UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL APPEALS BOARD

City of Fitchburg Wastewater Treatment Facilities Commission,	
Petitioner,	**NPDES Permit Appeal No. ____**
In re: NPDES Permit No. MA0100986	

PETITION FOR REVIEW

Pursuant to 40 C.F.R. § 124.19, the City of Fitchburg Wastewater Treatment Facilities Commission (Fitchburg) submits this Petition for Review (Petition) to contest the 0.2 milligram per liter (mg/l) and 20.7 pounds per day (lbs/day) April 1 – October 1 average monthly total phosphorus effluent limits (Limits) in Part I.A.1 of the July 22, 2010 reissuance of the above referenced NPDES permit (Permit) issued to Fitchburg for the Fitchburg East Wastewater Treatment Facility (Facility).[1]

I. OVERVIEW

Fitchburg seeks review of a final determination by the United States Environmental Protection Agency, Region I (Region) to reduce the April 1 – October 1 average monthly total phosphorus effluent limit from 1.0 mg/l to 0.2 mg/l and to add a corresponding average monthly total phosphorus effluent limit of 20.7 lbs/day.

Fitchburg submits that the issues raised in this appeal involve clearly erroneous determinations by the Region that warrant Board review. 40 C.F.R. § 124.19(a)(1). As

explained below, the Region acted arbitrarily and capriciously and abused its discretion by deriving the Limits based upon a water quality criterion that is not supported by the available water quality assessments and data. In so doing, the Region imposed limits that are without a scientific basis in the record.

Specifically, in the absence of an established numeric in-stream phosphorus standard for the Nashua River and without the benefit of modeling, the Region relied on in-stream phosphorus data, a 0.1 mg/l in-stream phosphorus guidance level from EPA's 1986 Gold Book, and simple dilution calculations to conclude that the Nashua River upstream of the Pepperell Impoundment is impaired due to phosphorus and thereby justified using the 0.1 mg/l criterion and river flows upstream of the Impoundment to set the Limits. The record shows that the Region ignored and mischaracterized other relevant data as well as the plain language of the applicable water quality assessment report in concluding that the Nashua River upstream of the Pepperell Impoundment is impaired due to phosphorus and in using the 0.1 mg/l criterion and river flows upstream of the Impoundment to set the Limits. The record also shows that the Region rushed to judgment by establishing the Limits based on limited information, criterion derived from a literature reference that is almost 40 years old, simple dilution calculations, and with the knowledge that modeling of the Nashua River's "complex riverine environment" for nutrients was underway, but incomplete.

II. BACKGROUND

The Facility provides primary, secondary, and advanced wastewater treatment to flows from the City of Fitchburg's separate and combined sanitary sewer systems.[2]

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[1] The Permit was received by Fitchburg by certified mail on July 27, 2010.
[2] Fact Sheet #MA0100986 accompanying draft permit at 2-3 (July 16, 2009) (Fact Sheet).

Although the Facility has a design flow capacity of 12.4 million gallons per day (MGD), dry weather flows currently average 8.4 MGD.[3]

The Facility discharges to the North Nashua River at Segment MA81-03.[4] Segment MA81-03 extends 1.6 miles from the Facility's outfall to the outfall for the Town of Leominster's wastewater treatment facility. The next downstream segment (Segment MA81-04) extends 10.4 miles from the Leominster wastewater treatment facility to the North Nashua River's confluence with the Nashua River. Segment MA81-05 encompasses the Nashua River from its confluence with the North Nashua River to its confluence with the Squannacook River, a distance of 14.2 miles. Segment MA81-06 encompasses the North Nashua River from its confluence with the Squannacook River to the Pepperell Dam, a distance of 9.1 miles. Segment MA81-06 includes the Pepperell Impoundment created by the Dam.[5]

Based on water quality assessments conducted prior to 2005, the Massachusetts Department of Environmental Protect (DEP) determined that portions of the Nashua River were impaired due to nutrient enrichment. The Pepperell Impoundment, in particular, was found to be suffering from eutrophication as evidenced by the presence of excessive algal mats, macrophytic plant growth, and supersaturated dissolved oxygen

[3] Fitchburg's September 21, 2009 comments on draft permit at 4 and 5 (Comments); Fact Sheet at 5. (The Comments' reference to 12.5 million gallons per day (MGD) is incorrect. The reference should have been to 12.4 MGD.)

[4] Segment references correspond to the stream segment identification numbers used by the Massachusetts Department of Environmental Protection in its Water Quality Assessment Reports, Integrated List of Waters, and Total Maximum Daily Loads. The relevant stream segments are identified and described in the Nashua River Watershed 2003 Water Quality Assessment Report (Assessment Report or Report), which is part of the record in this case.

[5] Assessment Report at 71. The Pepperell Impoundment is alternatively referred to in various documents as the Pepperell Pond or Pond.

conditions.[6] Based on this impairment determination, the DEP and the Region undertook development of a Total Maximum Daily Load (TMDL) for phosphorus for the Nashua River. The DEP released a Draft TMDL Report in June, 2007, but for reasons unknown to Fitchburg, the DEP and EPA have never completed the TMDL or solicited public comment on the Draft TMDL Report. During development of the TMDL DEP began, but has not completed, modeling of the Nashua River for nutrients.[7]

In the absence of a TMDL-derived phosphorus waste load allocation and the results of modeling conducted for the TMDL, the Region developed a site-specific 0.2 mg/l phosphorus waste load allocation for the Facility and proposed to include it in the Permit as seasonal (April 1 - October 1) average monthly concentration and mass load limits when the Permit was reissued. The Region issued public notice of the draft Permit (including the proposed Limits) on July 22, 2009. After receiving an extension of the comment deadline, Fitchburg submitted it comments on the draft Permit on September 21, 2009.

In the Fact Sheet accompanying the draft permit, the Region noted that in the absence of numerical criteria for total phosphorus, the narrative criteria in the Massachusetts Surface Water Standards (314 CMR 4.00) require that nutrients "shall not exceed the site specific limits necessary to control accelerated or cultural eutrophication."[8] Therefore, as described in the Fact Sheet, the Region proceeded to develop a site specific phosphorus limit for the Facility based on an in-stream phosphorus concentration of 0.1 mg/l from EPA's 1986 Quality Criteria for Water (the "Gold

[6] Draft Nashua River, Massachusetts Total Maximum Daily Load for the Nutrient Phosphorus at 5 (June 2007) (Report #81-TMDL-2007-2) (Draft TMDL Report).
[7] Response to Comments at 22.
[8] Fact Sheet at 9 (quoting 314 CMR 4.05(5)(c)).

Book").[9] Although the Fact Sheet indicates that the Region considered using either the 0.1 mg/l Gold Book guidance or an "Ecoregional Nutrient Criterion" of 0.025 mg/l, it does not explain why the Region selected the Gold Book guidance as the basis for the Limit.[10] However, it is clear from the Fact Sheet that the Region made no attempt to develop a site specific in-stream phosphorus criterion considering all of the available relevant data and information, but instead selected the Gold Book guidance based solely on data and information that has little or no relevance to calculating the appropriate phosphorus limit for the Facility. Moreover, the Region made no attempt in the Fact Sheet to explain the relevance of the data and information cited in the Fact Sheet to either its decision to select the 0.1 mg/l criterion or to its decision to set the concentration-based limit at 0.2 mg/l.

Specifically, the Fact Sheet discloses that the Region looked at historical data from monitoring of the North Nashua River below the Facility's discharge (Segments MA81-03 and MA81-04) which showed in-stream phosphorus concentrations both above and below the 0.1 mg/l criterion. However, the Region offered no explanation of the relevance of these data to selection of the appropriate in-stream criterion or its decision to set the limit at 0.2 mg/l. Instead, EPA relied on circular logic, selecting the Gold Book value based on the fact that it is, on occasion exceeded. This is particularly significant in light of the fact that neither of these segments is listed as impaired for nutrients,[11] and, as discussed below, the Region did not use flows in either of these segments for the dilution

[9] U.S. EPA Off. of Water, Quality Criteria for Water 1986 (May 1, 1986)(EPA 440/5-86-001), *available* at http://water.epa.gov/scitech/swguidance/waterquality/standards/upload/2009_01_13_criteria_goldbook.pdf.
[10] Fact Sheet at 9-10.
[11] Assessment Report at 56-57, 59-60.

calculations used to arrive at the proposed Limits.[12] The Region also noted that the DEP has included the Nashua River immediately downstream of its confluence with the North Nashua River (Segment MA81-05) on the 303(d) impaired waters list for nutrients, but failed either to explain the relevance of this listing to its decision to select the 0.1 mg/l criterion or, as discussed below, point out that DEP has, in fact, determined that the River in segment MA81-05 fully supports all uses that could be impaired by excessive nutrients. Finally, the Region pointed to documented eutrophication of the Pepperell Impoundment 26 miles downstream of the Facility, but again, offered no explanation of the relevance of eutrophication in the Impoundment to its decision to select 0.1 mg/l as the appropriate in-stream concentration for calculating the proposed Limit. In summary, the Fact Sheet offers absolutely no explanation of or justification for the Region's decision to select the 0.1 mg/l phosphorus criterion as the basis for the proposed Limits.

Having selected the 0.1 mg/l criterion, the Region then explained in the Fact Sheet that it used the criterion to develop the proposed Limits based on simple dilution calculations using the Facility's design flow (12.4 MGD) and the 7Q10 flow[13] in the Nashua River segment from its confluence with the North Nashua River to its confluence with the Squannacook River (Segment MA81-05) in order to maintain in-stream phosphorus concentrations in Segment MA81-05 at or less than the 0.1 mg/l under all river flows at or above the 7Q10 flow.[14] Although the Fact Sheet did not state that the Region had concluded that an in-stream phosphorus concentration at or below 0.1 mg/l

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[12] Fact Sheet at 10-12.

[13] The 7Q10 flow is the seven-day, consecutive low flow with a ten year return frequency; or the lowest stream flow for seven consecutive days that would be expected to occur once in ten years. U.S. EPA, Terms of Environment: Glossary, Abbreviations, and Acronyms" (Dec. 1997).

[14] Fact Sheet at 12. The Assessment Report describes the location of Segment MA81-05 as "[c]onfluence with North Nashua River, Lancaster, to confluence with Squannacook River, Shirley/Groton/Ayer." For

was required to prevent eutrophication in Segment MA81-05, Fitchburg assumed that to be the case since the Region used river flow in that segment in the dilution calculations used to arrive at the proposed Limits. As discussed below, it is now clear from the Region's Response to Comments that this was, in fact, the Region's objective in proposing the Limits.

Keeping in mind that the Region was proposing the Limits based on the requirement in 314 CMR 4.05(5)(c) of the Massachusetts Water Quality Standards that nutrients "shall not exceed the site specific limits necessary to control accelerated or cultural eutrophication", Fitchburg's comments on the draft Permit pointed to the absence of any evidence in the Fact Sheet of a relationship between the 0.1 mg/l criterion and protecting the Nashua River from the effects of eutrophication.[15]

In its response to Fitchburg's comments, the Region explained that it decided to apply the Massachusetts narrative water quality standards using a 0.1 mg/l in-stream phosphorus criterion rather than a more stringent 0.025 mg/l "Ecoregional Nutrient Criterion" because the 0.1 mg/l criterion was developed from an effects-based approach versus the reference conditions approach used to develop the Ecoregional Nutrient Criterion.[16] The Region went on to offer the following explanation for why it selected a criterion based on the effects-based approach rather than a criterion based on the reference condition approach.

> The effects-based approach is taken because it is more directly associated with an impairment to a designated use (e.g., healthy aquatic life, swimming). The effects-based approach provides a threshold value above which adverse effects (i.e. water quality

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ease of reference, we refer to it simply as "confluence of North Nashua River to confluence of Squannacook River."

[15] Fitchburg Comments at 3.

[16] Response to Comments at 7.

> impairments) are likely to occur. It applies empirical observations of a causal variable (i.e. phosphorus) and a response variable (i.e. chlororphyll a) associated with designated use impairments. Reference-based values are statistically derived from a comparison within a population of rivers in the same ecoregional class. They are a quantitative set of river characteristics (physical, chemical, and biological) that represent minimally impacted conditions. While reference conditions, which reflect minimally disturbed conditions, will meet the requirements necessary to support designated uses, they may also surpass the water quality necessary to support such requirements. Consequently, the effects-based 0.1 mg/l criterion is more appropriate in this instance.[17]

Keeping in mind that the Region used Segment MA81-05 to develop the Limits, the above-quoted language makes clear that the Region selected the 0.1 mg/l criterion based on its conclusion that this segment is currently impaired due to phosphorus and that in-stream phosphorus concentrations at or less than 0.1 mg/l are required to prevent nutrient-related impairments in Segment MA81-05.

III. STANDARD OF REVIEW

Under the Environmental Appeals Board's (Board's) rules, Fitchburg must show that the Region's determination to impose the Limits was clearly erroneous in order to warrant Board review. Fitchburg submits that this standard of review is equivalent to the Administrative Procedures Act's standard on judicial review of agency action, which provides that an agency's action is valid unless, inter alia, it is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A).

This standard is highly deferential to the agency, merely requiring the court to determine whether the "decision was based on a consideration of the relevant factors and whether there was a clear error of judgment." Town of Norfolk v United States Army Corps of Eng'rs, 968 F.2d 1438, 1445-46 (1st Cir. 1992) (citing Citizens to Preserve

[17] Response to Comments at 10.

Overton Park, Inc. v. Volpe, 401 U.S. 402, 416 (1971)). While this standard of review is deferential, it is not a "rubber stamp" and the "court must undertake a thorough, probing, in-depth review and a searching and careful inquiry into the record" to ensure that the "agency decisions are founded on a reasoned evaluation of the relevant factors." Airport Impact Relief, Inc. v. Wykle, 192 F.3d 197, 203 (1st Cir. 1999) (citation and internal quotations omitted). To withstand review, the "agency must explain the evidence which is available, and must offer a rational connection between the facts found and the choice made." Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 52 (1983) (citation and internal quotations omitted); see also, e.g., Puerto Rico Sun Oil Co. v. U.S. Envtl. Prot. Agency, 8 F.3d 73 (1st Cir. 1993) (overturning final permit where EPA failed to explain why it refused to wait for local authority to reconsider its certification that the permit complied with local water quality standards). Further, agency action must be overturned if it "entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." Motor Vehicle Mfrs. Ass'n, 463 U.S. at 43.

IV. GROUNDS FOR REVIEW

Fitchburg submits that the following analysis of the record in this case shows that the Region acted arbitrarily and capriciously and abused its discretion when it acted on limited information, selected the 0.1 mg/l in-stream phosphorus criterion to calculate the Limits based on its conclusion that Segment MA81-05 is currently impaired due to phosphorus, and concluded that in-stream phosphorus concentrations at or less than 0.1 mg/l are required to prevent nutrient-related impairments in this segment.

The Region attempted to support its conclusion that Segment MA81-05 was impaired due to phosphorus by pointing to the Draft TMDL Report, the Massachusetts 2008 Integrated List of Waters, and the Assessment Report as containing evidence of cultural eutrophication in that segment. The following shows that the record does not support this conclusion.

The Assessment Report is very clear about the status of the various river segments. Although the Report clearly identifies Segment MA81-05 as impaired for primary contact recreation due to bacteria, it expressly states that this segment supports both uses that could be impaired by excessive nutrients - the aquatic life and aesthetics designated uses. Moreover, the Report contains aesthetic-related field observations in Segment MA81-05 indicating no evidence of eutrophication such as overabundant growths of aquatic plants or algae.[18] The Assessment Report's description of Segment MA81-05 stands in sharp contrast to its description of the Pepperell Impoundment at the downstream end of Segment MA81-06. Although the Report clearly identifies the Impoundment as impaired for aquatic life and aesthetics due to nutrients, it is equally clear from the Report that these impairments are limited to the Impoundment and do not extend to the portion of the Segment (MA81-06) upstream of the Impoundment.[19]

Notwithstanding the clearly stated findings and conclusions in the Assessment Report, the Region asserted in its Response to Comments that the impacts of increased eutrophication are not limited to the Pepperell Impoundment, but extend to the rest of

[18] Assessment Report at 61-62.
[19] Assessment Report at 71-73.

Segment MA81-06 and Segment MA81-05 as well.[20] As support for this assertion, the Region states that "[a]ll five of these segments (MA81-03 through MA81-07, inclusive) are listed on the Massachusetts 2008 Integrated List of Waters as 'Category 5 – Waters requiring a TMDL', and the three Nashua River segments (MA81-05, MA81-06, and MA81-07) are listed for impairment caused by nutrients."[21] As explained above, this statement is directly contradicted by the plain language of the Assessment Report, which classifies Segments MA81-03 through MA81-05, inclusive, as in attainment for aquatic life and aesthetics with "no observed observations of ... overabundant growths of aquatic plants or algae" in any of these segments. In contrast, the segment downstream of Segment MA81-05 from the confluence with Squannacook River, Shirley/Groton/Ayer, to Pepperell Dam, or Segment MA81-06, is clearly identified as impaired for nutrients. Despite this, the Region based the Limits on Segment MA81-05, not that section of the Nashua River that is, in fact, impaired.

The Region's reliance on Massachusetts 2008 Integrated List of Waters (Integrated Waters List or List) to support its conclusion that Segment MA81-05 is impaired is similarly misplaced. While the List does include these five segments among its "Category 5 Waters - 'Waters requiring a TMDL,'" nowhere does the List identify these segments as impaired. When the List and Assessment Report are read together it appears that Segments MA81-05 and MA81-06 appear on the Category 5 List, not because they are impaired due to nutrients, but because DEP has concluded that TMDLs are needed for Segment MA81-05 and Segment MA81-06 upstream of the Pepperell

[20] Response to Comments at 2-3.
[21] Response to Comments at 2.

Impoundment in order to remediate the impairments in the Impoundment.[22] However, the record does not support the conclusion that the Limits will affect the impairments in the Impoundment because the Limits were derived based on the Region's erroneous conclusion that Segment MA81-05 was impaired for nutrients.

The Region also quoted from language in the Draft TMDL Report which states that Segment MA81-05 "currently displays impacts of increased eutrophication."[23] This quote is a broad generalization of river conditions that is directly contradicted by the Assessment Report as well as the Draft TMDL Report itself. The Draft TMDL Report presents chlorophyll *a* data from the 1998 water quality assessment indicating that the observed levels of chlorophyll *a* in Segment MA81-05 ranged from 1.3 to 5.8 micrograms per liter (ug/l). Sampling conducted in upstream area of Segment MA81-06 (approximately 4 miles upstream of the inlet to Pepperell Impoundment) in 2003 indicates that the chlorophyll *a* values ranged from 1.8 to 2.7 ug/l.[24] Chlorophyll *a* levels this low are not considered to be indicative of eutrophic conditions. This is demonstrated by the Region's own analyses, which were prepared as part of the approved Lower Charles River Basin TMDL for phosphorus, in which the Region presented ranges of values for chlorophyll *a* and their associated trophic status, as stated in the following tables.[25]

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[22] Any other interpretation would lead to a clear conflict between the Assessment Report and the Integrated Waters List.
[23] Response to Comments at 3.
[24] MassDEP, Technical Memorandum-TM-81-4, Nashua River Watershed DWM Year 2003 Water Quality Monitoring Data-Rivers, at 35 (Dec. 2005) (DWM Control No. CN 107.2).
[25] Fitchburg referenced the Lower Charles River TMDL Report in its comments on the draft Permit. See Fitchburg Comments at 4. The Lower Charles River TMDL Report can be found at http://www.epa.gov/region1/eco/tmdl/assets/pdfs/ma/lowercharles.pdf.

Table 3-1. Summary of fresh water system trophic status as characterized by mean chlorophyll *a* concentrations*

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

*Table taken in part from USEPA 2003a.

Table 3-2. Fresh water trophic status boundary values for peak chlorophyll *a* and peak chlorophyll *a* observed in the Lower Charles River*

Trophic Status	Peak Range (µg/l)	Charles River Basin (1998 - 2004) (µg/l)
Eutrophic	16.9 –107	41.0 to 97.0
Mesotrophic	8.2 – 29	not applicable
Oligotrophic	2.6 - 7.6	not applicable

*Table taken in part from USEPA 2003a.

MassDEP & U.S. EPA, New England Region, Final Total Maximum Daily Load for Nutrients in the Lower Charles River Basin, Massachusetts CN 301.0, at 20 (June 2007) (Lower Charles River TMDL).

Additionally, the Draft TMDL Report itself presents information which shows that the current levels of oxygen saturation in the Nashua River upstream of Pepperell Impoundment are well below levels indicative of excessive algae associated with eutrophic conditions. In the course of developing the Nashua River TMDL, DEP and EPA established 125 percent oxygen saturation as a key response variable associated with eutrophication.[26] The Draft TMDL Report contains observed percent saturation values from the upstream area of Segment MA81-06 from 1998 and 2004. These values indicate that dissolved oxygen saturation in this area was never over 125 percent and rarely over 100 percent, thereby adding to the evidence that eutrophic conditions do not exist in Segment MA81-05.[27] The chlorophyll *a* and oxygen saturation data, together

[26] Draft TMDL Report at 9.
[27] Draft TMDL Report at 32-33.

with the Assessment Report's findings discussed above, are uncontroverted evidence that Segment MA81-05 is not exhibiting signs of accelerated or cultural eutrophication.

In summary, nothing other than observed concentrations of phosphorus above the 0.1 mg/l Gold Book guidance level lends support to the Regions erroneous conclusion that there is any potential for cultural eutrophication in Segment MA81-05. As Fitchburg pointed out in its Comments on the draft permit, elevated levels of phosphorus alone are not a sufficient basis for concluding that cultural eutrophication exists.[28] While in-stream phosphorus concentrations in excess of 0.1 mg/l were measured in Segment MA81-05, all other available data and

water quality assessments clearly indicate that in-stream phosphorus concentrations alone are not a reliable indicator of eutrophication.

In focusing on the 0.1 mg/l value of the Gold Book, the Region selectively applies parts of the guidance offered in the Gold Book, while ignoring its other recommendations. The Gold Book is clear as to its recommendations, when it says it does not present a criterion for total phosphorus to control nuisance aquatic growths.[29] The Gold book goes into significant detail to describe the rationale which "should be considered" to develop such a criterion. The Gold Book then goes on to say:

> There are natural conditions, also, that would dictate the consideration of either a more or less stringent phosphorus level. Eutrophication problems may occur in waters where the phosphorus concentration is less than that indicated above and, obviously, such waters would need more stringent nutrient limits. Likewise, there are those waters within the Nation where phosphorus is not now a limiting nutrient and where the need for phosphorus limits is substantially diminished. Such conditions are described in the last paragraph of this rationale.[30]

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[28] Fitchburg Comments at 3.
[29] Gold Book at 240.
[30] Gold Book at 241.

The last paragraph contains the following conditions that might lead to more or less stringent criteria:

> 1. Naturally occurring phenomena may limit the development of plant nuisances.
> 2. Technological or cost effective limitations may help control introduced pollutants.
> 3. Waters may be highly laden with natural silts or colors which reduce the penetration of sunlight needed for plant photosynthesis.
> 4. Some waters morphometric features of steep banks, great depth, and substantial flows contribute to a history of no plant problems.
> 5. Waters may be managed primarily for waterfowl or other wildlife.
> 7[sic]. In some waters nutrient other than phosphorus is limiting to plant growth: the level and nature of such limiting nutrient would. not [sic] be expected to increase to an extent that would influence eutrophication.
> 6[sic]. In some waters phosphorus control cannot be sufficiently effective under present technology to make phosphorus the limiting nutrient.[31]

In sum, the Gold Book rationale is clear that the values presented in its initial paragraphs are neither hard, nor fast and that each case must be carefully evaluated. Certainly, the wording of the Gold Book does not support the Region's conclusion in response to comment A5 that the values are recommended as "not to exceed," since the rationale clearly identifies conditions under which they values may be too stringent. If the adopted value of 0.1 mg/l was as definitive as the Agency claims, it would certainly have been proposed as criteria, which it has not been.

The Region also sought to justify its use of the 0.1 mg/l Gold Book value by producing two tables (Tables 1 and 2) in its Response to Comments to show how nutrient concentrations generally (Table 1), and in other states (Table 2) are used for phosphorus control.[32] While these values may be appropriate for their original intended purposes, as

[31] Gold Book at 243.
[32] Response to Comments at 7, 8 and 9.

shown by the record in this case, they are not evidence that a 0.1 mg/l criterion is required to prevent nutrient-related impairments in Segment MA81-05.

The Region's attempt to justify its use of the 0.1 mg/l criterion by pointing to other criteria generally and to criteria adopted by other states is undermined by a recent report by EPA's Science Advisory Board (SAB Report), which was published after the close of the comment period on the draft Permit, but before the Region issued the Permit.[33] A focus of the SAB Report is the issue of applying numeric nutrient criterion without consideration of the other relevant limitations on algal growth. The SAB Report contains a comprehensive discussion on the subject of nutrient enrichment and biological responses and includes the process for developing nutrient criteria. Further, the Report suggests a way forward for developing a scientifically sound in-stream phosphorus criterion for the Nashua River. Specifically, the SAB Report states that

> [t]he absence of a direct causative relationship between stressor and response is one of the most serious issues raised by the Committee. Without a mechanistic understanding and a clear causative link between nutrient levels and impairment, there is no assurance that managing for particular nutrient levels will lead to the desired outcome. There are numerous empirical examples where a given nutrient level is associated with a wide range of response values due to the influence of habitat, light levels, grazer populations and other factors. If the numeric criteria are not based upon well-established causative relationships, the scientific basis of the water quality standards will be seriously undermined.[34]

This observation is relevant to this case because it is clear from the record that the Region ignored and mischaracterized information in the Assessment Report which indicates that there are locations on the North Nashua and Nashua Rivers (most notably Segment MA81-

[33] U.S. EPA Science Advisory Board, Review of Empirical Approaches for Nutrient Criteria Derivation (Apr. 27, 2010), *available at* http://yosemite.epa.gov/sab/sabproduct.nsf/E09317EC14CB3F2B85257713004BED5F/$File/EPA-SAB-10-006-unsigned.pdf.

[34] SAB Report at 6 (emphasis added; emphasis in original omitted).

05) where the observed in-stream phosphorus concentrations exceed 0.1 mg/l without adverse impacts, exactly the condition that the SAB hypothesizes.

The SAB Report goes on to say that

> [a] reasonable way to assess nutrient effects might be to split data sets (through PSA, principal components analysis, and/or cluster analysis) to enable a system-specific analysis (or analysis of a small groups of sites). Given the many factors that affect streams and rivers, system-specific analysis really provides an assessment of whether altering nutrient concentrations would have the desired effect on the biotic communities present. Possible factors to consider in splitting data for streams and rivers might include, for example, stream order, flow, velocity, canopy cover, dissolved oxygen, bottom type, channel width, habitat, and depth.[35]

This observation makes it clear that a properly developed nutrient criterion would subdivide available information into various data sets, and that different nutrient criterion levels would result for different sets of physical conditions. In part, this is why values derived for other states may be entirely appropriate for those locations, but may be inappropriate for the Nashua River. Indeed, even some of the information presented in Table 2 in the Region's Response to Comments shows that various States have taken this into account. For example, the Vermont criterion only applies to upland streams at elevations above 2,500 feet, while the criterion for Washington State and Oregon are specific to individual rivers. In contrast, the Gold Book guidance relied on by the Region is a "one size fits all" value, derived from a literature reference that is almost 40 years old.[36] These admonitions by the SAB strike directly at the stressor-response methodology (quoted above from page 10 of the Region's Response to Comments, supra at 7-8) cited by the Region to support its use of a 0.1 mg/l criterion.

[35] SAB Report at 21 (emphasis omitted).
[36] The Gold Book cites to a 1973 publication by Kenneth Mackenthum as the reference for the 0.1 mg/l phosphorus guidance level. See Gold Book at 240.

As discussed above, the 0.1 mg/l criterion used by the Region is not supported by the available information which shows that Segment MA81-05 experiences phosphorus concentrations in excess of 0.1 mg/l while still supporting the aquatic life and aesthetic use designations. Since the impairments observed in the Nashua River are in the Pepperell Impoundment, the Region's restoration efforts should be directed to setting phosphorus limits based on nutrient impacts in the Impoundment, not Segment MA81-05. Having failed to do so, the Region responds to Fitchburg's Comments by attempting to show that the results of the work that is the basis for the Lower Charles River TMDL, if applied to the Nashua River, would result in effluent limits comparable to those in the Permit. The Region's response is flawed for two reasons.

First, the Lower Charles TMDL uses chlorophyll *a* rather than phosphorus as the basis for the water quality criterion. The Lower Charles River TDML properly acknowledges that the state has no numeric criteria for nutrients applicable to rivers, but that the "[t]he chlorophyll *a* target is set at a level that will satisfy all applicable Class B narrative (nutrients, aesthetics, and clarity) and numeric (dissolved oxygen in the photic zone of the upper water column and pH) criteria as specified in the MAWQS."[37] Thus, consistent with the first observation in the SAB Report quoted above, it was not the concentration of nutrients that drove decision making in the Lower Charles River TMDL, but the combination of nutrient loads, detention times, light limitations and other environmental factors that compelled the limits appropriate to the Lower Charles River.

Second, the Lower Charles River is not the Nashua River. The Charles River is a relatively flat, coastal plain river which traverses highly developed urban areas through the cities of Boston, Cambridge and Watertown, particularly in its lower reaches, which are the

[37] Lower Charles River TMDL at vii.

focus of the TMDL. The residence time in the Lower Charles River basin at 7Q10 flows is estimated at over 200 days.[38] The Nashua River, on the other hand, traverses elevated terrain, open forested land, distinct small urban city centers, and protected watershed lands. In total, the Nashua River watershed is decidedly more rural than that of the lower Charles River. While no direct measurements of residence time are readily available for the Nashua River, it appears to be less than two weeks based on the Draft TDML Report.[39] Because of these important physical differences, the results of the Lower Charles River studies should not be used for the Nashua River. This is consistent with the second observation in the SAB Report, which cautions against applying results from one setting to another setting that is markedly different in important ways.

Finally, the Region itself acknowledges the complexities inherent in deriving nutrient criteria as described by the SAB. The Region stated as follows when responding to a comment on the draft Permit which suggested that the Region should wait until modeling conducted in connection with the Nashua River TMDL is completed before imposing the proposed Limits in the Permit:

> In the absence of a TMDL, EPA is required to use available information to establish water quality limits when issuing NPDES permits for discharges to impaired waters. *See* 40 C.F.R. § 122.44(d). There is no indication that a final water quality model will be completed anytime soon given EPA's understanding of the schedule and progress for that effort at MassDEP, and the complexities of modeling nutrients in a complex riverine environment. Reissuance of this permit is long overdue and severe impairments from nutrients and bacteria need to be addressed.[40]

This candid admission alone is grounds for setting the Limits aside with instructions to complete the modeling that was started, but has not been completed, as part of the Nashua

[38] Lower Charles River TMDL at 12.
[39] Draft TMDL, Appendix E at 2 (emphasis added).
[40] Response to Comments at 22 (emphasis added).

River TMDL before proposing new phosphorus limits in the Permit. The Region clearly had the authority to establish water quality-based limits in the absence of a TMDL, but it is equally clear that the Region was also under a legal obligation to ensure that its decision to impose the Limits was "founded on a reasoned evaluation of the relevant factors" (Airport Impact Relief, Inc., 192 F.3d at 203), and that it offered "a rational connection between the facts found and the choice made." Motor Vehicle Mfrs. Ass'n, 463 U.S. at 52. Based on the record in this case, it is abundantly clear that the Region included the Limits in the Permit, not because it had sufficient information to establish scientifically sound phosphorus limits that reflected the Nashua River's "complex riverine environment," but because "[t]here is no indication that a final water quality model will be completed anytime soon" and "this permit is long overdue." There can be no clearer evidence of arbitrary and capricious conduct on the part of an agency.

Fitchburg's Comments on the draft Permit proposed an approach for moving forward in light of the Region's desire to begin addressing the nutrient-related impairments in the Pepperell Impoundment in the absence of a final TMDL. As proposed in Fitchburg's Comments, that approach would be for the Region to develop an adaptive management strategy, imposing a seasonal 0.75 mg/l monthly average effluent limit for a period during which it and the DEP would work to finish the model and the TMDL and thereby develop scientifically valid load and waste load allocations for the Nashua River. Fitchburg does not object to spending millions of dollars in upgrades to the Facility to comply with more stringent effluent limits where the limits are based on complete information and a well reasoned analysis. It does object to such expenditures to comply with limits based on incomplete information and a flawed analysis used to derive the limits challenged here.

V. CONCLUSION

For the foregoing reasons, Fitchburg seeks the Board's review of the Region's final decision to include the Limits in the Permit when it was reissued on July 22, 2010.

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Respectfully submitted,

City of Fitchburg Wastewater Treatment Facilities Commission

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