

RESPONSE TO PUBLIC COMMENTS

From February 24, 2005 to March 25, 2005, the United States Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MA DEP) solicited Public Comments on a draft NPDES permit, developed pursuant to an application from the Wastewater Treatment Plant in Billerica, MA. After a review of the comments received, EPA has made the final decision to issue the permit authorizing the discharge. The following describes and responds to comments, and describes any subsequent changes to the draft permit. A copy of the final permit may be obtained by writing or calling Jeanne Voorhees, United States Environmental Protection Agency, 1 Congress Street, Suite 1100 (CPE), Boston, Massachusetts, 02114-2023; Telephone (617) 918-1686.

A) Comments submitted by Meredith S. Zona, Vice President; Fay, Spofford & Thorndike, LLC.

Comment A1: A request was made to increase the annual average daily flow limit from 5.4 million gallons per day (MGD) to 5.5 MGD based on the Billerica Wastewater Treatment Facility's *Operation and Maintenance Manual*.

Response: As stated in the current Fact Sheet (page 6), and in the previous response to comments (November 2001), any increase of flow to the Concord River must be closely reviewed to ensure that water quality standards and antidegradation requirements are met. See *MADEP-DWM NPDES Permit Program Policies Related to Flow and Nutrients in NPDES Permits*. This permit will not increase the flow limit given that the WWTF is currently discharging substantially below its current permit flow limit of 5.4 MGD and water quality standards are not being met. Consideration will be given to increasing the annual daily flow limit only upon the completion of a Comprehensive Wastewater Management Plan (CWWMP) by the Town, and a Total Maximum Daily Load analysis, which is expected to be conducted by MA DEP at a future time.

Comment A2: The draft permit changes the pH limitation from its current range of 6.0 - 8.3 standard units (su) to 6.5 - 8.3 su. Given the addition of an aluminum limit, the Town may find it necessary to change chemicals for phosphorus removal. It is requested that the current pH range be continued to allow for a change in phosphorus removal chemicals which may depress the pH.

Response: Immediately upstream of the WWTF, instream pH values from Whole Effluent toxicity test dilution water samples were measured from 6.6 su and 7.75 su (n=27) (MA DEP 2005). The pH values recorded at station CR3, located approximately 0.5 miles upstream of the WWTF, were 7.59 su and 8.38 su (USACOE, MADEP, ENSR 2003). Based on monthly DMR data from 2002 to 2004, the WWTF's effluent pH range was from 6.5 su to 8.1 su (n = 35). Also, approximately 3 miles downstream of the WWTF, at station CR2, instream pH values have been recorded at 7.96 su and 8.18 su (USACOE, MADEP, ENSR 2003). These values are well above the criteria.

EPA will retain the pH limitation as proposed, 6.5 su to 8.3 su, given that data indicate the upstream pH has occasionally approached the lower pH limit of the Massachusetts Surface Water Quality Standards (WQS). See the final permit page 2, Effluent Limits Table and page 6.

However, if the Billerica WWTF believes it is necessary to adjust the pH limits, an adjustment may be made as long as the pH of the effluent remains between 6.0-9.0 su and the pH of the receiving water remains between 6.5- 8.3 su, or as naturally occurs. The Permittee will be responsible for demonstrating that their proposed effluent pH range can be widened, but limited within a specific range that will not alter the naturally occurring pH of the receiving water. Alternatively, if warranted, the Permittee may demonstrate that the pH limit should be widened due to naturally occurring conditions in the receiving water. Ultimately, a satisfactory demonstration must be made by the Billerica WWTF that as long as discharges to the receiving water are within a specific numeric pH range the naturally occurring pH of the receiving water will be unaltered. Unless such a demonstration can be made, the pH range of 6.5-8.3 su must be achieved in the final effluent.

Comment A3: The draft permit requires a total phosphorus limit of 0.2 mg/l from April 1 to October 31, and a limit of 1.0 mg/l from November 1 to March 31. A request is made to confirm whether the limit of 1.0 mg/l total phosphorus is an average monthly limit. It is noted that the draft permit is more restrictive than the existing permit limits for total phosphorus. The question is posed whether highest and best practical treatment (HBPT; 0.2 mg/l total phosphorus) is necessary if a WWTF discharges total phosphorus at a higher concentration (i.e., 0.4 mg/l), but does not cause eutrophication in the receiving stream.

Response: The limit of 1.0 mg/l from November 1 to March 31 is an average monthly limit.

Under 40 CFR § 122.44(d)(1)(i), EPA must include limitations necessary to ensure compliance with State water quality standards. These limitations must control pollutants that are, or may be, discharged at a level that “causes, or has the *reasonable potential* to cause, or contribute” to an excursion from any State water quality standard, including State narrative criteria for water quality. (Emphasis added.) The *Massachusetts Year 2002 Integrated List of Waters* lists the entire stretch of the Concord River, from its confluence with the Assabet and Sudbury Rivers in Concord to its confluence with Merrimack River, as impaired for nutrients. Based on data from four field surveys that examines point and non-point sources of total phosphorus, it has been demonstrated that the Billerica WWTF is the major source of total phosphorus loads to the Concord River (ENSR 2003; please see attached copy of Figure 6.1 Total Phosphorus Loadings to the Concord River - Distributions of Point Source vs. Non-Point Source Loadings During 4 Field Surveys from ENSR 2003). For example, water quality surveys demonstrated that upstream of the WWTF total phosphorus concentrations averaged 0.05 mg/l, while downstream phosphorus concentrations in the Concord River averaged 0.15 mg/l (USACOE, MADEP, ENSR 2003). The downstream total phosphorus concentration is approximately three (3) times that of the upstream concentrations and exceeds the recommended criteria in the Gold Book and the National Ecoregion XIV guidance, and the New England-wide total phosphorus concentrations (0.05 mg/l, 0.024 mg/l, and 0.020 - 0.022 mg/l, respectively). In light of the forgoing and as outlined in the Fact Sheet (pages 4, 7-12), the Agencies have concluded that (i) existing effluent discharges from the Billerica WWTF have a reasonable potential to cause and/or contribute to excursions from numerical and narrative State Water Quality Standards with respect to nutrients and eutrophication, and (ii) a phosphorus effluent limitation no less stringent than 0.2 mg/l is necessary to ensure compliance with such standards.

Massachusetts Water Quality Standards require that “any existing point source discharges containing nutrients in concentrations which encourage eutrophication or the growth of weeds or algae shall be provided with the highest and best practicable treatment (HBPT) to remove such nutrients” (314 CMR 4.04(5)). For the reasons stated in the paragraph above, the Agencies also conclude that the discharges from the Billerica WWTF encourage eutrophication, necessitating the implementation of HBPT.

Comment A4: The fact sheet cites the 1986 Quality Criteria for Water (“the Gold Book”) with recommended total phosphorus criteria for receiving waters. The Gold Book recommends in-stream total phosphorus concentrations of 0.05 mg/l in any stream entering a lake or reservoir, 0.1 mg/l for any stream not discharging directly to lakes or impoundments, and 0.025 mg/l within the lake or reservoir. An explanation was requested of how the location of the downstream dam placed the Billerica WWTF discharge into the category of “direct discharge to a lake or impoundment.” It was requested whether there was any possibility of removing this dam, and what the cost comparison would be of dam removal versus the installation of a filtration system.

Response: Because State water quality standards do not have a numeric instream criterion for phosphorus, there is discretion available to the permitting agencies to determine the instream phosphorus level needed to meet the applicable narrative criteria and to achieve designated uses. Technical guidance materials such as the Gold Book (USEPA 1986), “Ecoregional Nutrient Criteria” (USEPA 2000), and Mitchell, Liebman, Ramseyer, and Card (in draft 2004) as referenced in the Fact Sheet were, therefore, used only to screen a range of total phosphorus limits that might be protective against eutrophication. Furthermore, the development of Ecoregional Nutrient Criteria was based on data from both free flowing and impounded rivers. It establishes one number that is protective of New England rivers, many of which are impounded.

The Concord River drops approximately 70 feet over its 16 mile length, which translates to an average slope of 4.5 feet per mile (McAdow 1990 in USACOE, MADEP, ENSR 2003). It is a wide and sluggish river that flows through wetlands from its beginning at the confluence of the Assabet and Sudbury Rivers in Concord to where it enters Lowell (approximately river mile 2.0). In Lowell, the Concord River narrows, and flows through several sections of rapids (Webber 1990). Regardless of the categorization of the Concord River prior to the Centennial Dam, the recommended criteria cited by the referenced materials, as stated above, were used to screen a range of total phosphorus limits that might be protective against eutrophication. As stated below, in Comment A5, the Fact Sheet states that an effluent limit for Total Phosphorus of 0.2 mg/l results in an instream concentration of approximately 0.05 mg/l at the 7Q10 flow. Also, it is correctly stated in this Comment, that 0.2 mg/l total phosphorus concentration meets the Gold Book concentration for discharges directly to impoundments. However, this limit was not developed based solely upon the physical characteristics of the Concord River. Rather, given the absence of state water quality criteria for nutrients, EPA and MADEP determined the instream phosphorus level needed to meet the applicable narrative criteria and to achieve designated uses. Also, upon the development of a TMDL and/or state nutrient criteria, the Town of Billerica should be prepared to potentially meet more stringent nutrient requirements. See Response to Comment A5.

Removal of the dam would lessen the impact of the nutrient enrichment but would not, in the opinion of the agencies, eliminate the need for a high level of nutrient control from the WWTF. If the dam was removed without increased treatment at the WWTF, instead of phytoplankton and floating macrophytes, we would expect to see a shift toward periphyton and attached algae growth (USEPA 2001). With additional treatment, however, dam removal would be beneficial in providing a somewhat greater ability to assimilate phosphorus. In addition, a free flowing stream has the added benefit of improving the habitat of the natural indigenous population of fish that originally inhabited the system. Dam removal/partial breaching should be considered as part of a comprehensive effort to restore the Concord River ecosystem.

Comment A5: “The Fact Sheet mentions two other sources that identify phosphorus concentrations that would protect rivers and streams from eutrophication. These include the “Ecoregional Nutrient Criteria,” a document that sets this total phosphorus concentration at 0.024 mg/L, and a 2004 draft document that establishes this concentration as 0.020 - 0.024 mg/L. The Fact Sheet points out that with a WWTF effluent limit for total phosphorus of 0.2 mg/L, the in-stream concentration would be about 0.05 mg/L at the 7Q10 flow, which meets only the Gold Book concentration for discharges *directly to impoundments*. Thus, it is not certain that eutrophication will cease with the establishment of the 0.20 mg/L total phosphorus limit at the WWTF. Is it prudent for the Town to design a process to meet 0.20 mg/L total phosphorus at this time, or is it better to pin down a limit applicable to Billerica’s situation and design accordingly?”

Response: As stated in the response to Comment A4, the references cited in the Fact Sheet assisted the Agencies in establishing a limit reasonably calculated to meet applicable water quality criteria relative to nutrients and, ultimately, to achieve designated uses in the Concord River. In the absence of a TMDL and/or the development of state nutrient criteria, a concentration of 0.2 mg/l is required to meet the State standard of HBPT and the minimum of EPA recommended criteria. The permit requirement of the 0.20 mg/l total phosphorus limit is applied given that a discharge greater than 0.20 mg/l will not achieve water quality standards.

Because the state water quality standards do not have a numeric instream criterion for phosphorus, there is some discretion available to the permitting agencies for determining the instream phosphorus level needed to meet the narrative criteria and the designated uses. At the same time, there is strong evidence in the record that in order to fully support the designated uses, total phosphorus concentrations in the Concord River system have to be significantly reduced. EPA and DEP believe it may be possible to meet the numeric and narrative criteria and attain uses if the discharge is limited in the summer months to 0.20 mg/l. The agencies propose to take an “adaptive management” approach in this case and to require the permittee to reduce its phosphorus to 0.20 mg/l, after which the agencies will evaluate whether additional treatment is needed.

Because tighter limits and additional treatment could be necessary in the future, EPA and DEP recommend that the Permittee implement a design that is consistent with meeting the 0.20 mg/l total phosphorus limit. See Fact Sheet at page 8. Furthermore, the design should

be able to incorporate future technologies which will achieve lower concentrations of total phosphorus in the effluent. See Fact Sheet at page 12. The State is in the process of establishing numeric nutrient criteria, and if, based on these numeric criteria, 0.2 mg/l is not protective then EPA will apply the new criteria when establishing future permit limits. Also, the Fact Sheet states that a lower limit may be required upon completion of a future TMDL, or an updated water quality analysis, including a better understanding of the reductions in upstream concentrations that may be achievable. Finally, Billerica should note that the permit may be re-opened and modified to account for more stringent nutrient limits and/or new state numeric nutrient criteria.

Comment A6: “The most recent field surveys on the Concord River occurred between June 2001 and September 2002, which was prior to any dedicated phosphorus removal efforts at the Billerica WWTF. The Fact Sheet reports that total phosphorus concentrations upstream of the WWTF were about one-third of those downstream of the plant. The only specific downstream concentrations cited were at survey stations located approximately 2.8 and 3.4 miles downstream of the WWTF. Because these stations were relatively far downstream of the WWTF, it doesn’t seem reasonable to ascribe the concentration difference entirely to the WWTF. Knowing the influence of the WWTF, were no samples taken any closer? WWTF effluent total phosphorus concentrations ranged from 2.0- 3.4 mg/L in 2002, based on several samples obtained from January through August. For the phosphorus removal season May 1- October 31, 2004, the effluent total phosphorus concentration averaged 0.54 mg/L, so there should be far less disparity between upstream and downstream total phosphorus concentrations with current phosphorus removal efforts in place at the WWTF.”

Response: EPA acknowledges that the stations were located at a distance from the WWTF, and that other sources may be present. However, data from four field surveys examines point and non-point sources of total phosphorus and demonstrates that the Billerica WWTF is the major source of total phosphorus loads to the Concord River (ENSR 2003; please see attached copy of Figure 6.1 Total Phosphorus Loadings to the Concord River - Distributions of Point Source vs. Non-Point Source Loadings During 4 Field Surveys from ENSR 2003). EPA recognizes that it would have been beneficial to have sampling stations closer to the Billerica WWTF. However, ascribing the concentration entirely to the WWTF is reasonable.

First, the drainage area downstream of the WWTF is small (i.e., there is very little flow entering the Concord River between the Billerica WWTF discharge and the downstream sampling station). Data from the tributaries contributing to this drainage area, measured at stations T1 and T3, had a median for total phosphorus of 0.045 mg/l (n=18; range undetected to 0.12) (USACOE, MADEP and ENSR 2003). Secondly, the dissolved fraction of phosphorus, which has been reported as high as 90% in the Assabet River (USEPA-Region 1 2005), is unlikely to completely settle and, even with some uptake, would still result in the total phosphorus values cited at the sampling stations downstream (2.8 - 3.4 miles) of the Billerica WWTF. Finally, Gerdes and Kunst (1998) reported that the importance of a catchment area (i.e., watershed) with higher portions of inputs from sewer treatment plants could be underestimated relative their influence on eutrophication when examining bioavailable phosphorus. They found, despite reductions of phosphorus inputs from WWTFs, the significance of municipal effluents for supporting eutrophication was

emphasized by the high phosphorus bioavailability of treated wastewater relative to other effluents (i.e., urban runoff, erosion, agricultural drainage etc.).

EPA recognizes that the Billerica WWTF has made progress in reducing the effluent concentrations of total phosphorus. However, despite the effluent's total phosphorus concentration average being 0.54 mg/l for the removal season May 1- October 31, 2004, the maximum daily concentrations ranged between 0.40 mg/l and 2.44 mg/l, and average monthly concentrations ranged between 0.27 mg/l and 1.03 mg/l. Based on these values, instream concentrations of total phosphorus can be as high as 0.59 mg/l. Therefore, despite the current phosphorus removal at the WWTF, and based on the 2004 data, a total phosphorus limit 0.20 mg/l would still be proposed. Also, see Response to Comment A7 below.

Comment A7: It is requested whether there is more data for chlorophyll *a* and dissolved oxygen (DO) upstream of the Billerica WWTF, and whether it is also indicative of eutrophication. Also, it is requested that if upstream conditions are not eutrophic, whether upstream values of total phosphorus concentrations could be used as a guide for determining WWTF effluent total phosphorus concentrations.

Response: Data for chlorophyll *a* and DO at sampling stations upstream of the Billerica WWTF (located at approximately river mile 4.5) are indicative of eutrophication. Sampling conducted in July and September 2001 at upstream sampling stations for chlorophyll *a* and DO are presented below in Table 1 (USACOE, MADEP, ENSR 2003).

Table 1. Chlorophyll *a* and Dissolved Oxygen Results at Stations CR3, CR6 and CR8

Station No. (approx. River mile)	Sampling Date	Chlorophyll <i>a</i> (ug/l)	Dissolved Oxygen (% saturation)
CR3 (5.0)	July 2001	15	126.9
	Sept. 2001	19	127.2
CR6 (10.8)	July 2001	5.6	106.0
	Sept. 2001	13	149.6
CR8 (15.9)	July 2001	No Data	82.5
	Sept. 2001	3.3	105.6

Table 2 provides a summary of the trophic status for fresh water systems as characterized by mean chlorophyll *a*. Although, the data for chlorophyll *a* measures in the Concord River are based on single samples, a comparison of these values with those in Table 2 serves to generally demonstrate that eutrophic conditions exist in the Concord River upstream of the Billerica WWTF. Also, as stated in the Fact Sheet, during water quality surveys conducted July 26 and September 7, 2001, total chlorophyll *a* concentrations increased with distance downstream, and were higher downstream of the Billerica WWTF than upstream (USACOE, MADEP, ENSR 2003). Values at the downstream station (CR1) were 16 ug/l and 25 ug/l for July and September 2001 sampling events, respectively. Additionally, the chlorophyll *a*

measures upstream of the WWTF are above the recommended criteria of 3.75 ug/l for aggregate Ecoregion XIV streams (USEPA 2001).

Table 2. Freshwater System Trophic Status Based on Mean Chlorophyll *a* *

Trophic Status	Wetzel (2001)	Ryding and Rast (1989)	Smith (1998)	Novotny and Olem (1994)
Eutrophic	>10	6.7 - 31	-----	>10
Mesotrophic	2- 15	3 - 7.4	3.5 - 9	4 - 10
Oligotrophic	0.3 - 3	0.8 - 3.4	-----	< 4

*Adapted from USEPA 2003

Regarding DO, during the July and September 2001 surveys, the percent saturation of dissolved oxygen was measured in the Concord River at several stations along the mainstem of the Concord River, including stations upstream of the WWTF. Supersaturation can occur under conditions of excessive algae/plant growth which produce oxygen during photosynthesis (Thomann and Mueller 1987). Hence, supersaturated conditions can be indicative of eutrophic conditions. As illustrated in Table 1, supersaturated conditions exist at stations upstream of the WWTF. As noted in the Fact Sheet, the maximum percent saturation of DO was measured at the two survey stations located downstream of the WWTF, ranging between 121.8% and 162%.

Further evidence of eutrophic conditions in the Concord River is provided by biological surveys conducted in July and September, 2001 (USACOE, MADEP, ENSR 2003). These surveys were conducted upstream of the Billerica WWTF only. Species identified during these surveys are known to respond positively to eutrophication, and included filamentous algal mats of *Cladophora*, duckweed, watermeal, water chestnut etc. (USACOE, MADEP, ENSR 2003).

Regarding the final question, it is important to note that upstream conditions are eutrophic. Therefore, upstream values of total phosphorus concentrations would not be used as a guide to determine the WWTF effluent total phosphorus concentrations. If upstream total phosphorus concentration values were higher than the recommended values and there was no eutrophication, then upstream values may be considered in the analysis for setting the total phosphorus limit. However, as stated, eutrophic conditions exist upstream of the WWTF, therefore this approach would be unreasonable.

Comment A8: “Depending on the responses to the above questions, the Town proposes conducting additional sampling upstream and downstream of the WWTF to assess whether a total phosphorus permit limit in the range of 0.3 – 0.5 mg/L will achieve water quality standards. The 2005 phosphorus removal season will begin soon, and it seems most worthwhile, prior to making costly plant upgrade decisions, to assess how the river is responding to current phosphorus removal efforts, rather than relying on theoretical data, or past monitoring results that are no longer applicable.”

Response: EPA and MADEP will review any data that is collected. However, we recommend that the Town coordinates with EPA and MADEP to ensure that meaningful data is collected.

Comment A9: “The draft permit provides a four-year compliance schedule to meet the total phosphorus limit of 0.2 mg/L, but provides no interim limit. Will it be the current seasonal average of 0.75 mg/L.”

Response: The final permit has been altered to include an interim seasonal limit of 0.75 mg/l total phosphorus April 1 to October 31 with monitoring 2/week. This change is found in Part I.A., footnote number 14 on pages 5 and 6 of the final permit.

Comment A10: “The draft permit contains a limit of 357 ug/L for total aluminum. Since March 2004, all total aluminum concentrations in the effluent determined for the quarterly acute and chronic toxicity reports have exceeded this concentration, ranging from 384 – 790 ug/L. We believe the major source of the aluminum is the alum sludge from the Billerica Water Treatment Facility, which the WWTF is treating. There is also some contribution from the aluminum salts added to achieve phosphorus removal. We request a meeting to discuss options to achieve this limitation, given the Town’s commitment to treating the alum sludge.”

Response: We believe there are various options available such as filters, biological treatment and alternative chemicals, that will allow the Billerica WWTF to meet both the aluminum and total phosphorus limits. We are available to discuss and advise the Town on this issue at any time.

In addition, the permit has been modified to include a compliance schedule to meet the aluminum limits. This schedule is identical to the compliance schedule for total phosphorus. See Permit Part I, Section F, Compliance Schedule.

Comment A11: “Regarding the need to meet water quality standards under 7Q10 conditions, we ask the following: Do the agencies have any data to support the premise that the effluent flow from WWTFs equals the design average daily when the receiving stream has a 7Q10 flow? We suspect that in the “design year”, the WWTF flow will be much less than the design average daily flow during severe drought conditions, which a 7Q10 flow represents. With a lower WWTF flow, the dilution factor will exceed the 4.1 value presented in the draft permit, and calculated limits for total phosphorus and aluminum based on water quality criteria will be less restrictive.”

“Meeting water quality standards for 7Q10 means that there will be no water quality violations, other than one week every 10 years, on average. This translates to achieving these standards 99.8% of the time. The public should understand that the trade-off of this benefit is significant capital and operation and maintenance costs, increased chemical usage, increased energy consumption and sludge production, and addition of metals to sludge that provide no benefit (and possible environmental harm) if sludge is reused, and degradation of air quality if sludge is incinerated.”

Response: While the Agencies acknowledge the assumption that 7Q10 and the plant's design flow occur simultaneously is conservative, offsetting non-conservative assumptions are also incorporated into the establishment of permit limits. For example, limits are established to meet criteria under 7Q10 conditions as a 30 day average limit rather than 7 day average limit.

Also, the use of the 7Q10 is a requirement of the *Massachusetts Surface Water Quality Standards* (WQS) (MADEP 1997; revised 2000). In particular, 314 CMR 4.03 (3)(a) states that the MADEP will determine the most severe hydrologic conditions at which water quality criteria must be met. For rivers and streams, the 7Q10 is specified in the WQS as the lowest flow condition at and above which criteria must be met.

Concerning the use of the WWTF's design flow in calculating the permit effluent limits, please see 40 CFR Section 122.45 (b)(1). This section states that permit effluent limitations for treatment plants are to be calculated based on the design flow.

Relative to the comment that meeting water quality standards for 7Q10 means that there will be no water quality violations other than one week every 10 years on average is a mis-characterization of the water quality standards. The 7Q10 flow can occur over shorter durations (i.e., less than 7 days) more regularly than once in ten years. Thus, 7Q10 flows occur more frequently than suggested. During periods when 7Q10 flows occur, regardless of the number of days it occurs, water quality standards need to be met.

Comment A12: As part of its Industrial Pretreatment Program requirements, the Town has been evaluating its industries on a calendar-year basis, and prefers to submit its Annual Industrial Report to EPA on March 15, rather than the June 15 date specified in the draft permit.

Response: EPA has accommodated this request and made the appropriate change in the permit (Section D, page 10). However, this change will not take effect until March 15, 2006.

B) Comments submitted by Cindy Delpapa, Stream Ecologist, MA Riverways Program, MA Department of Fisheries, Wildlife, and Environmental Law Enforcement

Comment B1: The Fact Sheet indicates the outfall is 6 feet below the water surface. Is this the depth below the surface at mean low water? At what depth below the water surface would the outfall be a (sic) 7Q10?

Response: We do not know the river elevation at which the depth was calculated. However, this depth was not used to calculate any effluent limitations or conditions.

Comment B2: Agreement is expressed concerning the need to closely review any flow increase request to ensure water quality standards and antidegradation requirements are met. It is noted that a target I/I rate should be identified for the Town and a comprehensive wastewater management plan is recommended to determine if additional flow volume is necessary. A recommendation is made that I/I be reduced to provide capacity at the WWTF to potentially accommodate additional flows (i.e., MCI Billerica and potential industrial park). It is noted that, given the impaired status of the Concord River, increases in wastewater flows should

be avoided whenever there are practicable alternatives such as I/I reduction and water conservation measures.

Response: Please see Response A.1 with respect to flow increases. The permittee is required to submit an inflow/infiltration plan within 1 year of the effective date of the final permit and is advised to consider the impact of such influent to future flow determinations.

Comment B3: “Until the completion of the TMDL and given the troubling water quality data gathered recently, year round nutrient limit of 0.2 mg/l should be considered to reduce the total annual load and the load sequestered in the downstream impoundment and receiving waters.”

Response: In addition to the total phosphorus limit of 0.2 mg/l during April 1 through October 31 (summer), the permit also contains a total phosphorus limit of 1.0 mg/l during November 1 through March 31 (winter). Thus, the permit already requires total phosphorus limits on a year-round basis.

EPA believes that 1.0 mg/l is sufficient during the winter period because the higher levels of phosphorus discharged in the winter period do not result in the accumulation of phosphorus in the sediments. Also, this limitation assumes that the dissolved fraction of the total phosphorus will pass through the system given the lack of plant growth during the winter period (USEPA-Region 1 2005). Thus, the concern for reducing the total annual load and loads behind the dam are addressed by the inclusion of this winter limit. If water quality sampling or other data indicate otherwise, more stringent winter period phosphorus limits may be pursued.

Given that the total phosphorus limits are required on a year-round basis, and will subsequently result in an overall reduction in the annual load, including loads behind the dam, the proposed total phosphorus limits will remain unchanged. However, EPA recognizes that a lower limit may be required for total phosphorus (summer and/or winter) upon completion of a future TMDL, or an updated water quality analysis. Therefore, the permit may be reopened and modified to account for a more stringent limit or new state criteria.

Comment B4: “The permittee has seasonal ammonia limits starting in June and lasting through September and the draft permit has extended the season into May. How was this seasonal time frame determined? Ammonia can be quite toxic to aquatic life. An ammonia limit starting well into the growing season could be problematic for some aquatic species, especially if spring flows are low due to a paucity of snow pack and atypically low spring rainfall levels. For several years efforts have been underway to try to reintroduce anadromous fish to the Concord River, high concentrations of ammonia could impacts (sic) these efforts. Waiting for the completion of a TMDL and a reopening of the permit, should it be necessary, would further delay efforts to improve the aquatic system in the river. Consideration should be give (sic) to broadening the seasonal ammonia limits to match those proposed for total phosphorus.”

Response: The draft permit imposes limits for total Ammonia-Nitrogen from May 1 to October 31, and requires reporting November 1 through April 30. Extending the seasonal ammonia limits to match those proposed for total phosphorus (April 1 through October 31) would include the

month of April. The analysis below indicates there is no basis for extending the seasonal ammonia limits to include the month of April because there is no reasonable potential for water quality standards to be exceeded during the month of April.

Review of April 2002 -2004 ammonia-nitrogen effluent discharge data revealed that the maximum daily effluent concentration of ammonia-nitrogen for April 2002, 8.15 mg/l, was the highest concentration discharged for this month. The minimum average flow in the Concord River recorded at USGS 01099500 gage station for April is 377 cfs (244 MGD) (USGS 1984), and the design flow of the WWTF is 5.4 MGD. Assuming zero background concentration of ammonia-nitrogen, the application of the mass balance equation indicates that instream concentration of ammonia-nitrogen would be 0.1765 mg/l; where, $(8.15 \text{ mg/l})(5.4 \text{ MGD}) / (5.4 \text{ MGD} + 244 \text{ MGD}) = 0.1765 \text{ mg/l}$.

Instream pH ranges between 6.7 and 8.6 su (USACOE, MADEP, ENSR 2003) and temperatures of 14° C to 18° C were used to determine the CMC and CCC for ammonia (USEPA 1999). As follows,

	CMC	CCC	
		Early Life Stage Present	Early Life Stage Absent
pH Range 6.7 - 8.6 su	44.6 - 2.65 mg N/l		
pH 6.7 Temp. 14° C to 18° C		6.44 -5.15 (mg N/l)	6.66-5.86 (mg N/l)
pH 8.6 Temp. 14° C to 18° C		0.9320-0.735 (mg N/l)	0.951-8.36 (mg N/l)

The calculated instream concentration of ammonia - nitrogen, 0.1765 mg/l, is well below the CMC and CCC's presented above. Thus, there is no reasonable potential for water quality standards to be exceeded during the month of April. The proposed seasonal ammonia-nitrogen limit will, therefore, remain May 1 through October 31.

C. Comments submitted by Elizabeth Coughlin, President; Merrimack River Watershed Council, Inc.

Comment C1: Request for public hearing.

Response: In a letter addressed to Ms. Coughlin of the Merrimack River Watershed Council, Inc. (MRWC) (June 10, 2005), EPA determined, based on the provisions of 40 CFR §124.12, that a significant degree of public interest did not exist. The basis for this determination considered that EPA received only one request for a public hearing, and comments from only three other sources during the public notice period. The letter stated that all comments received by MRWC and others would be thoroughly addressed in the final permit and the Response to Comments. Therefore, EPA decided not to conduct a public hearing on the draft permit. The letter acknowledged that EPA's decision did not prejudice MRWC's right to file a petition for review with the Environmental Appeals Board.

Comment C2: “There appears to have been some kind of “lapse” in the renewal process and although the existing permit was administratively extended, there is no inclusion of data from 2004, a year that included a substantial discharge of Perchlorate into the Concord River from this facility. In addition the chronic violation of exceedance of Total Phosphate discharge into an **already impaired and listed waterway** as well as full toxicity levels has continued without regulatory notice or action. The fact that such a discharge of Perchlorate could go **unnoticed and/or undetected** suggests that perhaps other pollutants of concern are in a similar situation.” [Emphasis in original.]

Response: At the time the Fact Sheet was drafted 2004 data was incomplete (i.e., only the months of January and February were available). Furthermore, given the current absence of water quality criteria for perchlorate, no information would have been available on which to calculate water quality-based effluent limitations for perchlorate.

Relative to the exceedance of the total phosphorus limit, one exceedance occurred in 2004. The exceedance of the monthly average limit (0.75 mg/l) occurred during the month of May 2004 with a recording of 1.03 mg/l. This violation is subject to enforcement action by both EPA Region One - Office of Environmental Stewardship Water Enforcement Program and the MADEP.

The suggestion that other pollutants, such as perchlorate, can be unnoticed and/or undetected is accurate given the extensive number of pollutants which exist in an industrialized society. To date, there are 158 pollutants for which EPA has developed criteria. Section 304(a)(1) of the Clean Water Act requires EPA to develop criteria for water quality that accurately reflects the latest scientific knowledge. These criteria are based solely on data and scientific judgments on pollutant concentrations and environmental or human health effects. Additional information regarding the requirements under Section 304(a) (1) of the Clean Water Act can be found at <http://www.epa.gov/waterscience/criteria/>.

In addition, if a WWTF has a design flow greater than or equal to 1.0 MGD, or it has (or is required to have) a pretreatment program, then the permit application requires the permittee to provide effluent testing and data for 98 pollutants, including metals, volatile organic, acid-extractable, and base-neutral compounds. Also, at a minimum, effluent testing data must be based on at least three pollutant scans [40 CFR §122.21(j)(4)(vi)].

Finally, WET tests are required to be conducted. These tests help protect the receiving water quality from the aggregate toxic effect of a mixture of pollutants in the effluent. The WET tests are useful for complex effluents where it may be infeasible to identify and regulate all toxic pollutants in the discharge or where chemical-specific pollutant limits are set, but synergistic effects are suspected to be problematic (USEPA 1996).

Comment C3: “A preliminary look at the small amount of data provided shows an uncomfortable relation between the maximum daily and the monthly average values which calls for a close inspection of the data collection and analyses including SOPs for sample collection and analytical methods as well as statement of qualifications.”

Response: The permit requires that effluent samples be analyzed using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136. Additionally, the permit requires that a routine sampling program be developed in which samples are taken at the same location, same time and same day(s) of every month. Any deviations from the routine sampling program are required to be documented in correspondence appended to the applicable discharge monitoring report that is submitted to EPA. Also, as required in the permit, all sampling must be representative of the effluent that is discharged through Outfall 001 to the Concord River.

Also, routine inspections are conducted by qualified EPA and MADEP staff. During these inspections staff examine various components of WWTF's, including, but not limited to, data records, reports, compliance schedules, and the laboratory.

Comment C4: "What regulatory sector is keeping apprised of the values reported in the Total Phosphate (sic) and Toxicity parameters? What happened in 2004 and what will be done to assure proper oversight for compliance? Who will provide Guidance (sic) for Compliance and where will the resources be found to implement that guidance?"

Response: EPA Region One - Office of Environmental Stewardship Water Enforcement Program is responsible for conducting compliance monitoring and enforcement activities under the authorities of the Clean Water Act (CWA), including, but not limited to the NPDES program. Additionally, MADEP also has their own authorities to enforce state wastewater laws and regulations. In 2004, there were no violations of the Whole Effluent Toxicity (WET) tests, and only one violation of the total phosphorus limit. This violation would be subject to enforcement action at the discretion of either EPA and/or MADEP.

Comment C5: "There are eighteen industrial users discharging to the Billerica WWTF. Who are these industrial users? What is the nature of their effluent and does it contain any surface runoff? Has anyone characterized their runoff? Who is measuring the metals, endocrine disruptors, and nutrients of this runoff?"

Response:

Industrial User	Industrial Processes
Aotco Metal Finishing, Inc.	Electroplating
Axsun Technologies	Polishing and wafer thinning, photolithography
Baker Commodities, Inc.	Rendering
Billerica Water Treatment Plant	Raw water coagulation and flocculation
BNZ Materials, Inc.	Marinite board fabrication
Bristol-Meyers Squibb Pharmacy Co.	Manufacturing and packaging radio pharmaceuticals
Cabot Corporation	Laboratory research and development
Cambridge Tool & Manufacturing, Inc.	Metal finishing

C.R. Bard, Inc.	Reverse osmosis units, acid bleach cleaning medical supplies
Lexigen Pharmaceuticals Corp.	Biological research
Minntech	Cleaning and reprocessing dialysis machines
Mykrolis Corporation	Cleaning and fabricating filtration products
Nortel Networks	Cooling tower bleed-off
Nutcracker Snacks, Inc.	Preparation & packaging of edible nuts
Roy Brothers, Inc.	Washing interior of tanker trucks
RWE Schott Solar, Inc.	Silicon wafer manufacturing
Welch's Foods	Manufacturing of test foods and drinks
Millipore Corporation	Manufacturing & testing of filtration equipment

Regarding surface run-off, the industrial users are served by a separate sewer system that carries only their process wastewater. Thus, surface runoff from their sites should not be a component of their effluent. However, runoff from their sites could enter the Billerica sewer system through inflow. If this were the case, the NPDES permit requires the Billerica WWTF to develop and implement a plan to control infiltration and inflow to the sewer system (Part I. C. 2). In addition, some industrial users may be required to be covered under the NPDES multi-sector Stormwater Permit depending on site characteristics and operations. These facilities would be required to develop stormwater pollution prevention plans.

Also, the Billerica WWTF is required to submit to EPA and MADEP an annual Industrial Pretreatment report. The annual report includes an updated list of all industrial users, and information regarding compliance with categorical standards and local limits. In addition, annual sampling and analysis of the influent and effluent of the Billerica WWTF is required for total cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, cyanide and arsenic. Attachment B provides a list of requirements for the IPP annual report. Please see response to Comment C15 for additional details regarding the requirements of the Pretreatment Program.

Finally, endocrine disruptors are an evolving concern. However, there are currently no criteria or accepted monitoring protocols for them.

Comment C6: It is stated that the collection system is separated, however the limited data available suggests that it is not. The phosphate levels seem to be too high for a separated system.

Response: The concern expressed in Comment C6 is unclear given that, typically, when a sewer system is not separated phosphorus concentrations are lower given the added dilution from infiltration and inflow. Conversely, in cases where the sewer systems are separated (i.e., tighter) phosphorus concentrations are typically higher given the lack of additional dilution.

Comment C7: It is stated that ammonia was exceeded twice. What is being provided as a remedy for ammonia exceedence?

Response: An excursion of the monthly average ammonia-nitrogen limit (6 mg/l) occurred April 2002, and was recorded as 7.09 mg/l. The maximum daily limit (9 mg/l) was exceeded in July 2002, and was recorded as 13.8 mg/l. These limits apply June 1 to September 30. Therefore, there was only one exceedence (July 2002). The draft permit establishes an ammonia limit that is protective of the designated uses of the Concord, and violations of the permit are appropriately addressed through the enforcement authority. Provisions for remedying exceedences are not included in the permit, but are done through enforcement actions at the discretion of the EPA and MADEP.

Comment C8: “The permit requires measurements of total phosphorous and orthophosphates; however, it only requires total ammonia nitrogen. Since the relationship between total nitrogen (especially nitrates) and soluble reactive phosphorous (orthophosphates) is an indication of the source, please include total nitrogen measurement in the permit.”

Response: Municipal wastewater discharges are a complex mixture of sanitary, commercial and industrial wastes. Determining the sources based on nitrogen to phosphorus ratios in the effluent is not feasible. Also, total nitrogen is typically not limited in freshwater systems, and therefore is not a pollutant of concern relative to violations of the water quality criteria.

Comment C9: “According to the fact sheet the Gold Book recommended level for total phosphorous concentrations in-stream is 0.05 mg/l, the Ecoregion XIV, Eastern Coastal Plains level is 0.024 mg/l, and the New England-wide document level is between 0.020 - 0.022 mg/l. The Massachusetts Surface Water Quality Standards, which do not contain numerical criteria, state that nutrients “shall not exceed the site specific limits necessary to control accelerated or cultural eutrophication.” The MADEP HBPT limit is 0.2 mg/l, which is significantly higher than the reputable documents mentioned in this report. Why is this permit negating the Massachusetts Surface Water Quality Standards conditions in favor of the MADEP HBPT limits?”

Response: The recommended criteria values of total phosphorus concentrations are in-stream values. The MADEP HBPT value is a limit applied to, and measured in the effluent. Therefore, these numbers are not strictly comparable. However, at the calculated dilution factor of 4.1, an effluent discharge concentration of total phosphorus at 0.20 mg/l would, after mixing, result in an in-stream concentration of total phosphorus of 0.05 mg/l.

Also, the phosphorus concentrations cited in the documents are not water quality criteria which have been accepted by the state, and so, therefore, were used to screen the effect of the proposed effluent limitations.

Comment C10: “The permit is cited for monthly average; however, what is the maximum daily flow the plant can handle?”

Response: Based on the Operation and Maintenance Manual the Billerica WWTF can handle 16 MGD (peak hourly flow) (telephone conversation, Zona 2005). Based on Table One in the Fact Sheet, during the 2 year period of review, the plant recorded maximum daily flows ranging between 2.88 MGD to 8.45 MGD.

Comment C11: “What emergency response plan does the plant have if it were to receive a volume greater than the maximum daily flow or have an impulse event?”

Response: The Billerica WWTF has developed an in-house plan to deal with high flows that usually occur during the wet weather season. Specifically, all available tanks are put on-line, then the influent flow to the plant is controlled in an attempt to not exceed 10 mgd. Excess influent flow is stored in the large interceptors and is gradually bled into the plant during the low flow periods (i.e., evenings and night) (Malcuit 2005).

Comment C12: “Has the plant released untreated effluent during a high flow day (i.e., April 2003)?”

Response: Based on a review of DMRs, and file records there are no reported by-passes (i.e., release of untreated effluent) from the Billerica WWTF . Similarly, there are no reported overflows from the sewer system (Harding 2005).

Comment C13: “Has in-stream monitoring noted any changes in flow or water quality as a result of the Billerica WWTP?”

Response: There has been no in-stream monitoring specifically addressing the effects of the Billerica WWTF upon flow in the Concord River. Relative to changes in water quality resulting from the Billerica WWTF discharge, please see the Fact Sheet, pages 7 through 12.

Comment C14: “It is clear that the Agency and the Department have set forth an array of testing and reporting requirements as well as a required consideration of the design parameters and the treatment performance parameters in the draft permit. However, the time frame for implementation for relief from chronic phosphate discharge raising the level to three times the existing value in the Concord River is too long. **Four years to compliance is too long.**” [Emphasis in original.]

Response: The Town will need to secure funds, plan and design a new system, enter into a bidding process, and complete construction within three years. Considering the time required to complete these steps, four years to attain compliance is not unreasonable.

Comment C15: “The additional suggestion that WET may be reduced or discontinued does not really make sense. Undetected **pollutant discharges** from unknown process of industrial dischargers to the system **cannot continue to remain undetected. Unforeseen treatment by-products additionally cannot continue to remain undetected. What other mechanism is in place or will be put in place to monitor these toxic discharges?** At present all that is in place is WET four times a year. This needs to be reevaluated and more adequately addressed.” [Emphasis in original.]

Response: After submitting one year and a minimum of two consecutive sets of WET test results, all of which demonstrate compliance with the WET permit limits, the permittee may request a reduction in the WET testing requirements. Any reductions that might be permitted would be to only reduce the number of species used during the analysis, and not the frequency of WET tests. Furthermore, the permit does not state, or by any means suggest, that WET testing can be discontinued. See Permit Section I.A. Footnote Number 10.

Regarding unknown industrial discharger's and undetected processes and by-products, the Billerica WWTF is required to implement a Pretreatment Program. The Pretreatment Program is designed to reduce the level of pollutants discharged by industry and other non-domestic wastewater sources into municipal sewer systems, and thereby, reduce the amount of pollutants released into the environment through wastewater. The objectives of the program are to protect the Publicly Owned Treatment Works (POTW) from pollutants that may interfere with plant operation, to prevent pollutants that may pass through untreated from being introduced into the POTW, and to improve opportunities for the POTW to reuse wastewater and sludges that are generated.

The National Pretreatment Program, published in Title 40 Code of Federal Regulations (CFR) Part 403, provides the regulatory basis to require non-domestic dischargers to comply with pretreatment standards (effluent limitations) to ensure that the goals of the CWA are attained.

As specified in the permit, Part I.A. 2, 3 and 5, and Part I.D, the Billerica WWTF is required to implement an Industrial Pretreatment Program in accordance with the legal authorities, policies, procedures, and financial provisions described in the Billerica WWTF's approved Pretreatment Program, and the General Pretreatment Regulations, 40 CFR 403.

Additionally, the Billerica WWTF is required to submit to EPA and MADEP an annual Industrial Pretreatment report. The annual report includes an updated list of all industrial users, and information regarding compliance with categorical standards and local limits. In addition, annual sampling and analysis of the influent and effluent of the Billerica WWTF is required for total cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, cyanide and arsenic. Attachment B provides a list of requirements for the IPP annual report.

Comment C16: "It is simply not acceptable for a wastewater facility to continue to operate outside the limits of the State Water Quality Standards. Municipalities need resource assistance to be able to upgrade their operations and management to come into compliance. **Billerica's management and engineering capacity deserves comprehensive support to address the necessary adjustments that must be made to multiple sectors of their infrastructure and work force to bring this facility and these operations under control.**" [Emphasis in original.]

Response: As discussed previously in this Response to Comments, we believe that the effluent limitations are protective of water quality standards. If these limitations are exceeded, EPA and MADEP may take enforcement action.

Comment C17: As stated, the commentor, "...insists that all mention of the tie-in of the Billerica House of Corrections and future industrial development park to this facility be removed from the language of this permit."

Response: There is no language in the permit related to this issue. Please read pages five through six of the Fact Sheet for more details. Also, please see Comments A1 and B2 and their respective responses.

D. Comments submitted by Kevin Gilligan; Billerica Town Meeting Representative, Concord River Environmental Stream Team Coordinator

Comment D1: My remarks herein concern only one point discussed in the draft permit Fact Sheet. Please refer to page 6 thereof, paragraph 1:

"As stated in the previous Fact Sheet, the Town requested that the flow limit in its permit be increased to reflect the planned tie-in of wastewater from the Billerica House of Correction (BHOC). The BHOC, a State entity, currently owns and operates a wastewater treatment plant with a NPDES permitted discharge of 0.15 MGD to the Concord River. Following the tie-in of the BHOC, the Town has tentative plans to take over the BHOC treatment plant, rehabilitate and expand the facility, and resume treating flow from the BHOC, and a planned industrial park at the BHOC treatment plant. In the event this plan is executed, it is likely that more stringent limits (in particular phosphorus) will be necessary because existing water quality data, collected under current loadings, indicate that the Concord River is already impaired and has very limited assimilative capacity for nutrients. In addition, any net increase in flow above the permitted levels may not be approved."

"I wish to reiterate here the objections I raised to these "tentative plans" in my comment letter of August 24, 2001."

Response: Please see previous Response to Comments, and the current responses to Comments A1 and C17 above.

Comment D2: It was asked whether the Town of Billerica has completed a Comprehensive Wastewater Management Plan (CWWMP). Also, regardless of the stage of development of the CWWMP, have EPA and DEP addressed it during the preparation of this permit.

Response: A CWWMP has not been developed by the Town of Billerica, and was therefore, not used during the development of this permit.

Comment D3: "..., as was the case with the town's new water treatment plant currently under construction, it appears that EPA and DEP are addressing direct impacts of withdrawals and discharges to the "impaired" Concord River, yet neglecting the indirect impacts of construction and reconstruction in the riparian zone.

It would be helpful to have clarification and confirmation on the following point, once and for all, so as to adjudge the validity or invalidity of the Town's "tentative plans" to acquire

and expand the BHOC WWTF, irrespective of river impacts. With regard to the new WTF under construction on the same parcel of land occupied by the BHOC plant, Condition 121 of the Order of Conditions issued by the Billerica Conservation Commission for this project (DEP File No. 109-794) specifically disallows the on-site reconstruction of a WWTF or further alteration of the 70-acre site's resource areas:

"A restriction, approved by the Conservation Commission, prohibiting any future alteration or activity that will cause any impact to the Wetland Resource Areas and their associated buffer zones shall be recorded on the deed to the property. . . . The exception shall be the minimum work necessary to maintain and operate, at the current operating capacity, the existing Middlesex County House of Correction wastewater treatment facility until such time as the wastewater treated from the House of Correction is redirected towards the Town's wastewater treatment facility in North Billerica. Once this occurs, this exception will become null and void."

If a superseding order issued by DEP has voided this restriction, please let me know. If this is indeed the case, a further constraint on the Town's "tentative plans" to rehabilitate the BHOC wastewater plant remains. It would appear that re-use of the BHOC plant and site has been ruled out by legislation that mandates the plant's retirement:

"On the passage of this Act, the Division of Capital Planning and Operations shall dismantle and remove the existing treatment plant . . . and ensure that the site is returned to an environmentally safe condition." [Prison Bond Bill, Acts of 1996, Chapter 12, Section 1102-8968]."

Response: Clarification of this issue is beyond the scope of this permit's reissuance. However, it is recommended that the Town's Conservation Commission and MADEP wetlands division be contacted regarding whether a superseding order has been issued, and for all matters related to wetland issues. In addition, Mr. Matt Schweisberg, USEPA wetlands unit, may be contacted at 617.918.1628.

Other Notes

1. A typographical error occurred on page 10, paragraph 3, third sentence: the reference to "total phosphorus" criteria should be "chlorophyll *a*" criteria.

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