RESPONSE TO PUBLIC COMMENTS

From April 20, 2006 to May 19, 2006, the United States Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) solicited Public Comments on a draft NPDES permit, developed pursuant to an application from City of Leominster, Department of Public Works for the Leominster Water Pollution Control Facility in Leominster, MA. After a review of the comments received on the current draft permit, EPA has made the decision to issue the final permit authorizing the discharge. The following response to public comments describes the changes and briefly describes and responds to the comments on the draft permit. A copy of the final permit may be obtained by writing or calling Michele Cobban Barden, United States Environmental Protection Agency, 1 Congress Street, Suite 1100 (CMP) Boston, Massachusetts, 02114-2023; Telephone (617) 918-1539.

A) Comments submitted by John Gall, Vice President, Camp Dresser & McKee Inc. on behalf of the City of Leominster, dated May 19, 2006.

Comment #1: *Having reviewed the permit, the City has determined that compliance with the new phosphorus limits of 0.2 mg/l in the summer and 1.0 mg/l in the winter could require the investment of as much as $15 million, and a significant increase in our annual operating costs to reduce the amount of phosphorus in our effluent by a small amount. For this reason the City has paid close attention to the rationale underlying the new permit, with a particular emphasis on the relationship between our loads, other loads in the system and the potential benefits to be achieved by this significant investment.*

The City understands that the new limits might be appropriate if new information were presented to justify the more stringent limit. However, it is noted that there is no new information presented; River water quality data from as far back as the late 1990's is being used, in conjunction with literature references from the mid 1980's and early 1990's about the possible effects of different levels of phosphorus on receiving streams. These data and references were both available at the time of the last permit, so it is surprising that they show up now, rather than in the last permit.

Based on the above discussion, the City believes that EPA's conclusions fail to adhere to accepted standards and are otherwise arbitrary and capricious. Without applicable factual support, based in current data, the EPA should not implement more stringent permit limits.

Response: EPA understands that complying with the phosphorus limit in the permit will require significant capital expenditures and will also increase operational costs. It has been well established that EPA may not consider the cost of compliance in establishing water quality-based effluent limitations. Costs may be taken into account in establishing the compliance schedule for achieving the limits, and EPA will consider the impacts of the costs on user charges in establishing a reasonable compliance schedule, which we anticipate issuing in an administrative order subsequent to issuing the final permit.

Regarding the comment that EPA may not establish phosphorus limits more stringent than the current permit without new information, there clearly is no basis for saying that

the EPA may not put the correct permit limits into a new NPDES permit because it has put different permit limits into a prior NPDES permit. The EPA revisits all aspects of NPDES permits at each permit reissuance, consistent with the goal of the Clean Water Act to restore and maintain the chemical, physical and biological integrity of the nation's waters. While section 402(k) of the Clean Water Act, 33 U.S.C. § 1342(k), provides some protection for permittees against having to comply with changes in requirements during a permit's term, the clear intent of the statute is that there can and indeed often must be such changes in requirements when new permits are issued after prior permit terms.

As described in the fact sheet, and consistent with the State's water quality standards and EPA's regulations at 40 C.F.R. § 122.44(d)), EPA determined that there was reasonable potential for the discharge of phosphorus to cause or contribute to exceedances of the state's narrative water quality standards for eutrophication and established numerical limits which meet the state's requirement for Highest and Best Practical Treatment, and also ensure that the discharge will not cause an in-stream exceedance of EPA's Gold Book criteria. This determination necessarily concluded that the permit limit of 1 mg/l in the current permit was not stringent enough, and imposed the more stringent limit of 0.2 mg/l.

The reasonable potential for the Leominster WWTP to cause or contribute to violations of state water quality standards for eutrophication was recognized in its previous permit, which included a water quality based limit of 1 mg/l for total phosphorus. What has been recognized and addressed in this permit is that this limit is not sufficiently stringent to result in attainment of water quality standards. The discussion below expands on the discussion in the fact sheet and focuses on the need for more stringent effluent limitations to achieve water quality standards in Segment 81-05, which is the next segment downstream of the Leominster WWTP.

As stated in the fact sheet, segments 81-05, 81-06 and 81-07 of the Nashua River (from the confluence of the North Nashua to the New Hampshire state line) are listed on the Massachusetts 303(d) list as waters needing a TMDL for nutrients, (among other pollutants) indicating that these segments are eutrophic. Segment 81-05 begins at the confluence of the North Nashua River and the Nashua River (locally known as the "South Branch") in Lancaster. The major discharges upstream of this segment are the POTWs in West Fitchburg, East Fitchburg, and Leominster, which discharge to the North Nashua, and the MWRA Clinton POTW which discharges to the South Branch. The West Fitchburg plant is not a significant source of phosphorus given that its flow consists entirely of nutrient deficient paper making waste. Together, the East Fitchburg, Leominster and Clinton treatment plants represent a high percentage of the receiving water low flow in segment 81-05 under 7Q10 conditions. The average summer flow from these facilities is currently about 17 cfs and the receiving water 7Q10 is about 40 cfs (see calculations below).

7Q10 = North Nashua 7Q10 + South Branch 7Q10

North Nashua 7Q10 = gage downstream of Leominster + (flow factor)(watershed area between Leominster gage and confluence of North Nashua and South Branch)
=27.1cfs + (0.25cfs/sq mi[1])(24 sq mi)
= 27.1 cfs + 6 cfs
= 33.1 cfs

South Branch 7Q10 = 7Q10 at Clinton[2] + Clinton dry weather flow + (flow factor) (watershed area between Clinton and confluence with North Nashua)

= 2.8 cfs + 3.1cfs + (0.25cfs/sq mi)(6 sq mi)
= 2.8 cfs + 3.1 cfs + 1.5 cfs
= 7.4 cfs

7Q10 at confluence of North Nashua and South Branch = 33.1 cfs + 7.4 cfs = 40.5 cfs

Dry weather flow from POTWs[3]:

E Fitchburg = 5.4 mgd = 8.4 cfs
Leominster = 3.7 mgd = 5.7 cfs
MWRA Clinton = 2 mgd = 3.1 cfs

Total = 17.2 cfs

These calculations show that under current dry weather conditions the discharges from these POTWs account for about 40 percent (17.2/40.1) of the total flow in the river in segment 81-05 during dry weather. The corresponding dilution factor would be:

Dilution Factor = (7Q10 + POTW flow)/POTW Flow
= 40.5cfs/17.2 cfs
= 2.4

Using this dilution factor calculated above, the instream concentration of total phosphorus in Segment 81-05 due to those discharges can be estimated for a given POTW effluent concentration by dividing the effluent concentration by the dilution factor. For an effluent concentration of 1.0 mg/l, the estimated instream concentration would be 0.4 mg/l (1.0/2.4), while the estimated instream concentration at a POTW effluent concentration of 0.2 mg/l would be about 0.08 mg/l (0.2/2.4).

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[1] Flow factor based on 7Q10 and upstream area at the USGS Leominster gage, 27.1 cfs/110 sq mi = 0.25 cfs/sq mi. This factor may over-predict baseflows since flow factors from other gages in the watershed are much lower. The flow factor calculated from the downstream gage in East Pepperell is 46 cfs/435 sq mi = 0.1 cfs/sq mi., and the flow factor for the Squannacook River gage is 5.5cfs/63.7 sq mi = 0.09 cfs/sq mi.
[2] 7Q10 of 1.8 mgd (2.8 cfs) from MWRA Clinton fact sheet
[3] Dry weather flows are the lowest monthly average flows reported during the months of June-Sept 2004, June-Sept 2005, and June-July 2006

As can be seen, at effluent concentrations of 1 mg/l the treatment plants discharges would result in a phosphorus concentration roughly 4 times the Gold Book-recommended criteria of 0.1 mg/l under dry weather flow conditions. At effluent concentrations of 0.2 mg/l, the POTW discharges would cause an instream concentration of about 0.08 mg/l which is less than the Gold Book-recommended criteria.

Under design flow conditions, which are the basis for establishing permit conditions, the instream concentrations would be higher for any given POTW effluent concentration, given that the loads from the POTWs would increase and there would be no increase in non-POTW dilution flow.

7Q10 with POTWs at design flow = Current 7Q10 + increase in flow due to POTWs discharging at design flow[4]

Increase in Flow POTW flows = Design Flow – Dry weather flow

E Fitchburg = 12.,4 mgd – 5.4 mgd = 7 mgd = 10.8 cfs
Leominster = 9.3 mgd – 3.7 mgd = 5.6 mgd = 8.7 cfs
MWRA Clinton = 3 mgd – 2 mgd = 1 mgd = 1.5 cfs

Total = 21 cfs

7Q10 = 40.1 cfs + 21 cfs = 61.1 cfs

Design flows from POTWs:

E Fitchburg = 12,4 mgd = 19.2 cfs
Leominster = 9.3 mgd = 14.4 cfs
MWRA Clinton = 3 mgd = 4.6 cfs

Total = 38.2 cfs

Under this scenario the POTW flows would represent about 60 percent of the dry weather flow in Segment 81-05. The corresponding dilution factor would be:

Dilution Factor = (7Q10 + POTW flow)/POTW Flow
= 61.1cfs/38.2 cfs
= 1.6

At a POTW effluent concentration of 0.2 mg/l the estimated instream concentration would be 0.125 mg/l (0.2/1.6) which is slightly greater than the Gold Book-recommended criteria.

[4] This analysis assumes that the increased POTW discharges will not impact base flow in the river. This is unlikely, and base flow in the river is likely to decrease with increased POTW flows given that at least some of the necessary drinking water withdrawals will come from the watershed.

While there may be some attenuation of phosphorus discharged from the treatment plants, the preceding analyses does not factor in other nonpoint sources of phosphorus, including phosphorus resuspended from sediments. Overall, the analyses demonstrate that the upstream discharges cause or contribute to the impairment of segment 81-05 and therefore, at a minimum, must provide highest and best practical treatment, and that such limit are necessary to achieve the Gold Book-recommended criteria instream.

As discussed in the fact sheet, EPA discussed the status of the TMDL with MassDEP and specifically asked what effluent limits would be proposed in the draft TMDL, to gauge what limits would be adequate to attain water quality standards. Based on these discussions it currently appears that a limit of 0.2 mg/l is adequate. The draft TMDL has not yet been released for public comment.

Furthermore, contrary to the City's suggestion that no new water quality information has been produced since the issuance of the current permit, EPA notes that MassDEP's Nashua River Basin, 1998 Water Quality Assessment Report was published in January 2001, approximately six months after the date of signature (July 28, 2000) of the City of Leominster's existing NPDES permit. EPA believes that if the data in the 1998 Water Quality Assessment Report was available and reviewed at the time of the last permit issuance, the limits for total phosphorus proposed in this permit would have been proposed at that time. Essentially, the time lapse between data collection and the publication of the assessment report has provided the City of Leominster with a five year deferral of the total phosphorus effluent limits necessary to meet water quality standards.

Comment #2: *The Fact Sheet accompanying the permit alludes to a model and TMDL being developed by the DEP and suggests that the results of the model will be presented to the public in early 2006. The Fact Sheet suggests that, based on "personal communication" (no record of which exists in the EPA's permit files) the model and TMDL support the phosphorus limitations contained in the permit. Although "early 2006" has certainly passed, the DEP has not yet released either the model or the TMDL. At a minimum, the City believes it should have been afforded the opportunity to review and comment on these documents before the draft permit was issued. Without being presented with the data on which EPA apparently relies for establishing permit limits, the City has been deprived of an opportunity to fully and fairly comment. Moreover, because the permit relies on dated information, it does not reflect changes made since the time of the last permit issuance. In particular, it does not capture improvements in quality associated with the upgrade to the Ayer WWTF, or the connection of MCI-Shirley WWTF to the Devens treatment plant.*

The City believes that the lack of applicable factual support renders the draft permit terms arbitrary and capricious. Should EPA seek to implement more stringent criteria it should base its analysis on a proper TMDL that is, in turn, fully disclosed to the City, after which the permit can be rewritten to achieve the objectives of the TMDL. Until that time, the draft permit lacks the necessary factual support.

Response: The TMDL has not yet been released for public comment. As discussed in the response to comment number A.1, the TMDL results are not the basis for the proposed limits. While it would be desirable for the TMDL to be completed prior to reissuance of this permit, EPA is required to include appropriate water quality-based limits in an NPDES permit when there is a reasonable potential for the discharge to exceed water quality standards.[5] As discussed previously, state water quality standards require that " any existing point source discharge containing nutrients in concentrations which encourage eutrophication or growth of weeds or algae shall be provided with the highest and best practical treatment to remove such nutrients." MassDEP has consistently interpreted its "highest and best treatment " requirement as an effluent limit of 0.2 mg/l for POTWs.

EPA regulations require that limitations based on narrative criteria be developed in accordance with procedures found at 40 CFR part 122.44 (d)(1) (vi) (A-C), which describes three methods for establishing such effluent limits. The regulation directs EPA to A) derive a criteria using proposed state criterion, an explicit State policy or regulation interpreting its narrative water quality criterion supplemented with other relevant information, B) use EPA's water quality criteria supplemented where necessary by other relevant information, or C) control the pollutant through use of an indicator.

As described in the response to comment A.1, EPA evaluated whether limits based on the "highest and best practical treatment" criteria of 0.2 mg/l would achieve instream concentrations equal to or less than EPA-recommended criteria. This is in accordance with 40 CFR part 122.44 (d)(1) (vi) (B). EPA has produced several guidance documents (i.e. Gold Book[6], Ecoregion Nutrient Criteria[7]) which include recommended instream concentrations of total phosphorus for achieving water quality standards. EPA can use these criteria to interpret the State's narrative criteria. EPA's1986 Quality Criteria of Water ("the Gold Book") recommends that to control cultural eutrophication instream phosphorus concentrations should not exceed 0.05 mg/l in any stream entering a lake or reservoir, 0.1 mg/l for any stream not directly discharging directly to lakes or impoundments, and 0.025 mg/l within a lake or reservoir. The more recently published Ecoregion Nutrient Criteria were developed to provide states with a baseline for developing more site specific criteria. EPA also notes that states may adopt these recommended criteria in their water quality standards. EPA, therefore, believes it is

[5] EPA regulations do not require that a wasteload allocation be completed before a water quality-based limit may be included in a permit. Rather, the NPDES permit must be "consistent with the assumptions and requirements of any available wasteload allocation" that has been prepared by the state and approved by EPA. 40 CFR part 122.44 (d)(1) (vii) (B)

[6] US EPA, 1986, Quality Criteria for Water, EPA-440-5-86-001.

[7] US EPA, Office of Water, Office of Science and Technology, Health and Ecological Criteria Division, 2000, Ambient Water Quality Criteria Recommendations, Information Supporting the Development of State and Tribal Nutrient Criteria for Rivers and Streams in Nutrient Ecoregion XIV, Eastern Coastal Plain, including all or parts of the States of South Carolina, North Carolina, Georgia, Virginia, Maryland, Delaware, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, New Hampshire, Maine, EPA 822-B-00-022.

appropriate to use these recommended criteria as a standard by which to interpret the State's narrative water quality standard.

As discussed in the response to comment number A.1, the impaired segments of the Nashua River begin at the confluence of the North Nashua and the South Branch, which is upstream of both the former MCI Shirley discharge and the Ayer discharge. Moreover, the impact of the Ayer discharge (which now has a total phosphorus effluent limit of 0.2 mg/l) is small compared to the Leominster discharge (see Table below).

Facility	Design Flow (mgd)	Total Phosphorus Load (lbs/day) Assuming a Total Phosphorus Effluent Concentration of 1 mg/l	Total Phosphorus Load (lbs/day) Assuming a Total Phosphorus Effluent Concentration of 0.2 mg/l
Leominster WWTF	9.3	77.56	15.51
Ayer WWTF	1.79	14.93	2.98
MCI Shirley	0.267	2.23	Discharge Eliminated

MassDEP has recently released a Technical Memorandum[8] of Nashua River Water Quality Data from 2003. This data set represents water quality conditions after the elimination of the MCI-Shirley discharge but prior to upgrades at the Ayer WWTF. The data indicates that eutrophication in downstream segments continues to be a problem**.**

Comment #3: *The impacts of the improvements to the Ayer and MCI facilities are important because the Agency relies on, among other things, river conditions found at sampling sites directly downstream and influenced by these discharges to support the need for the phosphorus limitations imposed on the Leominster Treatment Plant (see page 7 of the Fact Sheet, last paragraph). The Agency hypothesizes that the listing of Section 81-05 as impaired compels the inclusion of phosphorus limits. However, in its response on the 2002 integrated waters listing, the DEP refuses to list waters directly below the Leominster, and specifically indicated that the TMDL would be the vehicle for resolving these issues. The exchange presented in the 2002 Integrated list Response to comments is as follows:*

> *Comment: North Nashua River Segment 81-04 (Leominster WWTP to confluence with Nashua River, Lancaster) was listed in the DEP 1998 Assessment Report as having slightly elevated total phosphorus, and as a result the Aquatic Life was listed as partial support. Nutrients are not listed for this segment as a pollutant needing a TMDL and should be.*
>
> *Response: While total phosphorus concentration was slightly elevated in this segment there are no numerical standards for nutrients in the Massachusetts Water Quality Standards and there is little evidence to suggest that nutrients where the cause of "slight impairment" to the benthic macroinverebrate community. The Use Summary Table in the 1998 assessment report lists*

[8] Connors, Susan, MassDEP, 2005, Technical Memorandum – TM-81-4, Nashua River Watershed, DWM Year 2003 Water Quality Monitoring Data – Rivers.

> *nutrients as a "suspected cause" in need of further confirmation before it could be listed as a stressor in this segment. As with the South Nashua River, ongoing TMDL development in the Nashua watershed will assess the relative contribution of upstream discharges when attempting to identify causes and sources of impairment to downstream segments.*
>
> *See http://www.mass.gov/dep/water/resources/2002-il3.pdf, page 14.*

It follows that if past technical review has revealed that the waters directly below the Leominster discharge would not be listed as nutrient impaired, that impairment in waters farther downstream cannot be invoked, via a mere hypothesis, as the rationale for the permit limit without the completion of the TMDL.

As stated above, should the EPA seek to implement more stringent criteria it should base its analysis on a proper TMDL after which the permit can be rewritten to achieve the objectives of the TMDL. Until that time, the draft permit lacks the necessary factual support and is, as a consequence, arbitrary and capricious.

Response: We concur that Segment 81-04 is not listed on the Massachusetts 2002 Integrated List. The Nashua River in this segment is a free-flowing water with a relatively steep slope, significant tree cover and a sandy bottom. This has allowed the segment to remain free of gross signs of eutrophication despite the high phosphorus concentrations. The downstream segments, which are listed on the Integrated List for nutrients are receiving a significant quantity of those nutrients from the upstream sources as discussed in the response to comment number A.1.

Comment # 4: *Similarly, the Agency's claim of eutrophic conditions in the Pepperell impoundment cannot be cited as the rationale for the limitations because those conditions predated the improvements. A current TMDL is necessary to establish limitations on the Leominster discharge. Moreover, the Agency errs when it summarily claims the Pepperell impoundment is eutrophic. DEP's own water quality assessment describes this system as follows:*

> *In addition to the chlorophyll analysis, samples were examined to provide information on the algal community composition, which could provide evidence of excessive nutrient enrichment or other water quality problems. Nevertheless, at the time of the sampling in July and August there were no algal blooms evident and little or no blue-green algae were present at any sampling sites (Table D2). This suggests that nutrients, in combination with other environmental factors, were not causing excessive algal growth. The green algae were represented by several more planktonic genera in August than in July. The dominance of the green algae in the outlet from Pepperell Pond, along with the elevated chlorophyll values, would contribute to the classification of this reach as mesotrophic. (emphasis added)*

See APPENDIX D – 1998 DEP DWM BIOLOGICAL MONITORING TECHNICAL MEMORANDUM: Chlorophyll a, Phytoplankton and Periphyton, available at: http://www.mass.gov/dep/water/resources/81wqar4.doc.

As stated above, it is critical that, should the EPA seek to implement more stringent criteria, it must base its analysis and conclusions on a proper TMDL after which the permit can be rewritten to achieve the objectives of the TMDL. Until that time, the draft permit lacks the necessary factual support and is therefore arbitrary and capricious.

Response: As previously noted, NPDES regulations require the permitting authority to set effluent limits that to ensure attainment of water quality standards, whether or not a TMDL has been completed.

The commenter is incorrect with regard to the trophic state of Pepperell Pond. Table 11 in the main section of the 1998 Nashua River Assessment Report classifies the Pepperell Pond as hypereutrophic. The commenter relies on a technical memorandum in the appendix of the 1998 Assessment Report to support its claim that Pepperell Pond is wrongly classified. However, the referenced memorandum solely discusses classification based on phytoplankton information. MassDEP uses the Carlson Index[9] as its reference for determining trophic state. The Carlson Index uses chlorophyll pigments, Secchi depth and total phosphorus values to estimate algal biomass which is the basis for the classification of trophic state. Using this information and professional judgement, the State has classified the Pepperell Pond as hypereutrophic, and has included it on the Integrated List for nutrients and noxious aquatic plants, among other pollutants.

Comment # 5: *The discussion on page 6 of the Fact Sheet concerning the applicability of 314 CFR 4.04 requiring the application of highest and Best Practicable Treatment Technology is incorrect. According to the Massachusetts Department of Environmental Protection, that section applies only to lakes and ponds. While discussions are underway to possibly expand the applicability of this section to all waters, such expansion is now only proposed, and DEP has not yet formally modified the water quality standards to effect this change. See http://www.mass.gov/dep/water/laws/wqssum.htm, which states in part that:*

> *Nutrient/Control of Eutrophication 314 CMR 4.05 (5)(c): Cultural eutrophication now is addressed in the narrative nutrient criteria. The resulting provision is expanded to ensure that all surface waters, not just lakes and ponds, are protected from excessive nutrients. (emphasis supplied)*

Based on the above discussion, the City believes that there can be little doubt that basing substantially more stringent permit terms on inapplicable or nonexistent water quality standards fails to conform with acceptable standards ad practices and it otherwise arbitrary and capricious.

[9] Carlson, R.E., 1977, A trophic state index for lakes. Limnology and Oceanography. Volume 22, p. 361:369.

Response: The 0.2 mg/l total phosphorus limit is not an arbitrary application of HBPT, but is MassDEP's interpretation of its standards as is documented in numerous previous NPDES permits it has certified for facilities discharging to rivers. The revised language proposed in the water quality standards is for purposes of clarifying the existing standards.

Also, as discussed in the responses to comment A.1 and A.2, the effluent limit of 0.2 mg/l is necessary to achieve EPA-recommended water quality criteria for total phosphorus.

Comment #6: *The discussion on page 6 of the Fact Sheet concerning the applicability of 314 CMR 4.05(5)(c) is incorrect in that the limits proposed are not site specific as required by the regulation, but are generalized technology based limitations representing the Department's assessment of the Highest and Best Practical Treatment Technology. Such limitations fail to take into account the unique characteristics of the current site, as is required in the development of appropriately tailored permit terms. Site specific values require the completion of a TMDL.*

As stated above, the City believes that EPA's conclusions must be based on site specific analysis as required by the regulation, and that the permit should be written based on an actual site specific analysis. There is little doubt that basing substantially more stringent permit terms on generalized non-site specific data fails to conform with acceptable standards and regulations and is otherwise arbitrary and capricious.

Response: As discussed in the response to Comment A.2, EPA is required to establish water quality based limitations whenever there is a reasonable potential for the discharge to cause or contribute to a violation of state water quality standards, regardless of whether there is a completed TMDL. Also, as discussed in the response to Comment A.5, the application of highest and best practical treatment limits is in accordance with the requirements of state water quality standards, and is a site specific limit in that it is only required of discharges "containing nutrient in concentrations which encourage eutrophication or growth of weeds." Additionally, as described in the response to comments A.1 and A.2, a limitation of 0.2 mg/l is also necessary to ensure that instream concentrations of phosphorus do not exceed EPA-recommended water quality criteria.

Comment #7: *The paragraph starting at the bottom of page 6 of the Fact Sheet suggests that EPA has produced a total phosphorus criterion for receiving waters. This is incorrect; the Gold Book referenced in this paragraph clearly indicates that there is no such criterion. See http://www.epa.gov/waterscience/criteria/goldbook.pdf, specifically the discussion on Phosphate Phosphorus, which concludes with the following:*

> *No national criteria is presented for phosphate phosphorus for the control of eutrophication.*

While the document does describe a variety of approaches that could be considered, including concentration values, Vollenwieder loading rates, and a generic description of the factors influencing eutrophication induced by phosphorus, none of the approaches are criterion in the context of the EPA's Quality Criteria for Water.

The City believes that, because there is a lack of applicable criterion for total phosphorus, the draft permit lacks the necessary factual support and therefore, the total phosphorus limits contained in the draft permit are arbitrary and capricious.

Response: As stated in previous responses, EPA used the recommendations in the "Gold Book" and "Ecoregional Nutrient Criteria" as means to interpret the state's narrative criteria, pursuant to 40 CFR Part 122.44(d)(vi)(B).

Comment #8: *The Agency also argues that its ecoregion nutrient criteria compel phosphorus limitations. However, those criteria have been developed solely as recommendations and starting points for the States to use in the development of the state water quality standards. As indicated in the DEP response to comment quoted above, there are no numerical standards for nutrients in Massachusetts. Moreover, the criteria document cited by EPA explicitly disclaims its use to set limits:*

> *While this document contains EPA's scientific recommendations regarding ambient concentrations of nutrients that protect aquatic resource quality, it does not substitute for the CWA or EPA regulations; nor is it a regulation itself. Thus it cannot impose legally binding requirements on EPA, States, authorized Tribes or the regulated community, and it might not apply to a particular situation or circumstance.*

See http://www.epa.gov/waterscience/criteria/nutrient/ecoregions/rivers/rivers_14.pdf at page iv.

As stated above, the City believes that because there is a lack of applicable criterion the draft permit lacks the necessary factual support and therefore, the limits contained in the draft permit are arbitrary and capricious.

Response: As stated in previous responses, EPA used the recommendations in the "Gold Book" and "Ecoregional Nutrient Criteria" as means to interpret the state's narrative criteria.

Comment #9: *The last paragraph on page 7 of the Fact Sheet presents the basis for the 1 mg/l winter time phosphorus limit. The section indicates that the purpose of the limit is to prevent higher levels of particulate phosphorus that would otherwise be discharged in the winter from accumulating in the sediments. However, the Agency has consistently argued that POTWs discharge phosphorus in the dissolved form, not the particulate form, and thus a limit on total phosphorus is inappropriate. The limit should be based solely on particulate phosphorus. If the agency believes that the dissolved phosphorus fraction presents water quality problems in the winter, it should present calculations showing that*

the dissolved fraction does cause problems, and should compare that to the phosphorus load from all other sources in the same time frame to validate their conclusions.

The City believes that without the proper factual documentation and/or calculations demonstrating that the dissolved phosphorus fraction causes problems in the winter, any phosphorus limitation in the wintertime is arbitrary and capricious.

Response: EPA has not changed its position and continues to believe that particulate phosphorus is a concern in the winter months. While the majority of phosphorus discharged from a POTW without specific treatment for phosphorus will be in the dissolved form, a significant portion can be in the particulate form and thus accumulate in downstream impoundments. EPA considers an effluent limit of 1.0 mg/l for total phosphorus appropriate because the particulate portion at that concentration will be minimal. If a limit was set for particulate phosphorus then the limit would be proportional, and therefore, significantly lower (~0.1 mg/l).

Comment 10: *The dilutions used to calculate dilution based limits are incorrect. The Fact Sheet at page 4 states:*

> *(Note: The daily average effluent flow is not added to the river flow in the numerator because the gage is located downstream and therefore, is already accounted for.)*

While it is true that the downstream gage includes flow from the plant, it does not include flow equal in volume to the design flow, which is what the agency's logic assumes. The proper way to account for this is to subtract the plant wastewater flow volume from the gage, and then to add the design flow in the numerator, as would be done if the gage were immediately upstream of the plant discharge. The wastewater volume that should be subtracted must reflect the wastewater discharge in low flow conditions, in order to properly represent low river flows.

Using data from 1986 to the present, we have computed the 7 day 10 year low flow from the treatment plant at 3.1 mgd (4.8 cfs). The gaged 7 day, 10 year low flow was 32.4 cfs according to the Fact Sheet. Thus, the 7 day, 10 year flow absent the plant discharge is 27.6 cfs. Adjustments to reflect the small differences in drainage area (100 versus 110 square miles) reduces this to 24.91 cfs. The resultant dilution of a 14.4 cfs design flow discharge is (24.91+14.4)/14.4 = 2.73, as compared to the 2.04 value used in the permit. All statements and computations relying on the 2.04 value should be corrected.

The City believes that the lack of applicable factual support renders the draft permit terms arbitrary and capricious. Should the EPA seek to implement more stringent criteria it should base its analysis on a proper flow analysis after which the permit can be rewritten to achieve the objectives. Until that time, the draft permit lacks the necessary factual support.

Response: EPA agrees that the receiving water 7Q10 should be calculated using an estimate of the actual flow discharged from the POTW under 7Q10 conditions, and then calculating dilution using that receiving water 7Q10 and the POTW's design flow.

However, our revised dilution calculations are somewhat different than those presented in your comments. Because treatment plant low flow for the period of 1986 to present was used to calculate the POTW flow, EPA believes that it is appropriate to use this same period to estimate the receiving water 7Q10. The 7Q10 for the period from 1986 to present is 27.1 cfs (rather than 32.4 cfs, which represents the entire record). The revised dilution factor would be 2.4, as shown below.

Given:

7Q10 = 27.1 cfs
WWTF 7Q10 effluent flow = 4.8 cfs
WWTF daily average design flow = 14.4 cfs
Drainage Area @ gage = 110 square miles
Drainage Area @ point of discharge = 100 square miles

Hence:

7Q10 – (WWTF 7Q10) = 27.1 cfs – 4.8 cfs = 22.3 cfs

The adjusted 7Q10 then is prorated proportional to the drainage area.

22.3 cfs * (100/110) = 20.27 cfs

The dilution can then be calculated as follows:

$$\frac{\text{River flow (7Q10) + WWTF flow (design)}}{\text{WWTF flow (design)}} = \text{Dilution}$$

$$\frac{20.27 \text{ cfs} + 14.4 \text{ cfs}}{14.4 \text{ cfs}} = 2.4$$

Comment 11: *The hardness data used to compute effluent limits for copper is incorrect. The Fact Sheet indicates that a value of 35 was used to compute the ambient water quality criteria for copper. This appears to have been the value used in the prior permit, yet inspection of the sampling results presented in DEP's water quality assessment indicates that in-stream hardness is higher than 35 at low river flows. The table below presents the river hardness data and flow data for the reach of the river immediately downstream of the Leominster discharge. Hardness values are from table B6 and flow from table B4 of Appendix B to the Water Quality Assessment Report.*

Date	*Hardness*	*Flow*
5/27/1998	*35*	*108*
5/27/1998	*35*	*108*
6/17/1998	*17*	*999*

6/17/1998	*17*	*999*
7/22/1998	*53*	*58*
7/22/1998	*40*	*58*
8/12/1998	*63*	*49*

Careful inspection of the table indicates that as the flow goes up, the hardness goes down. The hardness level selected for computation of the criteria (35 mg/l) reflects relatively high flow conditions – over three times the seven day 10 year low flow conditions used to establish effluent dilution. Even the lowest flows on the table are roughly twice the seven day ten year low flow, suggesting that the hardness would be even higher under true low flow conditions. This is particularly true since the low flow hardness values for the Leominster plant discharges approaches 80 mg/l, on average, as shown in the June and September WET testing information submitted to the Agency by the City. An appropriately conservative river hardness value reflecting low flow conditions is 50 mg/l.

If the 50 mg/l hardness value is adopted, and corrections are made to the dilutions as suggested above, then the resulting effluent limits for copper would be 19.9 ug/l for a maximum day and 14.1 ug/l for the monthly average.

The City believes that the lack of applicable factual support renders the draft permit terms arbitrary and capricious. Should the EPA seek to implement more stringent criteria it should base its analysis on proper river hardness data and flow data for the reach of river. Until that time, the draft permit lacks the necessary factual support.

Response: To verify the hardness data submitted by the permittee, EPA planned to review both the water quality assessment report and hardness data submitted by the permittee as part of its analysis of upstream site water, required as part of the WET test protocol. However, EPA discovered that the permittee has not been submitting these results. The permittee should note that analysis of a site water control sample and a WET test on a sample consisting of 100 % site water is required even if the actual WET test is performed using laboratory water for dilution.

EPA did confirm that the downstream data cited in the comments is from the water quality assessment report, and we concur with the permittee that a hardness value of 50 mg/l is representative of the downstream water quality under 7Q10 conditions. We have therefore adjusted our calculations of the criteria, and the effluent limits accordingly. The calculations are as follows:

Water Quality Criteria for hardness-dependent metals:

Acute criteria (dissolved) = $\exp\{ m_a [\ln(\text{hardness})] + b_a \}$ (CF)
m_a = pollutant specific coefficient
b_a = pollutant specific coefficient
h = hardness
ln = natural logarithm

CF = pollutant specific conversion factor used to convert total recoverable to dissolved metal
Calculation of acute limit for copper:

m_a = 0.9422 b_a = -1.700 CF = 0.960 h = 50

Acute criteria (dissolved) = exp {0.9422 [ln (50)] + -1.700} * (0.960) = 6.99 ug/l
Dilution factor = 2.4
Effluent limitation for dissolved copper =2.4 * 6.99 ug/l = 16.77 ug/l
Effluent limitation for total recoverable copper = 16.77/0.96 = 17.5 ug/l*

The maximum daily water quality based limitation for total recoverable copper is 17.5 ug/l

Chronic criteria (dissolved) = exp{ m_c [ln(hardness)] + b_c } (CF)
m_c = pollutant specific coefficient
b_c = pollutant specific coefficient
h = hardness
ln = natural logarithm
CF = pollutant specific conversion factor used to convert total recoverable to dissolved metal
Calculation of chronic limit for copper:

m_c = 0.8545 b_c = -1.702 CF = 0.960 h = 50

Chronic criteria (dissolved) = exp {0.8545 [ln (50)] + -1.702} * (0.960) = 4.95 ug/l
Dilution factor = 2.4
Effluent limitation for dissolved copper = 2.4 * 4.95 ug/l = 11.88 ug/l
Effluent limitation for total recoverable copper = 11.88/0.96 = 12.4 ug/l*

The monthly average water quality based limitation for total recoverable copper is 12.4 ug/l.

Therefore, a monthly average limit of 12.4 ug/l and a maximum daily limit of 17.5 ug/l have been established in the final permit. These limits are less stringent than those proposed in the draft permit but are more stringent than the limits in the previous permit.

Comment 12: *The City is aware that the Commonwealth has proposed to modify its water quality criteria for copper in the North Branch of the Nashua River to levels that would substantially increase the limits contained in the permit.*

(See http://www.mass.gov/dep/water/laws/wqstbmp3.pdf). Should these proposed amendments be approved, the City will request a modification to this permit.

Response: EPA acknowledges the comment.

B) Comments submitted by Cindy Delpapa, Stream Ecologist, MA Riverways Program, dated May 18, 2006.

Comment #1: *We appreciate that care has been taken to craft a permit that will be protective of this significant resource. The careful consideration of the 7Q10 for this stretch of river fully explains the need for recalculation of the dilution factor. We appreciate the discharge permit will better reflect the receiving water conditions based on this more accurate dilution factor.*

Response: Please see the response to Comment A.10. The dilution has been recalculated.

Comment #2: *The facility disinfects year round. Is there a reason seasonal disinfection, a strategy that would reduce the amount of chlorine residuals entering the river, is not an option for this facility? If there is no compelling human health of other reason for year round sodium hypochlorite additions, we would like to voice support for seasonal disinfection at this facility.*

Response: It is MassDEP policy that any surface water discharge upstream of a water supply intake is required to disinfect the effluent year round regardless of the distance upstream from the withdrawal. The communities of Lowell, Methuen, Tewksbury and Lawrence use Merrimack River water with treatment for their water supplies.

Comment #3: *We are very pleased to see lower phosphorus limitations added to this permit. This change is important for this stressed river system with known eutrophication issues, (as noted in the Fact Sheet the Nashua River downstream of confluence with North Nashua is listed as impaired for pathogens and nutrients and instream phosphorus limits downstream of the discharge in to the North Nashua are well above the upstream concentration). Reducing the nutrient load into this stream is an important component in efforts to improve conditions in this waterway and move toward meeting water quality goals and the current data about instream phosphorus levels illustrates existing permit concentration limitation is not sufficient to result in the receiving water meeting guidelines. The Fact Sheet presented estimates of the receiving water phosphorus concentration if the facility maintains a 0.2 mg/l concentration. This estimate indicated the 0.2 mg/l permit limit would not be adequate to meet the recommended concentrations in the EPA Ecoregional guidance but it would meet best technically achievable level and the less regional specific Gold Book. This estimate is not a conservative one as it does not incorporate the known instream concentration in the receiving water so it is very likely the river would not meet Gold Book guidance even with a 0.2 mg/l limitation. Since there is currently no Massachusetts water quality numerical standard for nutrients, the permit is relying on the best practicable treatment concentration for this permit though we would like to emphasize this new lower concentration limit may not be sufficient as it*

clearly will not bring the instream concentration to the Ecoregion guidance recommendation. The Nashua River is currently the focus of a TMDL and we hope this permit and other affected permits in the watershed will be revisited when the TMDL determines the appropriate loads for all of the contributing sources of nutrients.

Given the degraded state of the receiving water and the upstream and downstream data on the impact of the Leominster discharge on phosphorus concentrations in the river, we would like to strongly recommend the best practicable treatment concentration of 0.2 mg/l also be required as the daily maximum for this facility and that load limitations also be added to the permit for monthly average and daily maximum. This option may not be as desirable as assigning a concentration limitation likely to achieve the Ecoregional recommended goals but it will require the facility to consistently meet practicably achievable goals and keep phosphorus concentrations and loads to the practicably feasible lowest level throughout the growing season. The addition of a phosphorus load, for both summer and winter seasonal limits, is necessary due to the wide fluctuations in the effluent volume with the DMR data showing many flow events well above 9.3 MGD. Without load limitations, excessive amounts of phosphorus could travel downstream and be sequestered in impoundments such as the highly eutrophied Pepperell Pond.

Response: Based on currently available reference documents and ambient water quality data, EPA believes that an effluent limit of 0.2 mg/l applied as an average monthly limit is consistent with achieving the water quality standards.

Comment #4: *We are pleased to see infiltration and inflow requirements in the permit and appreciate the efforts of the community to address I/I. The flow information from this plant makes a strong argument for the need to do further work. If one looks at recent flow figures and removes 2.5% to account for the large industrial users, the per capita discharge would exceed 120 gpc. Even with further discounting for business and other use the per capita figure suggests there is still ongoing I/I issues or a need to introduce a water conservation educational campaign to try to achieve the State's target per capita use goals of 65 gpc. The daily maximum flows from this WWTP further illustrate there remains some significant I/I issues. In October of 2005 the monthly average was 6.26 MGD but the daily maximum was almost treble that- 18.19 MGD. The April 2005 daily maximum was more than treble the monthly average, (17.38 MGD vs 5.6 MGD). With such variations in average and maximum flow it is likely the variations are stormwater related. We hope the City can make further significant inroads into the I/I issue in the near future and eliminate its combined manholes so there will be no discharges of sanitary sewage to the stormwater system.*

Response: EPA acknowledges the comment.

Comment #5: *The facility has had a poor compliance record for meeting its copper concentration limitation. Given the ongoing and consistent problems, we would like to strongly recommend more frequent monitoring. We feel monthly monitoring does not provide enough information on the variability of this toxic metal in the effluent or offer enough feedback to determine if efforts to reduce the copper load are being successful.*

Response: The permittee is currently under an administrative order for copper. EPA believes the proposed frequency of once per month is sufficient and that increased sampling would not provide useful information.

Comment #6: *Ammonia can be detrimental to aquatic life and water quality. The draft permit has seasonal limits calculated for the summer months and a report only requirement for winter. We note there is a separate listing in the effluent limitations table for the period of May 1 -31 but a report only requirement though more frequent monitoring. It is not unusual to have an interim limit between the report only winter season in municipal permits and we would like to advocate for interim/ramping-up limits in May for ammonia if there is potential for ammonia in the effluent to negatively impact the North Nashua- especially under the occasional low flow springs New England has experienced.*

Response: The increased sampling frequency will provide additional data and allow EPA to determine if there is reasonable potential for ammonia to cause a violation of state water quality standards during the month of May. The permit can be re-opened and modified if necessary.

Comment #7: *There is a minor typographical error in footnote number 10 where the Permittee is required to comply with the new phosphorus limit, it is listed as 1.0 mg/l but the new limit is 0.2 mg/l.*

Response: Footnote 10 applies to the winter (November 1 – March 31) total phosphorus limit of 1.0 mg/l. The previous permit did not include a winter total phosphorus limit, and therefore, this is a new limit, and a schedule is appropriate.

Comment #8: *Figure 2 in the Fact sheet has some interesting figures listed for plant flow for the time period listed. In looking at the PCS database the maximum flow for the period 7/03 to 6/04 is 19.26 MGD not 7.538 MGD as listed in the flow and phosphorus loading table in the figure. The minimum listed in the PCS data base is 5.29 MGD and the average is 5.59 MGD not 2.936 and 5.298 MGD. We suspect the PCS data base is correct and the numbers on the figure are not. Is this indeed the case?*

Response: Figure 2 is a process flow diagram for the facility submitted by the permittee as part of the permit application. It was included as an attachment to the fact sheet to show the unit processes at the treatment plant; the flow and loading information was not verified. The flow data from PCS data, as shown on the Tables attached to the fact sheet, is correct.

C.) Comments submitted by Elizabeth Ainsley Campbell, Executive Director and Martha S. Morgan, Water Resources Advisor, Nashua River Watershed Association, dated May 19, 2006.

Comment #1: *We strongly support the 0.2mg/l total phosphorus limit for the plant at this time, and agree with the frequency of monitoring for TP as well as the ortho phosphorus monitoring. We also agree with the 24 hour composite sampling for the phosphorus and the timing of the sampling (i.e., beginning in April and continuing through October). Control of phosphorus discharges to the Nashua River is essential to limit plant growth and the continued eutrophication in this impaired segment of the river.*

Response: EPA acknowledges the comment.

Comment #2: *We encourage the 6.0 mg/l minimum limit for dissolved oxygen, to minimize impact to this impaired segment of the Nashua River.*

Response: EPA acknowledges the comment.

Comment #3: *We believe the monitoring for copper should occur once per week, given the exceedences that have occurred in the past.*

Response: Please see the response to comment B.5.

Comment #4: *The NRWA supports the plan for identifying and controlling infiltration and inflow (I/I).*

Response: EPA acknowledges the comment