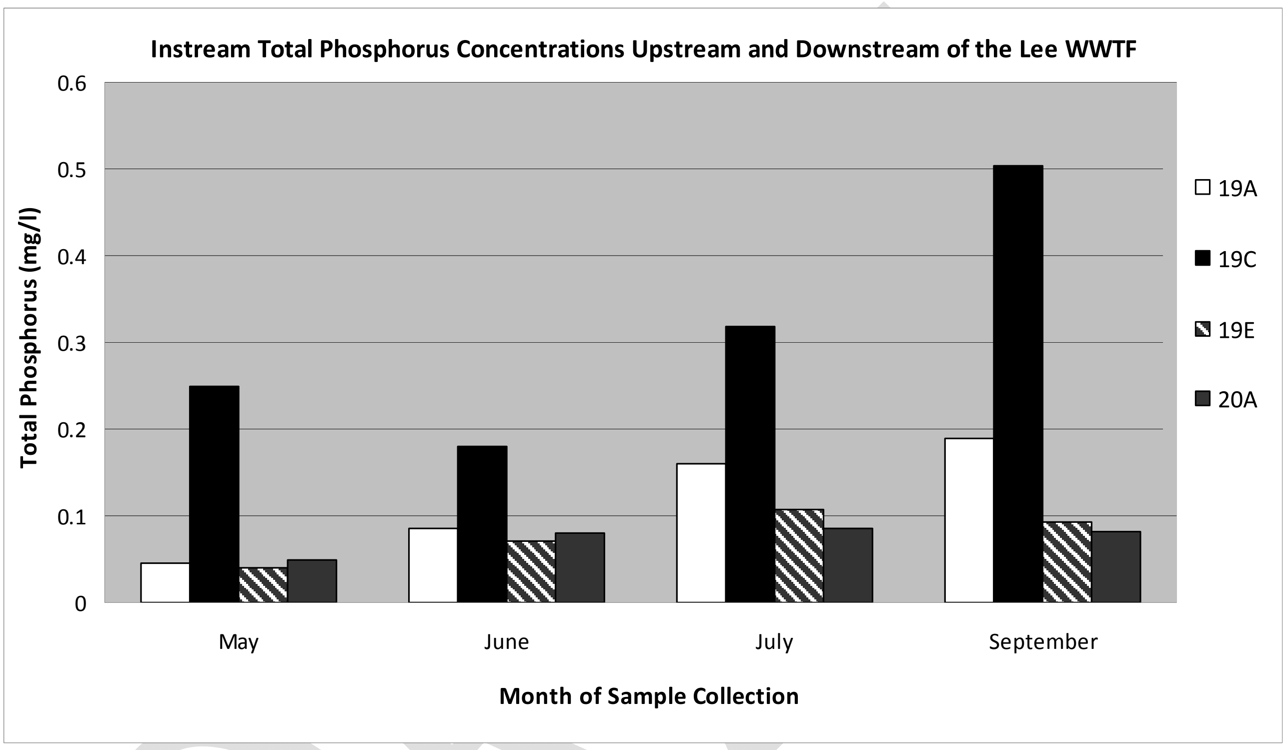

Figure 1: Instream Total Phosphorus Concentrations Upstream and Downstream From the Lee WWTF. Samples collected by the MassDEP in 2002. Results taken from the Housatonic River Watershed 2002 Water Quality Assessment Report, Appendix B (MassDEP 2007). Locations of sampling stations: 19A – Lenox, 19C – 300 ft. downstream of the Lee WWTF outfall, 19E – Stockbridge, 20A – Great Barrington.

Of the four stations sampled within this segment of the receiving water in 2002, samples collected approximately 300 feet downstream from the Lee WWTF outfall had the highest concentration of total phosphorus on each of the sampling dates. The data collected at this station also suggest that the Gold Book instream total phosphorus criteria of 0.1 mg/l is being exceeded in the receiving water (see **Figure 1** and **Appendix F**).

Taking the average of the 2002 total phosphorus results for the samples collected upstream of the Lee WWTF by the MassDEP yields an ambient (background) concentration of 0.12 mg/l (Housatonic River Watershed 2002 Water Quality Assessment Report, Appendix B (MassDEP 2007)). The effectiveness of the current seasonal average monthly total phosphorus limit (1.0 mg/l, May 1st - October 31st) in protecting the quality of the receiving water was evaluated by estimating the instream phosphorus concentration downstream from the discharge under critical flow (7Q10) conditions by accounting for a background phosphorus concentration (C_s) of 0.12 mg/l (this is the average of the results from the 2002 samples collected upstream from the Lee WWTF), an assumed concentration of phosphorus in the discharge equivalent to the current limit (C_d = 1.0 mg/l), the 7Q10 flow of the receiving water at the point of discharge (Q_s = 40.3 cfs), the design flow of the facility (Q_d = 1.5 MGD = 2.325 cfs), and the receiving water flow downstream of the discharge ($Q_r = Q_d + Q_s$ = 2.325 + 40.3 = 42.6 cfs) as follows:

$$C_r = Q_sC_s + Q_dC_d /Q_r$$

$$Cr = [(40.3 \text{ cfs})(0.12 \text{ mg/l}) + (2.325 \text{ cfs})(1.0 \text{ mg/l})] / 42.6 \text{ cfs} = 0.17 \text{ mg/l}$$

Therefore, given the background conditions, discharges of total phosphorus from the Lee WWTF in concentrations equal to the current limit would result in an instream concentration downstream from the discharge of 0.168 mg/l, which exceeds the Gold Book criteria of 0.1 mg/l.

Although effluent monitoring data submitted by the permittee from 2005-2007 show concentrations of phosphorus in the discharge ranging from 0.023 mg/l to 0.96 mg/l (see **Appendix B)**, which are less than the current limit of 1.0 mg/l, there is reasonable potential for the discharge to cause or contribute to an excursion above water quality criteria. The projected instream concentration of phosphorus downstream from the discharge was determined to be 0.17 mg/l by taking into account the maximum concentration of total phosphorus in the discharge from 2005-2007 (C_d = 0.96 mg/l), a background concentration of 0.12 mg/l (C_s), the 7Q10 flow of the receiving water at the point of discharge (Q_s = 40.3 cfs), the design flow of the facility (Q_d = 1.5 MGD = 2.325 cfs), and the receiving water flow downstream of the discharge ($Q_r = Q_d + Q_s$ = 2.325 + 40.3 = 42.6 cfs), as shown below.

$$C_r = Q_sC_s + Q_dC_d /Q_r$$

$$C_r = [(40.3 \text{ cfs})(0.12 \text{ mg/l}) + (2.325 \text{ cfs})(0.96 \text{ mg/l})] / 42.6 \text{ cfs} = 0.17 \text{ mg/l}$$

The results of the above calculation suggests that water quality criteria are not being met downstream of the discharge.

Phosphorus contributions from upstream municipal point sources could explain the 0.12 mg/l background instream total phosphorus concentration, as they have been implicated as suspected sources of nutrient inputs to the river in both the Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007) and in the State of Connecticut's 2006 Integrated Water Quality Report to Congress (CT DEP 2006). It is also possible that conditions in Woods Pond, a highly eutrophic impoundment located upstream from the Lee WWTF in Lenox, is negatively affecting downstream water quality and may have contributed to ambient conditions (i.e., elevated background concentrations of phosphorus), and therefore may have affected the high total phosphorus concentrations detected in samples collected by MassDEP in 2002 downstream from the Lee WWTF (Housatonic River Watershed 2002 Water Quality Assessment Report, Appendix B (MassDEP 2007)).

Prior to receiving the discharge from the Lee WWTF, the Housatonic River receives discharges of treated effluent from the Pittsfield Wastewater Treatment Plant (WWTP) as well as from the Lenox WWTP. A very stringent total phosphorus limit of 0.1 mg/l has been proposed in the draft permit for the Pittsfield Wastewater Treatment Plant, which is located upstream from the Lee and Lenox facilities. Since this facility is the largest municipal discharger on the river with a design flow of 17 MGD, it is expected that this limit will result in a significant decrease in phosphorus loadings to the river. Although the NPDES permit for the Lenox WWTP was recently issued with a year-round total phosphorus limit of 1.0 mg/l, more stringent phosphorus limits are anticipated to be included in future permits for this facility, as well as others which discharge to the Housatonic River, as they come up for reissuance in an effort to control eutrophication in the river.

Though it remains to be seen as to how long it will take for the anticipated reduction in phosphorus loadings to have an effect downstream, especially within and downstream from Woods Pond, the concentration of phosphorus upstream from the Lee WWTF following the incorporation of lower phosphorus limits in discharge permits issued to upstream POTWs can be approximated by accounting for an instream concentration equal to the recommended criteria (C_r = 0.1 mg/l), a concentration of phosphorus in the Lee WWTF's discharge equal to what is considered to be the highest and best practical treatment for phosphorus for POTWs (C_d = 0.2 mg/l), the 7Q10 flow of the receiving water upstream from the discharge (Q_s = 40.3 cfs), the design flow of the facility (Q_d = 1.5 MGD = 2.325 cfs), and the receiving water flow downstream of the discharge ($Q_r = Q_d + Q_s$ = 2.325 + 40.3 = 42.6 cfs), as shown below.

$C_s = Q_r C_r - Q_d C_d / Q_s$

C_s = [(42.6 cfs)(0.1 mg/l) – (2.325 cfs)(0.2 mg/l)] / 40.3 cfs = 0.094 mg/l ~ 0.09 mg/l

By assuming a reduction in the upstream phosphorus concentration (C_s = 0.09 mg/l), and by accounting for a phosphorus concentration in the Lee WWTF's discharge equal to the highest and practical treatment (C_d = 0.2 mg/l), the upstream concentration of phosphorus (C_s) can be estimated using the design flow of the facility (Q_d = 1.5 MGD = 2.325 cfs), the 7Q10 flow upstream from the discharge, and the receiving water flow downstream of the discharge ($Q_r = Q_d + Q_s$ = 2.325 + 40.3 = 42.6 cfs) as follows:

$C_r = Q_s C_s + Q_d C_d / Q_r$

C_r = [(40.3 cfs)(0.09 mg/l) + (2.325 cfs)(0.2 mg/l)] / 42.6 cfs = 0.099 mg/l ~ 0.1 mg/l.

By considering a reduction in phosphorus inputs from upstream sources, and by accounting for discharges of phosphorus from the Lee WWTF in concentrations equal to the highest and best practical treatment, it is expected that the downstream receiving water will meet the recommended criteria.

Based on the data and observations presented in the Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007), which are summarized in the above paragraphs, the listing of this segment of the river as being impaired due to, among other pollutants, total phosphorus and excess algal growth in the Massachusetts Year 2008 Integrated List of Water

(MassDEP 2008), and the results of the analyses presented above, an average monthly phosphorus limitation equal to what is considered by MassDEP to be the highest and best practical treatment for POTWs (0.2 mg/l) is proposed in the draft permit.

The phosphorus limit of 0.2 mg/l is seasonal, and shall be in effect from April 1st - October 31st in order to provide maximum protection of the receiving water during the entire growing season. In addition to the concentration limit, the draft permit includes a mass limitation for total phosphorus, which is based on the design flow of the new facility (1.5 MGD). The proposed average monthly mass limitation for total phosphorus is 2.5 lbs/day, which was calculated as follows:

> April 1st – October 31st Mass Limitations (lbs/day) = C X DF X 8.34
>
> Where:
>
> C = Concentration limit
> DF = Design flow = 1.5 MGD
> 8.34 = Factor to convert effluent limit in mg/l and design flow in MGD to a limit expressed in lbs/day
>
> Average Monthly Mass Limit (lbs/day) = 0.2 mg/l X 1.5 MGD X 8.34 = 2.5 lbs/day

The draft permit also includes an average monthly winter total phosphorus limit of 1.0 mg/l that is in effect from November 1st - March 31st. This limit is necessary to ensure that higher levels of phosphorus discharged during the winter months do not result in the accumulation of phosphorus in downstream sediments. This limitation assumes that the vast majority of the phosphorus discharged will be in the dissolved fraction, and that the dissolved phosphorus will pass through the system given the lack of plant growth during the winter period. The draft permit also includes an average monthly winter mass limitation for total phosphorus of 12.5 lbs/day, which is based on the design flow of the new facility (1.5 MGD) and was calculated as follows:

> November 1st – March 31st Mass Limitations (lbs/day) = C X DF X 8.34
>
> Where:
>
> C = Concentration limit
> DF = Design flow = 1.5 MGD
> 8.34 = Factor to convert effluent limit in mg/l and design flow in MGD to a limit expressed in lbs/day
>
> Average Monthly Mass Limit (lbs/day) = 1.0 mg/l X 1.5 MGD X 8.34 = 12.5 lbs/day

The mass limitation for total phosphorus in the draft permit is consistent with the antidegradation requirements found at 314 CMR § 4.04. The maximum daily mass loading of total phosphorus shall also be reported.

A seasonal (November 1st- March 31st) monitoring requirement for dissolved ortho-phosphorus is also proposed in the draft permit. Monitoring for ortho-phosphorus is necessary to identify whether the particulate fraction remains low and to further understand the dynamics of phosphorus during the non-growing season.

c. Dissolved Oxygen

The Massachusetts Surface Water Quality Standards for Class B waters state that the concentration of dissolved oxygen shall not be less than 5.0 mg/l in a warm water fishery (314 CMR §4.05(b)(1)). The Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007) cites low dissolved oxygen as contributing to the poor water quality at the sampling station located downstream from the Lee WWTF outfall. Specifically, the concentration of dissolved oxygen in samples collected at this station in July and September 2002 was 4.4 mg/l and 5.0 mg/l, respectively (Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007). The dissolved oxygen concentration of samples collected at this station in May, June, July, August, and September were consistently lower than those from samples collected at stations upstream in Lenox and downstream in both Stockbridge and Great Barrington on the same dates. These results, taken from Appendix B of the Housatonic River Watershed 2002 Water Quality Assessment Report (MassDEP 2007), are depicted in **Figure 2.**

In order to effectively evaluate the extent to which the Lee WWTF's discharge may be contributing to low dissolved oxygen in the receiving water in the vicinity of the outfall, the draft permit requires the facility to monitor the concentration of dissolved oxygen in the final effluent once per day.

3. Toxic Pollutants

a. Total Residual Chlorine (TRC)

The total residual chlorine limitations, monitoring, and reporting requirements that are in the current permit have been eliminated from the draft because the new facility uses ultraviolet (UV) irradiation for disinfection of the final effluent. In addition, the current permit's requirement for the annual submittal of a chlorination system report has also been removed from the draft permit.

b. Metals (Aluminum, Lead, Zinc, Chromium, Cadmium, and Copper)

The Massachusetts Surface Water Quality Standards 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.

Metals data submitted by the permittee along with the results of chemical analyses performed in conjunction with whole effluent toxicity (WET) tests from December 2005 through September 2007 were used to evaluate the potential for the discharge to cause or contribute to an excursion above any water quality standard for a particular metal (see **Appendix C**). The first step in making this determination was to calculate the concentration of each metal that can be discharged without resulting in an excursion of water quality criteria (an allowable effluent concentration) based upon the criteria in the receiving water and the dilution available at the point of discharge using the following equation:

$C_d = C_r \text{ X } DF$

.

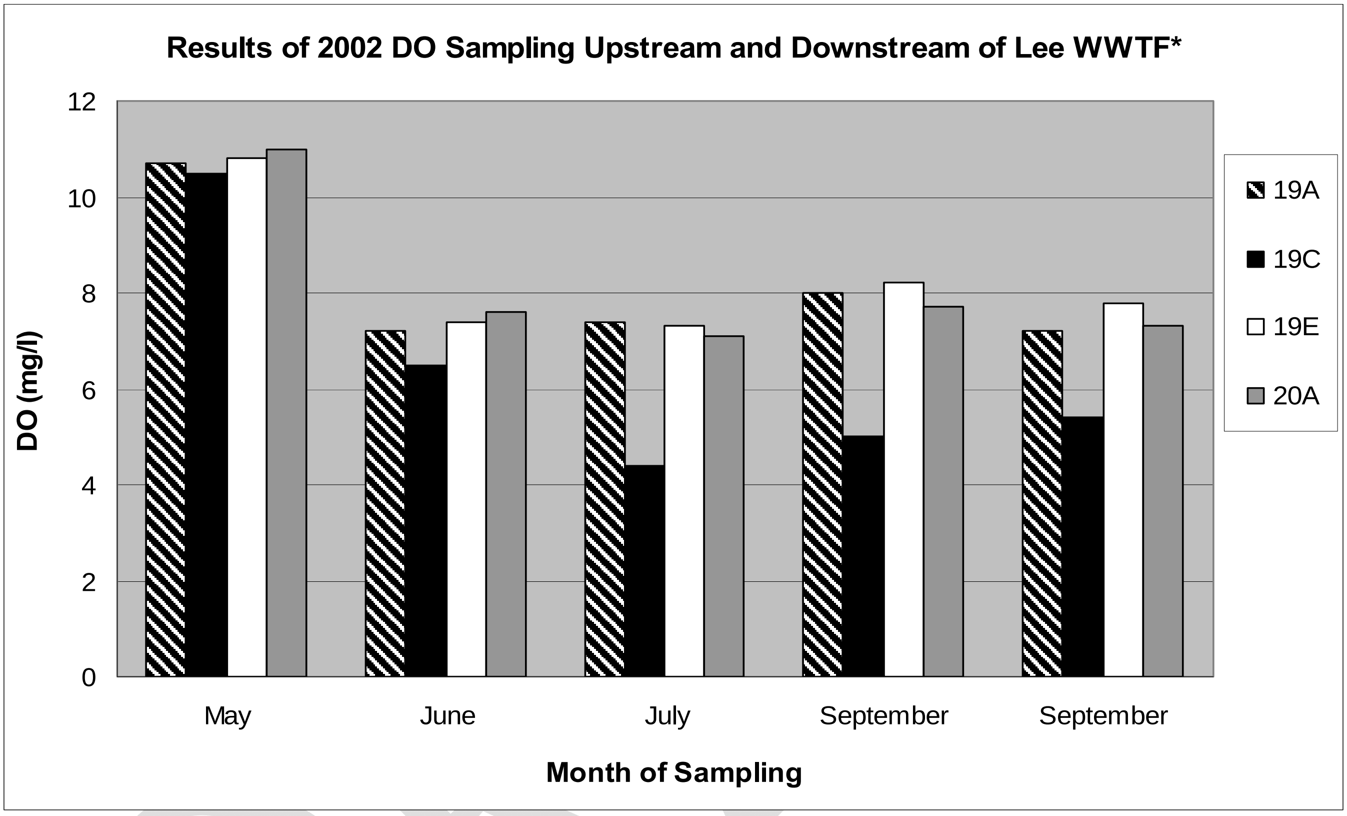

Figure 2: Results of 2002 Upstream and Downstream Dissolved Oxygen Analyses

The locations of the sampling stations were: 19A – Lenox, MA; 19C - ~300 feet downstream of the Lee WWTF; 19E: Stockbridge; and 20A: Great Barrington. Sampling conducted by the MassDEP. Results are from Appendix B of the <u>Housatonic River Watershed 2002 Water Quality Assessment Report</u> (MassDEP 2007). Raw data is shown in Appendix E of this fact sheet.

Where:

C_d = Allowable concentration of a particular metal in the effluent
C_r = Instream criteria for a particular metal
DF = Dilution factor

Next, the effluent data was compared to the calculated allowable effluent concentration. If the data revealed that metals were discharged in concentrations exceeding the allowable concentration, than it was determined there is reasonable potential for the discharge to cause or contribute to an excursion above a State water quality standard. In this case, a limit equivalent to the allowable effluent concentration would be incorporated into the draft permit.

The following sections illustrate how this process was used to determine whether or not effluent limitations and/or monitoring requirements for metals were needed in the draft permit.

ALUMINUM

The following acute and chronic criteria from the EPA 2002 National Recommended Water Quality Criteria were used in the calculation of permissible effluent concentrations of aluminum:

Criteria Maximum Concentration (CMC) = 750 µg/l
Criteria Chronic Concentration (CCC) 87 µg/l

There is some concern regarding the concentration of aluminum in the receiving water, particularly, that the acute criteria may be exceeded downstream from the Lee WWTF. The average concentration of aluminum detected in samples collected upstream from the facility for use as dilution water in WET tests from December 2005 to September 2007, ranged from 0.2 µg/l – 230 µg/l and averaged 117 µg/l (see **Appendix C**) The results of metals analyses conducted on effluent samples in conjunction with WET tests from December 2005 to September 2007 indicate that the concentration of aluminum in the discharge ranged from 54 µg/l to 680 µg/l, with the average concentration being 352 µg/l. Using a background aluminum concentration of 117 µg/l (C_s), the maximum concentration in the discharge from 2005 – 2007 (C_d), the 7Q10 flow of the receiving upstream from the discharge (Q_s), the design flow of the facility (Q_d), and the 7Q10 flow of the receiving water downstream from the discharge (Q_r), the downstream concentration of aluminum was estimated using the following equation:

$$C_r = [(Q_sC_s) + (Q_dC_d)] / Q_r$$

Where:

Q_s = Receiving water flow upstream from the discharge
C_s = Background concentration of aluminum
Q_d = Design flow of the facility
C_d = Concentration of aluminum in the discharge
Qr = Receiving water flow downstream from the discharge ($Q_r = Q_d + Q_s$)
C_r = Downstream concentration of aluminum

Q_s = 40.3 cfs
C_s = 117 µg/l
Q_d = 1.55 MGD = 2.325 cfs
C_d = 680 µg/l
Q_r = 42.6 cfs

$$C_r = [(40.3 \text{ cfs})(117\ \mu g/l) + (2.325 \text{ cfs})(680)] / 42.6 \text{ cfs} = 148\ \mu g/l$$

Although this value is greater than the acute criteria, given the low number of aluminum analyses conducted from 2005-2007 (eight samples in total), the draft permit includes a monthly monitoring requirement for aluminum in order to establish a more robust dataset in order to better evaluate the discharge. It is suggested that the facility use these monitoring results to make sure that the effluent is not contributing to aluminum toxicity in the receiving water as a result of the process used to meet the proposed seasonal 0.2 mg/l average monthly phosphorus limit.

Water Quality Criteria for Hardness-dependent Metals (Lead, Zinc, Nickel, Cadmium, and Chromium)

Water quality criteria for lead, zinc, nickel, cadmium, and chromium are dependent upon the hardness of the water(s) in which the criteria are being applied. Increasing hardness of the water acts to reduce the toxicity of these metals.

In order to evaluate the potential for the Lee WWTF's discharge to cause or contribute to an excursion of a water quality standard for lead, zinc, nickel, cadmium, and chromium, water quality criteria for these metals were calculated based upon the hardness of the receiving water where the facility discharges, the dilution factor calculated at the point of discharge, and freshwater metals criteria contained in the EPA 2002 National Recommended Water Quality Criteria. The Massachusetts Surface Water Quality Standards contain site-specific criteria for copper for this segment of the Housatonic River. Therefore, these criteria were used to determine the potential for the Lee WWTF to exceed the criteria.

An instream hardness value of 120 mg/l was used to calculate acute and chronic water quality criteria for lead, nickel, zinc, cadmium, and chromium. This is the average hardness of samples collected in the Housatonic River upstream of the Lee WWTF for use as dilution water for whole effluent toxicity (WET) tests from December 2005 through September 2007 (see **Appendix C**). This hardness value was compared to the average hardness value of 143 mg/l, which is the average hardness of upstream samples collected for use as dilution water in June and September of 2006 and 2007, since these are the months when the receiving water typically experiences the lowest and the water quality is more likely to be representative of critical conditions. However, the decision to use an instream hardness value of 120 mg/l in the calculation of metals criteria was made because the resulting criteria are more stringent than the criteria calculated using an instream hardness value of 143 mg/l.

The following equations, taken from the EPA 2002 National Recommended Water Quality Criteria, were used in the calculation of acute and chronic water quality criteria for lead, zinc, nickel, cadmium and chromium:

1. $\text{Acute Criteria}_{(\text{Dissolved})} = \exp\{m_a\,[\ln(h)] + b_a\} * CF$[1]

---

[1] EPA Metal Translator Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criteria (EPA 1996 [EPA-823-B96-007]) was used as the basis for the use of the criteria conversion factor (CF). National Guidance requires that permits limits for metals are to be expressed in terms of total recoverable metal and not dissolved metal. 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.

Where:

ma = pollutant-specific coefficient

ba = pollutant-specific coefficient
ln = natural logarithm
h = hardness of the receiving water
CF = Pollutant-specific conversion factor to convert total recoverable metals to dissolved metals

2. Chronic Criteria$_{(Dissolved)}$ = $\exp\{m_c [\ln(h)] + b_c\} * CF$

Where:

m_c = pollutant-specific coefficient
b_c = pollutant-specific coefficient
ln = natural logarithm
h = hardness of the receiving water
CF = Pollutant-specific conversion factor to convert total recoverable metals to dissolved metals

Once pollutant-specific water quality criteria were determined, allowable acute and chronic effluent concentrations for each metal were then calculated by multiplying the criteria by the calculated dilution factor (18.3). Effluent data from December 2005 - September 2007 was then reviewed and compared to the calculated allowable effluent concentrations (see **Appendix C**). If metals had been discharged in concentrations that exceeded the allowable effluent concentration, limitations equivalent to the allowable concentrations were imposed in the draft permit.

Note: Values for pollutant-specific coefficients and conversion factors were taken from **Appendix B** of the EPA 2002 National Recommended Water Quality Criteria.

LEAD

Calculation of Acute Water Quality Criteria and Allowable Effluent Concentration for Lead

m_a = 1.273 b_a = -1.460   CF = 1.46203-[ln(h)(0.145712)] = 0.764435 h = 120

Acute Criteria$_{(Dissolved)}$ = exp{1.273 [ln(120)] + (-1.46203)} * 0.764435 = 78.6 µg/l

Dilution Factor = 18.3
Allowable Acute Effluent Concentration$_{(Dissolved)}$ = 78.6 µg/l X 18.3 = 1438 µg/l
Allowable Acute Effluent Concentration$_{(Total\ Recoverable)}$ = 1438 µg/l / 0.764435 = 1881 µg/l

Calculation of Chronic Water Quality Criteria and Allowable Effluent Concentration for Lead

m_c = 1.273 b_c = -4.705 CF = 1.46203-[ln(h)(0.145712)] = 0.764435 h = 120

Chronic Criteria$_{(Dissolved)}$ = exp{1.273 [ln(120)] + (-4.705)] * 0.764435 = 3.07 µg/l

Dilution Factor = 18.3
Allowable Chronic Effluent Concentration$_{(Dissolved)}$ = 3.07µg/l * 18.3 = 56.2 µg/l
Allowable Chronic Effluent Concentration$_{(Total\ Recoverable)}$ = 56.2 µg/l / 0.76445
= 73.5 µg/l

Effluent data from December 2005 - October 2007 show concentrations of lead in the discharge ranging from not being detected to a maximum of 1.1 µg/l, and that the average concentration discharged was 0.14 µg/l (see **Appendix C**). These values are far below the allowable acute and chronic effluent concentrations for lead. Therefore, no reasonable potential exists for this discharge to cause or contribute to an excursion above a water quality criterion, and lead limits are not included in the draft permit. The permittee shall continue to conduct quarterly lead testing of the effluent as part of their whole effluent toxicity program.

ZINC

Calculation of Acute Water Quality Criteria and Allowable Effluent Concentration for Zinc:

m_a = 0.8473 b_a = 0.884 CF = 0.978 h = 120

Acute Criteria$_{(Dissolved)}$ = exp{0.8473 [ln(120)] + 0.884} * 0.978 = 136.8 µg/l

Dilution Factor = 18.3
Allowable Acute Effluent Concentration$_{(Dissolved)}$ = 136.8 µg/l * 18.3
= 2503.44 µg/l

Allowable Acute Effluent Concentration$_{(Total\ Recoverable)}$ = 2503.44 µg/l / 0.978
= 2560 µg/l

Calculation of Chronic Water Quality Criteria and Allowable Effluent Concentration for Zinc:

mc = 0.8473 bc = 0.884 CF = 0.986 h = 120

Chronic Criteria$_{(Dissolved)}$ = exp{0.8473 [ln(120)] + 0.884} * 0.986 = 137.9 µg/l

Dilution Factor = 18.3
Allowable Chronic Effluent Concentration$_{(Dissolved)}$ = 137.9 µg/l * 18.3 = 2523.6 µg/l
Allowable Chronic Effluent Concentration$_{(Total\ Recoverable)}$ = 2523.6 µg/l / 0.986 = 2559 µg/l

Effluent data from December 2005 - October 2007 show that the concentration of zinc in the discharge ranged from 41µg/l to 84 µg/l and averaged 55.8 µg/l (see **Appendix C**). These concentrations are well below the allowable acute and chronic concentrations and reasonable potential does not exist for the discharge to cause or contribute to an excursion above a water quality criterion. Therefore, zinc limits are not proposed in the draft permit. The permittee shall continue to monitor for zinc as part of their whole effluent toxicity testing program.

<u>Nickel</u>

<u>Calculation of Acute Water Quality Criteria and Allowable Effluent Concentration for Nickel</u>:

$m_a = 0.8460$ $b_a = 2.255$ CF = 0.998 h = 120

Acute Criteria$_{(Dissolved)}$ = exp{0.8460 [ln(120)] + 2.255} * 0.998 = 546 μg/l

Dilution Factor = 18.3
Allowable Acute Effluent Limit$_{(Dissolved)}$ = 546 μg/l * 18.3 = 9992 μg/l
Allowable Acute Effluent Limit$_{(Total\ Recoverable)}$ = 9992 μg/l / 0.998 = 10012 μg/l

<u>Calculation of Chronic Water Quality Criteria and Allowable Effluent Concentration for Nickel</u>:

mc = 0.8460 bc = 0.0584 CF = 0.997 h = 120

Chronic Criteria$_{(Dissolved)}$ = exp{0.8460 [ln(120)] + 0.0584} * 0.997 = 60.7 μg/l

Dilution Factor = 18.3
Allowable Chronic Effluent Concentration$_{(Dissolved)}$ = 60.7 μg/l * 18.3 = 1111 μg/l
Allowable Chronic Effluent Concentration$_{(Total\ Recoverable)}$ = 1111 μg/l / 0.997 = 1114 μg/l

The concentration of nickel discharge from the facility from December 2005 - September 2007 ranged from 1.7μg/l to 8.6 μg/l, with the average concentration being 3.3 μg/l (see **Appendix C**). Because the maximum concentration of nickel discharged from the facility is much less than the allowable acute and chronic effluent concentrations, there is no reasonable potential for the discharge to cause or contribute to an excursion above water quality criteria for nickel and limitations have not been included in the draft permit. The permittee shall continue to monitor for nickel as part of their whole effluent toxicity testing program.

<u>Chromium</u>

<u>Calculation of Acute Water Quality Criteria and Allowable Effluent Concentration for Chromium</u>:

$m_a = 0.8190$ $b_a = 3.7256$ CF = 0.316 h = 120

Acute Criteria$_{(Dissolved)}$ = exp{0.8190 [ln(120)] +3.7256} * 0.316 = 662 μg/l

Dilution Factor = 18.3
Allowable Acute Effluent Concentration$_{(Dissolved)}$ = 662 μg/l X 18.3 = 12115 μg/l
Allowable Acute Effluent Concentration$_{(Total\ Recoverable)}$ = 12115 μg/l/ 0.316 = 38339 μg/l

Calculation of Chronic Water Quality Criteria and Allowable Effluent Concentration for Chromium:

$m_c = 0.8190$ $b_c = 0.6848$ CF = 0.860 h = 120

Chronic Criteria$_{(Dissolved)}$ = exp{0.8190 [ln(120)] +0.6848} * 0.860 = 86.1 µg/l

Dilution Factor = 18.3
Allowable Chronic Effluent Concentration$_{(Dissolved)}$ = 86.1 µg/l X 18.3 = 1575.6 µg/l
Allowable Chronic Effluent Concentration$_{(Total\ Recoverable)}$ = 1575.6 µg/l/ 0.860 = 1832 µg/l

The concentration of chromium discharged from December 2005 - October 2007 ranged from not being detected to 1.7 µg/l, with the average concentration being 0.68 µg/l (see **Appendix C**). Therefore, since these concentrations are well below the permissible chronic and acute concentrations, there is no reasonable potential for the discharge to cause or contribute to an excursion of water quality criteria and limits are not included in the draft permit. The permittee shall continue to monitor for chromium as part of their whole effluent toxicity testing program

Cadmium

Calculation of Acute Water Quality Criteria and Allowable Effluent Concentration for Cadmium:

$m_a =$ 1.0166 b_a = -3.924 CF = 1.136672- [ln(h)*0.041838] = 0.936373 h = 120

Acute Criteria$_{(Dissolved)}$ = exp{1.0166 [ln(120)] – 3.924} * 0.93673 = 2.40 µg/l

Dilution Factor = 18.3
Allowable Acute Effluent Concentration$_{(Dissolved)}$ = 2.40 µg/l X 18.3 = 43.9 µg/l
Allowable Acute Effluent Concentration$_{(Total\ Recoverable)}$ = 43.9 µg/l/0.93673 = 46.9 µg/l

Calculation of Chronic Water Quality Criteria and Allowable Effluent Concentration for Cadmium:

$m_c =$ 0.7409 b_c = 0.6848 CF = 1.136672- [ln(h) * 0.041838] = 0.936373 h = 120

Chronic Criteria$_{(Dissolved)}$ = exp{0.7409 [ln(120)] + 0.6848} * 0.93673 = 64.5 µg/l

Dilution Factor = 18.3
Allowable Chronic Effluent Concentration$_{(Dissolved)}$ = 64.5 µg/l X 18.3 = 1180 µg/l
Allowable Chronic Effluent Concentration$_{(Total\ Recoverable)}$ = 1180 µg/l/0.93673 = 1261µg/l

Cadmium was not detected in any of the effluent samples collected and analyzed from 2005-2007 (see **Appendix C**). Because the amount of cadmium in the discharge is well below any limitation that would be necessary to meet water quality criteria, limits are not proposed in the draft permit. The permittee shall continue to monitor for cadmium as part of their whole effluent toxicity program.

<u>Copper</u>

The Massachusetts Surface Water Quality Standards were revised in December 2006 to include site-specific criteria that were developed for receiving waters where national criteria are invalid due to site-specific physical, chemical, or biological considerations, and do not exceed the safe exposure levels determined by toxicity testing (314 CMR § 4.05(5)(e) Table 28). EPA approved these criteria on March 26, 2007. MassDEP has adopted acute dissolved copper criterion of 25.7 µg/l (26.8 µg/l total recoverable) and chronic dissolved copper criterion of 18.1 µg/ (18.9 µg/ total recoverable) for the Housatonic River.

<u>Calculation of Existing Instream Copper Concentration</u>

The existing instream copper concentration downstream from the discharge that can be expected under critical (7Q10) flow conditions was estimated using the average copper concentration detected in analyses conducted on samples of the receiving water collected upstream from the discharge for use as dilution water in WET tests from December 2005 - September 2007, the maximum concentration of copper in the discharge from December 2005-October 2007 (see **Appendix C)**, the design flow of the facility, and the 7Q10 flow of the receiving water using the following equation:

$$Q_rC_r = Q_dC_d + Q_sC_s$$

Where:
Q_r = receiving water flow downstream of the discharge (Q_d+Q_s)
C_r = copper concentration in the receiving water downstream of the discharge
Q_d = design flow of the facility
C_d = copper concentration in the discharge
Q_s = receiving water flow upstream of the discharge

Effluent monitoring data from copper analyses conducted in conjunction with WET tests from December 2005 - September 2007 show concentrations of copper in the discharge ranging from not being detected to a maximum of 23 µg/l, with the average concentration being 10.4 µg/l (see **Appendix C**). The concentration of copper in the samples collected upstream from the Lee WWTF ranged from not being detected to 12 µg/l, and averaged 4 µg/l .

Using the design flow of the facility (Q_d = 1.5 MGD = 2.325 cfs), the7Q10 flow of the receiving water both upstream and downstream from the discharge (Q_s = 40.3 cfs and Q_r = 42.6 cfs, respectively), and the maximum concentrations of copper in the discharge (C_d = 23 µg/l) and in the receiving water upstream from the discharge from 2005-2007 (C_s = 12 µg/l), the existing instream concentration of copper in the receiving water downstream from the discharge under critical flow (7Q10) conditions can be estimated to be 12.6 µg/l, which is less than both the acute and chronic site-specific criteria. The following equation was used in this calculation:

$$C_r = Q_sC_s + Q_dC_d / Q_r$$

Where:

Q_s = 40.3 cfs
C_s = 12 µg/l
Q_d = 2.325 cfs
C_d = 23 µg/l
Q_r = 42.6 cfs

C_r = [(40.3 cfs)(12 µg/l) + (2.325 cfs)(23 µg/l)] / 42.6 cfs = 12.6 µg/l

<u>Calculation of Acute and Chronic Effluent Limitations that Would be Necessary for the Receiving Water to Meet Criteria</u>

The acute and chronic limits that would result in an instream concentration equal to the site-specific criteria were calculated using data from analyses of the effluent and upstream receiving water samples performed as part of the WET tests from December 2005 – September 2007 as follows (see **Appendix C**):

$C_d = C_rQ_r – C_sQ_s/Q_d$

Where:

Q_r = 42.6 cfs
Q_s = 40.3 cfs
C_s = 12 µg/l
Q_d = 2.325 cfs

C_r = Chronic criterion = 18.1µg/l (dissolved); 18.9 µg/l (total recoverable)
C_r = Acute criterion = 25.7 µg/l (dissolved); 26.8 µg/l (total recoverable)

<u>Acute Limit</u>

C_d = (26.8 µg/l)(42.6 cfs) – (12 µg/l)(40.3 cfs) / 2.325 cfs
C_d = 283 µg/l

<u>Chronic Limit</u>

C_d = (18.9 µg/l)(42.6 cfs) – (12 µg/l)(40.3 cfs) / 2.325 cfs
C_d =138.3 µg

The above calculations demonstrate that the existing discharge would not result in an exceedance of either the chronic or acute site-specific criteria in the receiving water under critical flow conditions. In addition, the concentration of copper discharged from 2005-2007 is much less than the limits that would be necessary to achieve a downstream copper concentration equal to the site specific criteria. As a result, copper limitations are not included in the draft permit. The permittee shall continue to monitor the concentration of copper in the effluent as part of their whole effluent toxicity testing program.

3. Whole Effluent Toxicity

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, found at 314 CMR § 4.05(5)(e), include the following narrative statements and require that EPA criteria established pursuant to Section 304(a)(1) of the CWA be used as guidance for interpretation of the following narrative criteria:

> *All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife. Where the State determines that a specific pollutant not otherwise listed in 314 CMR 4.00 could reasonably be expected to adversely affect existing or designated uses, the State shall use the recommended limit published by EPA pursuant to 33 U.S.C. 1251 § 304(a) as the allowable receiving water concentrations for the affected waters unless a site-specific limit is established. Site-specific limits, human health risk levels and permit limits will be established in accordance with 314 CMR § 4.05(5)(e)(1)(2)(3)(4).*

National studies conducted by the EPA have demonstrated that domestic sources, as well as industrial sources, contribute toxic constituents to POTWs. These constituents include metals, chlorinated solvents, aromatic hydrocarbons, and others. Based on the potential for toxicity from domestic and industrial contributions, the State narrative water quality criterion, the level of dilution at the discharge location, and in accordance with EPA national and regional policy and 40 CFR § 122.44(d), the draft permit includes an acute (LC_{50}) whole effluent toxicity (WET) limitation (see also " Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants", 49 Fed. Reg. 9016 March 9, 1984, and EPA's "Technical Support Document for Water Quality-Based Toxics Control", March 1991).

The Massachusetts Department of Environmental Protection's Division of Watershed Management has a current toxics policy which requires toxicity testing for all major dischargers such as the Lee WWTF (Implementation Policy for the Control of Toxic Pollutants in Surface Waters (MassDEP 1990)). In addition, EPA feels that toxicity testing is required to assure that the synergistic effects of the pollutants in the discharge do 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 ensure that the Lee WWTF does not discharge combinations of toxic compounds into the Housatonic River in amounts which would affect human or aquatic life.

The existing permit includes an acute (LC_{50}) WET limitation of ≥ 100%, based on a dilution ratio of 26:1. Pursuant to the EPA Region I Policy, and MassDEP's Implementation Policy for the Control of Toxic Pollutants in Surface Waters (February 1990), dischargers having a dilution greater than 10:1 but less than 20:1 are required to conduct chronic (and modified acute) WET testing four times per year. In addition, NPDES permits for such dischargers are to include an acute limitation and chronic-no observable effect concentration (C-NOEC) monitoring requirement. Based on the increased design flow of the new facility, the dilution at the point of discharge is approximately 17:1. In accordance with the above policies, the draft permit includes an acute (LC_{50}) toxicity limit of ≥ 100%, as well as a chronic no observable effect concentration

(C-NOEC) monitoring requirement. The permittee shall conduct 7-day chronic (and modified acute) WET tests using the daphnid, *Ceriodaphnia dubia (C. dubia),* as the test species. Toxicity testing shall be conducted four times per year, during the second week of the months of March, June, September, and December. Toxicity testing must be performed in accordance with the EPA Region I test procedures and protocols specified in **Attachment A** of the draft permit.

VII. SLUDGE CONDITIONS

Section 405(d) of the CWA requires that EPA develop technical standards regarding the use and disposal of sewage sludge. On February 19, 1993, EPA promulgated technical standards which are to be implemented through NPDES permits. The conditions in the draft permit satisfy this requirement.

VIII. INFILTRATION AND INFLOW (I/I)

Infiltration is groundwater that enters the collection system through physical defects such as cracked pipes or deteriorated joints. Inflow is extraneous flow that enters 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. Significant I/I in a collection system may displace sanitary flow, reducing the capacity and efficiency of the treatment works and may cause bypasses of secondary treatment. It greatly increases the potential for sanitary sewer overflows in separate systems, and combined sewer overflows in combined systems.

The standard permit conditions for “Proper Operation and Maintenance”, set forth at 40 CFR § 122.41(e), require the proper operation and maintenance of permitted wastewater systems and associated facilities to achieve permit conditions. The requirements at 40 CFR § 122.41(d) impose a “duty to mitigate” upon the permittee which requires that “all reasonable steps be taken to minimize or prevent any discharge in violation of the permit which has a reasonable likelihood of adversely affecting human health or the environment”. EPA and MassDEP maintain that an I/I removal program is an integral component to ensuring compliance with the requirements of the draft permit under the provisions of 40 CFR § 122.41(d) and (e).

The draft permit contains requirements for the permittee to control inflow and infiltration (I/I) into the wastewater collection system they own and operate. Information submitted by the permittee regarding I/I in their NPDES permit reapplication states that as much as 48% of the flow to the previous treatment facility was attributed to I/I. Inflow has been identified as the primary component of I/I-related flows in annual I/I reports submitted by the permittee. These reports, as well information provided in the permittee’s NPDES permit reapplication, indicate that the Town has been conducting flow metering and has undertaken a program to remove private sources of inflow.

The draft permit maintains the requirement in the current permit regarding the annual submittal of a summary report to MassDEP and EPA describing all of actions taken to minimize I/I to the collection system during the previous year. The report shall continue to be submitted by **February 28th** of each year. In addition, the draft permit requires the submission of an I/I control plan within six months of the effective date of the permit.

IX. INDUSTRIAL USERS

The permittee is required to identify, in terms of the character and volume of pollutants, any significant indirect dischargers to the POTW subject to pretreatment standards under Section 307(b) of the CWA and 40 CFR Part 403.

X. ANTIDEGRADATION

In accordance with regulations found at 40 CFR § 131.12, the Massachusetts Department of Environmental Protection (MassDEP) has developed and adopted a state-wide antidegradation policy to maintain and protect existing water quality. The Massachusetts Antidegradation Policy is found at 314 CMR § 4.04. No lowering of water quality is allowed, except in accordance with the State's antidegradation policy.

The draft permit includes mass limitations that are at least as stringent as those in the existing permit. In addition, there has been no change in the location of the discharge outfall since the issuance of the existing permit. As such, the State of Massachusetts has determined that there will be no lowering of water quality and no loss of existing uses, and that further antidegradation review is not warranted.

XI. ESSENTIAL FISH HABITAT (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 Service (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes, "may adversely impact any essential fish habitat" (16 U.S.C. § 1855(b)).

The Amendments broadly define "essential fish habitat" (EFH) as: "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity," (16 U.S.C. § 1802(10)). "Adverse impact" means any impact which reduces the quality and/or quantity of EFH (950 CFR § 600.910(a)). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855(b)(1)(A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. The Housatonic River is not covered by the EFH designation for riverene systems and thus EPA and MassDEP have determined that a formal EFH consultation with NMFS is not required.

XII. ENDANGERED SPECIES ACT (ESA)

Section 7(a) of the Endangered Species Act (ESA) of 1973, as amended (the "Act"), grants authority to and imposes requirements upon federal agencies regarding threatened or endangered species of fish, wildlife, or plants ("listed species") and habitat of such species that have been designated as critical ("critical habitat"). Section 7(a)(2) of the Act requires every federal agency in consultation with and with the assistance of the Secretary of the 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 modification of critical habitat. The National Marine Fisheries Service (NMFS) administers Section 7 consultations for marine species and anadromous fish. The United States Fish and Wildlife Service (USFS) administers Section 7 consultations for freshwater species. EPA and the MassDEP have determined that an ESA consultation is not required for this discharge, since no listed species or critical habitat are located in an area that could be affected by the Lee WWTF's discharge.

XIII. MONITORING AND REPORTING

The permittee is obligated to monitor and report sampling results to EPA and the MassDEP within the time specified in the permit. Timely reporting is essential for the regulatory agencies to expeditiously assess compliance with permit conditions.

XIV. STATE PERMIT CONDITIONS

The NPDES permit is issued jointly by the U.S. Environmental Protection Agency and the Massachusetts Department of Environmental Protection under Federal and State law, respectively. As such, all the terms and conditions of the permit are, therefore, incorporated into and constitute a discharge permit issued by the Director of the Division of Watershed Management pursuant to M.G.L.Chap. 21, § 43.

XV. GENERAL CONDITIONS

The general conditions of the permit are based on 40 CFR Parts 122, Subparts A and D and 40 CFR § 124, Subparts A, D, E, and F and are consistent with management requirements common to other permits.

XVI. STATE CERTIFICATION REQUIREMENTS

EPA may not issue a NPDES permit unless the MassDEP with jurisdiction over the receiving waters 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 (MassDEP) has reviewed the draft permit. EPA has requested permit certification by the State pursuant to 40 CFR § 124.53 and expects that the draft permit will be certified.

XVII. 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 Meridith Timony, U.S. EPA, Office of Ecosystem Protection, Municipal Permits Branch (CMP), One Congress Street, Suite 1100, Boston, Massachusetts 02114. 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. Public hearings may be held after at least thirty days public notice whenever the Regional Administrator finds that response to this notice indicate a 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 a 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. Permits may be appealed to the Environmental Appeals Board in the manner described at 40 CFR § 124.19.

XVIII. EPA AND MASSDEP 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 MassDEP contacts below:

Meridith Timony
U.S. Environmental Protection Agency
Office of Ecosystem Protection
One Congress Street
Suite 1100 (CMP)
Boston, MA 02114-2023
Telephone: (617) 918-1533
Fax: (617) 918-1505
e-mail: decelle.meridith@epa.gov

Paul Hogan
Massachusetts Department of Environmental Protection
Division of Watershed Management, Surface Water Discharge Permit Program
27 Main Street, 2nd Floor
Worcester, MA 01608
Telephone: (508) 767-2796
Fax: (508) 791-4131
e-mail: Paul.Hogan@state.ma.us

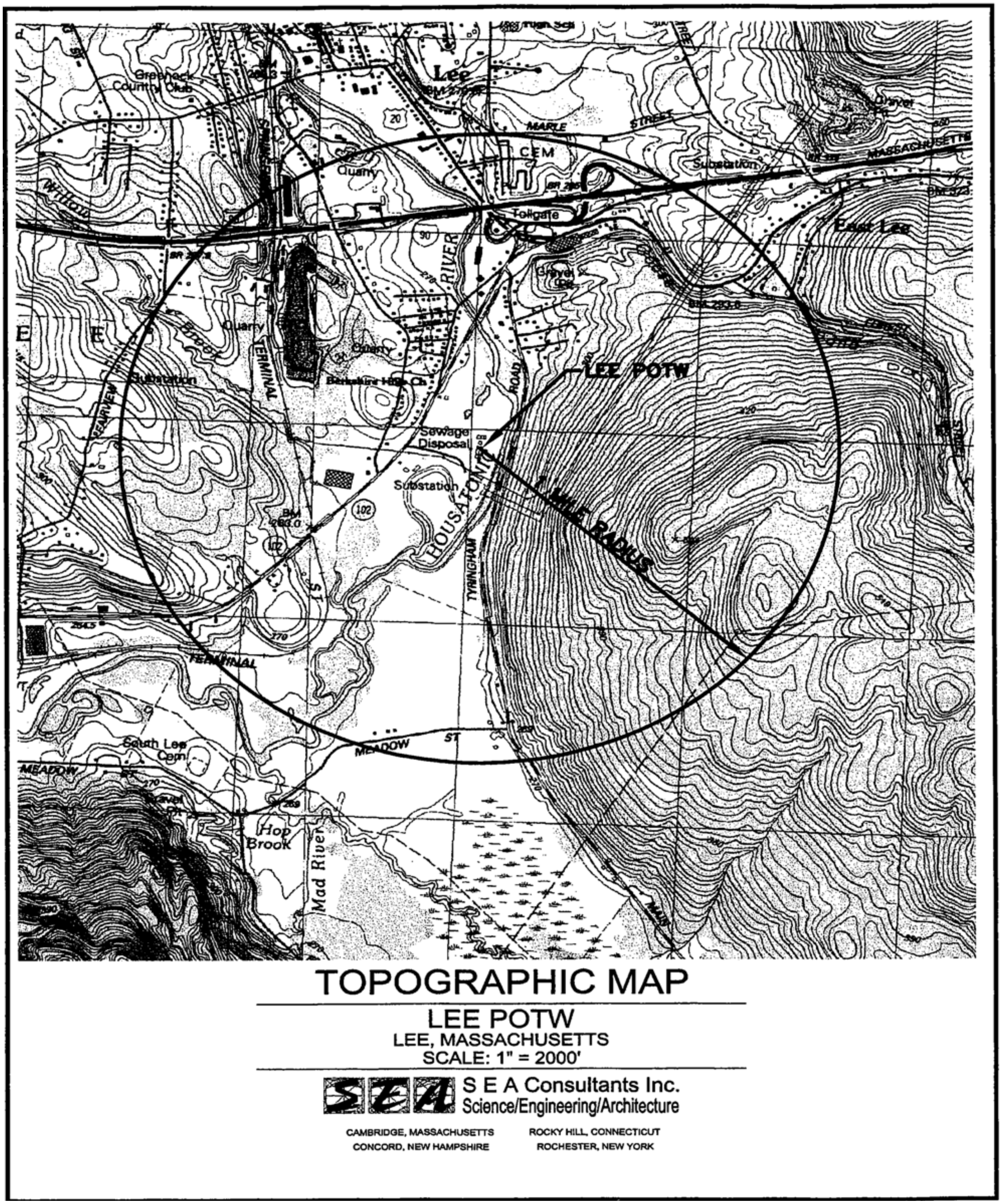

Figure 3: Location of Lee WWTF

Appendix A
Lee WWTF Conventional Pollutants Discharged from 2005-2007

Date	Flow (MGD)	BOD_5 (mg/l)			BOD_5 (lbs//day)	TSS (mg/l)			TSS (lbs/day)	pH (SU)		Fecal Coliform Bacteria (April 1st-Oct. 15th) (cfu/100 ml)	
	Avg.Monthly	Avg.Monthly	Avg.Weekly	Max.Daily	Avg.Monthly	Avg.Monthly	Avg.Weekly	Max.Daily	Avg.Monthly	Minimum	Maximum	Avg.Monthly	Max.Daily
Existing Limits	**1.0**	**30**	**45**	**Report**	**250**	**30**	**45**	**Report**	**250**	**6.5**	**8.3**	**200**	**400**
Jan. 2005	0.805	18	23	27	128	11	13	15	78	7.1	7.4		
Feb. 2005	0.811	24	28	30	163	15	22	25	101	7.1	7.6		
March 2005	0.81	32	35	38	311	17	29	33	165	7	7.3		
April 2005	0.824	22	27	30	211	16	18	22	153	7.1	7.5	2	
May 2005	0.864	13	17	17	76	9	12	12	53	7	7.3	8	TNTC
June 2005	0.859	12	16	16	67	7	13	13	40	6.8	7.2	19	118
July 2005	0.86	14	18	18	83	6	7	7	38	6.7	7.2	3	41
Aug. 2005	0.856	11	13	15	63	7	9	12	42	6.7	7	0	
Sept. 2005	0.829	13	15	16	71	11	19	19	60	6.7	7	3	206
Oct. 2005	0.871	8	8	9	78	20	34	54	23	6.8	7.3	45	47
Nov. 2005	0.949	9	12	15	72	11	15	21	88	6.8	7.1		
Dec. 2005	0.873	12	17	21	106	9	10	12	80	6.9	7.2		
Jan. 2006	0.911	19	25	26	200	10	10	15	105	7	7.3		
Feb. 2006	0.929	10	12	13	78	7	8	10	52	7	7.3		
March 2006	0.913	8	9	10	44	7	9	13	37	6.8	7.3		
April 2006	0.799	13	19	23	79	7	9	10	43	6.9	7.3	3	97

Appendix A
Lee WWTF Conventional Pollutants Discharged from 2005-2007

Date	Flow (MGD)	BOD$_5$ (mg/l)			BOD$_5$ (lbs//day)	TSS (mg/l)			TSS (lbs/day)	pH (SU)		Fecal Coliform Bacteria (April 1st-Oct. 15th) (cfu/100 ml)	
	Avg.Monthly	Avg.Monthly	Avg.Weekly	Max.Daily	Avg.Monthly	Avg.Monthly	Avg.Weekly	Max.Daily	Avg.Monthly	Minimum	Maximum	Avg.Monthly	Max.Daily
Existing Limits	**1.0**	**30**	**45**	**Report**	**250**	**30**	**45**	**Report**	**250**	**6.5**	**8.3**	**200**	**400**
May 2006	0.885	14	19	19	92	10	11	14	65	6.9	7.3	4	40
June 2006	0.902	11	16	16	77	9	10	11	63	7	7.3	16	
July 2006	0.902	15	20	21	100	8	11	12	52	7	7.3	2	40
Aug. 2006	0.901	19	23	29	74	13	19	26	108	6.8	7.1	4	190
Sept. 2006	0.912	17	22	25	87	13	15	16	66	6.8	7.2	13	30
Oct. 2006	0.864	11	15	15	61	9	13	15	50	6.8	7.1	100	730
Nov. 2006	0.847	11	15	15	68	6	10	16	37	6.8	7.2		
Dec. 2006	0.814	18	22	21	93	8	11	13	41	7.1	7.2		
Jan. 2007	0.764	13	19	20	78	7	9	12	46	7	7.3		
Feb. 2007	0.732	18	33	33	92	10	15	15	49	6.8	7.2		
March 2007	0.757	17	24	25	146	9	13	14	81	7	7.3		
April 2007	0.796	17	28	40	198	23	40	55	267	7.1	7.3	72	
May 2007	0.793	11	17	19	66	11	14	18	66	6.8	7.2		
June 2007	0.773	9	15	16	47	8	10	10	42	6.8	7.2	10	10
July 2007	0.763	9	12	13	49	8	10	10	43	6.7	7.1	10	10
Aug. 2007	0.754	9	10	10	45	7	9	9	36	6.7	7.1	25	100
Sept. 2007	0.741	13	18	29	54	14	16	26	60	6.7	7.3	1	10
Oct. 2007	0.729	14	25	40	59	12	17	30	52	6	7.4	9	80

Appendix A
Lee WWTF Conventional Pollutants Discharged from 2005-2007

Date	Flow (MGD)	BOD_5 (mg/l)			BOD_5 (lbs//day)	TSS (mg/l)			TSS (lbs/day)	pH (SU)		Fecal Coliform Bacteria (April 1st-Oct. 15th) (cfu/100 ml)	
	Avg.Monthly	Avg.Monthly	Avg.Weekly	Max.Daily	Avg.Monthly	Avg.Monthly	Avg.Weekly	Max.Daily	Avg.Monthly	Minimum	Maximum	Avg.Monthly	Max.Daily
Existing Limits	**1.0**	**30**	**45**	**Report**	**250**	**30**	**45**	**Report**	**250**	**6.5**	**8.3**	**200**	**400**
Min.	0.729	8	8	9	44	6	7	7	23	6	7	0	10
Max.	0.949	32	35	40	311	23	40	55	267	7.1	7.6	100	730
Average	0.84	14.2	19.0	21.5	97.5	10.4	14.4	18.1	70.1	6.9	7.2	21.4	122.7

Appendix B

Lee WWTF Non-conventional Pollutants Discharged From 2005-2007

Date	Total Phosphorus (May 31 - Oct. 31) (mg/l)		Ammonia Nitrogen (mg/l)	TKN	Total Nitrite (mg/l)	Total Nitrate (mg/l)	Total Nitrogen (mg/l)	Whole Effluent Toxicity
	Avg.Monthly	Max Daily	Avg.Monthly	Avg.Monthly	Avg.Monthly	Avg.Monthly	Avg.Monthly	LC_{50}
Existing Limits	1.0	Report	Report	Report	Report	Report	****	≥ 100%
Jan. 2005			1.7	6.1	0.2	2.77	9.07	
Feb. 2005			12.3	24	0.01	1.6	25.61	
March 2005			18.8	25.7	0.01	0.78	26.49	
April 2005			14.9	18.4	0.01	0.53	18.94	
May 2005	0.35	0.56	11	14.6	0.13	0.12	14.85	
June 2005	0.96	1.53	15.1	15.3	0.14	0.47	15.91	
July 2005	0.73	2.54	6	8.2	0.01	0.01	8.22	
Aug. 2005	0.55	1.43	4.3	4.6	0.04	0.17	4.81	
Sept. 2005	0.38	0.46	6.56	11.2	0.01	0.02	11.23	
Oct. 2005	0.23	0.34	0.02	0.77	0.01	4.94	5.72	
Nov. 2005			0.03	0.09	0.01	12.9	13	
Dec. 2005			1.1	2.2	0.2	5.6	8	100
Jan. 2006			0.95	1.5	2.22	5.9	9.62	
Feb. 2006			0.04	0.05	0.34	10.1	10.49	
March 2006			0.04	0.1	0.02	13.2	13.32	100
April 2006			3.8	4	0.28	4.1	8.38	
May 2006	0.67	1.3	4.5	7	0.15	2	9.15	
June 2006	0.39	0.77	7.4	14	0.3	0.8	15.1	100
July 2006	0.9	1.48	7.3	6.3	0.01	2.21	8.52	
Aug. 2006	0.49	0.91	10	18	0.01	0.03	18.04	
Sept. 2006	0.74	1.7	2.83	4.5	0.06	2	6.56	100
Oct. 2006	0.55	1.15	2.4	5.9	0.09	0.56	6.55	
Nov. 2006			8.3	14	0.07	0.46	14.53	
Dec. 2006			12.4	12.8	0.13	0.52	13.45	100
Jan. 2007			8.1	9.4	0.02	0.17	9.59	
Feb. 2007			9.5	15	0.19	0.07	15.26	
March 2007			0.25	1.19	0.01	7.8	9	100
April 2007			49.5	0.89	0.37	5.5	6.76	
May 2007	0.75	1.08	0.27	1.1	0.01	8.2	9.31	

Appendix B

Lee WWTF Non-conventional Pollutants Discharged From 2005-2007

Date	Total Phosphorus (May 31 - Oct. 31) (mg/l)		Ammonia Nitrogen (mg/l)	TKN	Total Nitrite (mg/l)	Total Nitrate (mg/l)	Total Nitrogen (mg/l)	Whole Effluent Toxicity
	Avg.Monthly	Max Daily	Avg.Monthly	Avg.Monthly	Avg.Monthly	Avg.Monthly	Avg.Monthly	LC_{50}
Existing Limits	**1.0**	**Report**	**Report**	**Report**	**Report**	**Report**	********	**≥ 100%**
June 2007	0.78	1.22	5.6	7.3	0.53	6	13.83	100
July 2007	0.81	1.22	0.91	2.65	0.26	2.15	5.06	
Aug. 2007	0.54	0.98	4.8	7	0.03	0.54	7.57	
Sept. 2007	0.71	1.09	13.1	14	0.09	0.03	14.12	100
Oct. 2007	0.4	0.69	0.18	14.9	0.07	21.5	36.47	
Min.	0.23	0.34	0.02	0.05	0.01	0.01	4.81	100
Max.	0.96	2.54	49.5	25.7	2.22	21.5	36.47	100
Average	0.61	1.15	7.18	8.61	0.18	3.64	12.43	100

Appendix C
Lee WWTF Toxic Pollutants Discharged From 2005-2007

Date	Total Residual Chlorine (mg/l) (April 1 - October 31)		Copper (µg/l)*	Lead (µg/l) *	Zinc (µg/l)	Aluminum (µg/l)	Nickel (µg/l)	Cadmium ((µg/l)*	Chromium (µg/l)*
	Avg.Monthly	Max Daily							
Existing Limits	**0.30**	**0.51**	**Report**	**Report**	**Report**	**Report**	**Report**	**Report**	**Report**
Jan. 2005									
Feb. 2005									
March 2005									
April 2005	0.2	0.4							
May 2005	0.2	0.44							
June 2005	0.2	0.37							
July 2005	0.2	0.4							
Aug. 2005	0.2	0.5							
Sept. 2005	0.2	0.51							
Oct. 2005	0.2	0.49							
Nov. 2005									
Dec. 2005			8.8	0	41	54	2.9	0	0
Jan. 2006									
Feb. 2006									
March 2006			11	0	84	92	2.3	0	0
April 2006	0.2	0.51							
May 2006	0.2	0.5							

Appendix C

Lee WWTF Toxic Pollutants Discharged From 2005-2007

Date	Total Residual Chlorine (mg/l) (April 1 - October 31)		Copper (µg/l)*	Lead (µg/l)*	Zinc (µg/l)	Aluminum (µg/l)	Nickel (µg/l)	Cadmium ((µg/l)*	Chromium (µg/l)*
	Avg.Monthly	Max Daily							
Existing Limits	0.30	0.51	Report	Report	Report	Report	Report	Report	Report
June 2006	0.2	0.52	0	0	52	350	2.2	0	0
July 2006	0.2	0.51							
Aug. 2006	0.2	0.51							
Sept. 2006	0.2	0.51	4.4	0	67	670	2.1	0	1.0
Oct. 2006	0.2	0.51							
Nov. 2006									
Dec. 2006			8.0	0	51	220	1.7	0	0
Jan. 2007									
Feb. 2007									
March 2007			18	0	53	110	8.6	0	1.7
April 2007	0.2	0.5							
May 2007	0.2	0.48							
June 2007	0.24	0.51	9.9	0	44	680	2.1	0	1.3
July 2007	0.23	0.53							
Aug. 2007	0.2	0.51							
Sept. 2007	0.25	0.66	23	1.1	54	640	4.4		1.4
Oct. 2007	0.27	0.49							

Appendix C

Lee WWTF Toxic Pollutants Discharged From 2005-2007

Date	Total Residual Chlorine (mg/l) (April 1 - October 31)		Copper (µg/l)*	Lead (µg/l)*	Zinc (µg/l)	Aluminum (µg/l)	Nickel (µg/l)	Cadmium ((µg/l)*	Chromium (µg/l)*
	Avg.Monthly	Max Daily							
Existing Limits	**0.30**	**0.51**	**Report**	**Report**	**Report**	**Report**	**Report**	**Report**	**Report**
Min.	0.2	0.37	0	0	41	54	1.7	0	0
Max.	0.27	0.66	23	1.1	84	680	8.6	0	1.7
Average	0.21	0.49	10.4	0.14	55.8	352	3.3	0	0.68

*0 = not detected

Appendix D

Massachusetts POTW Discharges to the Housatonic River Watershed

FACILITY NAME	PERMIT NUMBER	DESIGN FLOW (MGD)[1]	AVERAGE FLOW (MGD)[2]	TOTAL NITROGEN (mg/l)[3]	TOTAL NITROGEN - Existing Flow(lbs/day)[4]
Crane	MA0000671		3.100	8.200	212.003
Great Barrington	MA0101524	3.200	2.600	17.000	368.628
Lee	MA0100153	1.000	0.870	14.500	105.209
Lenox	MA0100935	1.190	0.790	11.800	77.745
Mead Laurel Mill	MA0001716		1.500	6.400	80.064
Mead Willow Mill	MA0001848		1.100	4.600	42.200
Pittsfield	MA0101681	17.000	12.000	12.400	1240.992
Stockbridge	MA0101087	0.300	0.240	11.100	22.218
West Stockbridge	MA0103110	0.076	0.018	15.500	2.327
Massachusetts Totals			**22.218**	**101.500**	**2151.386**

1. Design flow – typically included as a permit limit in MA and VT but not in NH.
2. Average discharge flow for 2004 – 2005. If no data in PCS, average flow was assumed to equal design flow.
3. Total nitrogen value based on effluent monitoring data. If no effluent monitoring data, total nitrogen value assumed to equal average of MA secondary treatment facilities (19.6 mg/l), average of MA seasonal nitrification facilities (15.5 mg/l), or average of MA year round nitrification facilities (12.7 mg/l). Average total nitrogen values based on a review of 27 MA facilities with effluent monitoring data. Facility is assumed to be a secondary treatment facility unless ammonia data is available and indicates some level of nitrification.
4. Current total nitrogen load.

Appendix E

Results of MassDEP 2002 Sampling on the Housatonic River (Segment MA21-19)*

Station Name	Station ID	TP (mg/l)				DO (mg/l)			
		May	June	July	Sept.	May	June	July	Sept. (Avg.)
Lenox	**19A**	0.045	0.085	0.16	0.19	10.7	7.2	7.4	7.6
Lee	**19C**	0.25	0.18	0.319	0.504	10.5	6.5	4.4	5.2
Stockbridge	**19E**	0.04	0.07	0.108	0.092	10.8	7.4	7.3	8
Great Barrington	**20A**	0.05	0.08	0.086	0.081	11	7.6	7.1	7.5

***These results are from the Housatonic River Watershed 2002 Water Quality Assessment Report, Appendix B (MassDEP 2007)**