requirements. Thus, Region 1 is not entitled to impose limits based upon its nitrogen numeric translator in UBWPAD's permit.

3. Region 1's Interpretation Of Rhode Island's Narrative Standard To Impose A Numeric Effluent Limitation On Nitrogen In The Permit Violates Due Process

Region 1 has violated UBWPAD's right to due process, because the District was afforded no opportunity to comment on or challenge the development and imposition of the Region's interpretation of the Rhode Island narrative cultural eutrophication standard. As discussed in the previous section, numeric values used as "interpretations" of narrative criteria have not undergone the extensive rulemaking process required in setting water quality standards. *See* 40 C.F.R. § 131, Subparts B and C. Although there was an opportunity to comment on the draft permit, UBWPAD and other stakeholders were not afforded the same procedural rights that they ordinarily would have during a rulemaking to establish true water quality standards. In addition, the numeric "interpretation" of the narrative criterion has not undergone the scientific review process that is used in developing numeric water quality standards.

EPA regulations address these concerns about narratives by requiring states to establish a methodology for translation of narrative criteria for toxic pollutants before regulating point sources to impaired waters:

> Where a State adopts narrative criteria for toxic pollutants to protect designated uses, the State must provide information identifying the method by which the State intends to regulate point source discharges of toxic pollutants on water quality limited segments based on such narrative criteria. Such information may be included as part of the standards or may be included in documents generated by the State in response to the Water Quality Planning and Management regulations.

40 C.F.R. § 131.11(a)(2).

However, in this case, rather than following the requirements EPA imposes on states concerning numeric translations of narrative criteria, Region 1 has arbitrarily established a numeric limit for nitrogen without either following or requiring Rhode Island to provide a scientifically sound methodology.

The use of narrative criteria in this way violates the procedural due process rights of UBWPAD. Recent cases in which legal issues surrounding narrative criteria have been addressed establish that agencies must follow appropriate procedures, including public notice and comments, when using narrative criteria as the basis for regulatory requirements. For example, a Tennessee court held that an agency acted improperly when it issued nitrogen limits in permits based on the need to protect against "organic enrichment," because the organic enrichment test was being used as a water quality criterion, but had not been promulgated as a rule. *City of Cookeville v. Tennessee Water Quality Control Board*, No. 02-3694-III (Davidson Cty, Tenn. Chancery Ct. Jul. 31, 2003) (bench decision); *dismissed as moot*, 2004 Tenn. App. LEXIS 759 (2004) (the agency later adopted an emergency rule establishing a nutrient criterion, so the reviewing court dismissed the case as moot). Likewise, a West Virginia court held that the state could not use its narrative criteria as the basis for including waters with "biological

impairments" on its 303(d) List. *Monongahela Power Co. v. Chief, Office of Water Resources*, No. 99-AA-66 (Cir. Ct. Kanawha Cty, W.Va. May 1, 2001), *rev'd on other grounds*, 567 S.E.2d 629 (W. Va. 2002) (this opinion was later reversed on jurisdictional grounds). Furthermore, a California court determined that an agency's narrative "toxicity objective" was consistent with federal regulations, but that the agency had not adequately shown how the numeric limits in the facility's permit were derived from the narrative water quality objective. As of April 2004, this case was on appeal. *City of Burbank v. State Water Resources Control Bd.*, 4 Cal. Rptr. 3d 27 (Cal. App. 2d Dist. 2003), modified, 2003 Cal. App. LEXIS 1421 (Cal. App. 2d dist. Sept. 12, 2003), petition for review granted on other grounds, 7 Ca. Rptr. 3d 1 (Cal. 2003), aff'd, 26 Cal. Rptr. 3d 304 (Cal. 2005) reh'g denied.

4. Region 1's Analysis Was Clearly In Error In Its Use Of Outdated, Unreliable Data And Scientific Analysis, Rather Than Basing The Limit On TMDL Calculations Or Other Credible Data.

Region 1 has imposed the 5 mg/L limitation in the absence of any credible scientific data in support of that limit. The Region developed this limit through the exercise of judgment based on the extrapolation of experiments to a different ecosystem. The Marine Ecosystems Research Laboratory ("MERL") at University of Rhode Island ("URI") developed an experimental protocol of the Narragansett Bay, which was applied by Region 1 to the Providence and Seekonk Rivers. While these rivers undeniably flow into the Narragansett Bay, river systems are entirely different than bays and it is inappropriate to extrapolate an experiment simulating the Bay to the rivers.

The underlying basis for the nitrogen limits in the District's permit is the extrapolation of the results of a series of tank experiments conducted at MERL in the early 1980's to the Providence and Seekonk Rivers. These experiments were designed to represent the response of Narragansett Bay to a variety of nutrient loadings. The experiments were set up to mimic the general conditions of Narragansett Bay; the location adjacent the Bay ensured that the systems were exposed to the same temperature, light, and cloud cover as the Bay at large and they were designed to reflect the depths commonly encountered in the Bay (5 meters) and were operated to reflect the average flushing time of the Bay (27 days). Various loading rates, expressed in terms of kilogram (kg) of nutrient per square meter per day were used to test the response of the system. Key system response variables included dissolved oxygen ("DO"), nutrient concentrations and chlorophyll-a. As would be expected, excessively high loadings of nutrients resulted in high growth rates, which led to high levels of chlorophyll-a and low DO concentrations.

The District objected to the application of these experiments to develop its limits because the conditions in the Providence and Seekonk River are materially different than the conditions under which the experiments were conducted, which were set for the Bay and not rivers. In particular, the District observed that the flushing times in the Seekonk River are on the order of 3.5 days, not at all comparable to the 27 days used in the MERL experiments. This faster flushing time results in a lower concentration, going from 2.68 mg/L to 0.35 mg/L, and thus

lower productivity levels. The relationship between productivity, as measured by chlorophyll-a, and concentration of nutrients is well established by the MERL data.[3]

In its Response to Comments, the Region fails to address this issue in any meaningful way. The Response to Comments never addresses this point directly. Rather, it makes the broad assertion that

> [t]he basic relationship demonstrated by the MERL tank experiments between nitrogen loadings, dissolved oxygen impairment and chlorophyll *a* levels corresponds to what is actually occurring in the Providence/Seekonk River system.

See RTC, R#F18A, p. 49.

The Region then goes on with an extended discussion as to why and how it applied the results of the MERL experiments to the development of the District's permit. Only once does it attempt to connect the findings of the MERL experiments to the conditions in the Providence and Seekonk Rivers, when it claims that the range of observed chlorophyll a in 1995/1996 increased as nutrient concentrations increase. *See* RTC, R#F18A, p. 49. The Region never, however, compares the experimental model results to the actual conditions.

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[3] The rate at which the system flushes is important because it controls the maximum amount of nutrient available for growth. The more slowly the system is flushed, the greater the amount of nutrient that will build up in the system and the greater the growth. In tank experiments such as the MERL, the maximum nutrient level is reached when the amount flushed out each day is equal to the amount added each day.

In the MERL experiments, the 32x loading added 1.29 grams per day of nitrogen to the 13,000 liter tank, and 1/27 of the volume (3.7 %) was extracted and replaced with water from the lower bay. This system reaches equilibrium when the amount of nitrogen in the 1/27 of the volume is equal to 1.29 grams. This calculates out to a concentration of 2.68 mg/l. At 2.68 mg/l, there is a total of 34.8 grams of nitrogen available to support growth in the MERL reactors.

If the same reactor was operated at a flushing rate of 3.5 days and the same 1.29 grams per day of nitrogen loading, then 28.6 % of the volume would turn over every day (1/3.5). The maximum concentration would be 0.35 mg/l, and a total of 4.5 grams of nitrogen would be available in the 13,000 liters to support growth.

This shows that the slower flushing system can develop almost 8 times as much biomass as the faster flushed system. This is the essential reason that it is inappropriate to use the mass loading rates in kg/ sq. meter of the MERL experiments to "model" the response of the Providence and Seekonk Rivers.

What is at issue here is not if a basic relationship between excessive nutrients and environmental impairment exists, but whether the conditions forecast by the MERL experiments accurately predict conditions in the Providence and Seekonk River, and can thus be relied upon to establish loading limits of any kind. Data from RIDEM's *Evaluation Of Nitrogen Targets And WWTF Load Reductions For The Providence And Seekonk Rivers* shows that conditions in the Providence and Seekonk Rivers are not consistent with the MERL experiments. The table below compares the predicted dissolved inorganic nitrogen ("DIN") and chlorophyll a from the MERL experiments with the observed data from 1995/1996[4].

	Seekonk River	North of Fields Point
Observed 95/96 Load	70um/m2/d	52 um/m2/day
Predicted MERL DIN (mg/L)	3.5	3.1
Observed mean DIN (mg/L)	0.9	0.4
Predicted MERL Chl a, ug/L	45.0	35.0
Observed mean chl a, ug/L	19.7	9.5

In all cases, the MERL data is shown to substantially overstate the impact of the 1995/1996 loading. This is entirely consistent with more rapid flushing times of the River systems, which results in far lower ambient concentrations. Since the basic design of the MERL experiments is inconsistent with the conditions of the Providence and Seekonk River systems, and it fails to reproduce the conditions in the Providence and Seekonk Rivers, the MERL experiments cannot be used to set the District's limits.

Moreover, the Region's extrapolation from these inappropriately-applied experiments is problematic. The MERL experiments evaluate load. But rather than impose load-based limits

[4] Predicted values are taken from Figures 10 and 11 of RIDEM's document at the loading levels shown in Figure 12. Observed data are taken from Table 3 of the same document.

on nitrogen, the Region has extrapolated these results using professional judgment to impose limits on concentrations. The Region indicates that since the development of limits was based on the concentration of nitrogen, that 40 C.F.R. § 122.45(f)(1)(ii) requires the imposition of concentration based limits. The Region is in error when it claims that the limits were based on the concentration of nitrogen. The RIDEM analysis that forms the basis for the Permit looks at the loading of nitrogen expressed in kilograms per day emanating from the Blackstone River as the key variable it seeks to control. *See Evaluation of Nitrogen Targets And WWTF Load Reductions For The Providence And Seekonk Rivers*, pages 25 and 31. On page 31 the analysis allocates a specific mass to Massachusetts sources. It is thus incorrect to suggest that this study uses anything other than mass as a basis for determining allowable pollutant loads.[5] In light of the fact that mass was used to determine allowable loading, the Region is obliged to express the nitrogen limit in terms of mass.

In the Response to Comments, Region 1 acknowledged that a model cannot completely simulate complex natural systems, even going so far as to say that the MERL experiments fail to simulate key aspects of Narragansett Bay (stratification and flushing time), which they were designed to simulate. RTC, R#F18A, p. 49. Likewise, the Region states that physical modeling efforts to date are not sufficient to adequately reflect the dynamic water system:

> [T]here are uncertainties associated with use of a physical model such as the MERL tank experiments. As noted in the Fact Sheet and further detailed in this response to comments, the MERL tank experiments cannot completely simulate the response of chlorophyll a and dissolved oxygen to nitrogen loadings in a

[5] While the Region is correct in saying that there will be a lower loading at current conditions using a concentration limit than there would be at a design flow of 56 million gallons per day ("mgd"), this fact was explicitly considered by RIDEM in the development of its recommendations and allocations.

> complex, natural setting such as the Upper Narragansett Bay. These differences may overestimate the impact that a given nitrogen load would have on the Seekonk and Providence River system.

RTC, R#A10, p. 6.

The Region sees these uncertainties as justifying their limits, saying that, based on the MERL experiments, even greater reductions may be needed to achieve water quality standards. RTC, R#F18A, p. 51. The uncertainty, however, could also point to even lesser reductions being required. The MERL experiments were conducted in such a fundamentally different setting than the Seekonk and Providence Rivers that they are inappropriate in total, and Region 1 has no basis for using the MERL experiments to establish the limits, and no basis for assuming that there is no likelihood that less stringent limits would be sufficient. At a minimum, the fact that the MERL experiments at 27 days flushing time are capable of producing 8 times as much biomass as the River at 3.5 days flushing time clearly indicates that there is significant uncertainty about the validity of the 5 mg/L conclusion. In the face of this uncertainty, Region 1 clearly erred in applying unduly conservative assumptions, resulting in arbitrarily harsh limits.

Yet, despite the admissions of all the flaws and uncertainty associated with the experiments on which the nitrogen limits were based, the Region has decided to impose binding, enforceable permit limits on the District. The Region has chosen a 5 mg/L nitrogen limit without sufficient technical basis to determine whether such limit is appropriate and necessary to address impairments to waterways within Massachusetts or Rhode Island. In so doing, the Region is admittedly omitting nitrogen loads from local contributing non-point sources such as groundwater (i.e., septic systems) and Combined Sewer Overflows ("CSOs"), atmospheric

deposition, effect of sediments on nitrogen flux, and effects of tidal ranges and currents within the Bay and River systems on dispersion, dilution, and effective retention time. *See* Exhibit B, Attachment A5.

The Region's decision to move forward with the particular effluent limitations in the Permit is faulty, because the limits are not supported by sufficient scientific evidence. The results of the 1981-84 MERL laboratory tank studies are not an acceptable substitute for a TMDL to establish total nitrogen effluent limits. RIDEM should complete the federally-required TMDL before Region 1 imposes the proposed total nitrogen permit modification.[6] Total nitrogen loading to Narragansett Bay has been essentially level in the past 3 decades, based on evaluations by Dr. Scott Nixon of URI's Graduate School of Oceanography[7]. Such findings underscore the need for a TMDL to determine the appropriate relationship and relative importance of nutrient loading and climatic conditions to producing hypoxic conditions. Research efforts are needed to clarify the role of nutrients in seasonal hypoxic events along with a TMDL that can replicate the physical and chemical conditions observed in Narragansett Bay. There is a growing tendency among estuarine and coastal scientists to view eutrophication in a more complex manner. The interaction of nutrient limitation to light limitation, as well as to the influence of residence time on community structure and ecological interactions are still poorly understood, and an improved understanding of the factors that determine the sensitivity of

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[6] *See* February 7, 2005 letter from Narragansett Bay Commission (NBC) to RIDEM commenting on proposed N limits (Appendix, Tab B-5 to the District's Comments).

[7] *See* Nixon, S. et al. February 2005. *Anthropogenic Nutrient Inputs to Narragansett Bay: A Twenty-Five Year Perspective*, A Report to The Narragansett Bay Commission and Rhode Island Sea Grant.

estuaries to nutrients may eventually lead to better management of coastal nutrient pollution.[8] Again, even if it is very difficult to develop a TMDL for nutrients, Region 1 cannot use a lesser process to develop permit limits and expect that those limits will be appropriate.

Moreover, proceeding without a fully developed model of the Bay is contrary to EPA's own recommended water quality criteria for nutrients which state: "wherever possible, develop nutrient criteria that fully reflect localized conditions and protect specific designated uses."[9]

The total nitrogen limit is fatally flawed because it is based on criteria that are not scientifically defensible. The criteria used to develop the total nitrogen limit failed to determine causal relationships between the nutrients and attainment of the designated uses; they are not effects-based criteria. The causal relationships between the nutrients and response variables (e.g., Chlorophyll a, Dissolved Oxygen, pH) were not adequately determined. Experts recommend 3-5 years of growing season data to account for annual variability and such nutrient data should not be developed using data reflective of unusual hydrologic and physical conditions of the water body. Such precautions to ensure that the experiments accurately reflected the conditions of the Providence and Seekonk Rivers were not taken here, despite recommendations from the Narragansett Bay Commission that the MERL experiments be run under conditions simulating those environments. *See* Exhibit B, Attachment B3, *Guidance on Developing Nutrient Criteria for Protecting Designated Uses of Water Bodies*, Benjamin R. Parkhurst, Ph.D., et al.

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[8] Howarth, R.W. and Marino, R. 2006. Nitrogen as the limiting nutrient for eutrophication in coastal marine ecosystems: Evolving views over the decades. *Limnol. Oceanogr.*, 51:364-376.

[9] Published January 9, 2001 (66 FR 1671).

The use of the MERL experiments as a methodology for establishing limits was based on the purported inability of RIDEM to develop a numerical model that could properly simulate water quality in Upper Narragansett Bay. (*Evaluation of Nitrogen Targets And WWTF Load Reductions For The Providence And Seekonk Rivers*, page 2). In its Response to Comments, the Region has indicated that indeed there is a model of the Providence and Seekonk River system that has successfully been developed and applied, and on which the Region is willing to rely. (*See* RTC, R#F18B, p. 52, concerning the model of Kester). If this model is adequate to use as part of its Response to Comments, it is not clear why Region 1 did not also use it to develop the limits in the first place, or to have documented the applicability of the MERL experiments to the conditions of the Providence and Seekonk Rivers. Revealing the use of another model at this late date has the appearance of a post-hoc rationalization of the limits set. The District has not been afforded the opportunity to examine or review this model or its results. Given no such opportunity, the District does not at this time have confidence in the model's results.[10]

Because a proper assessment of total nitrogen has not yet been completed, Region 1 has not met its obligation to demonstrate the need for these numeric limitations. Without reliable scientific evidence, the Region cannot show that UBWPAD "will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard" as required by 40 C.F.R. § 122.44(d)(1). Therefore, the Board should vacate the nitrogen limits in the Permit.

[10] The District would welcome the chance to evaluate the model to see if it does indeed provide a more accurate predictor of the actual conditions in the Providence and Seekonk Rivers, but cannot support limits that have been developed without any public scrutiny.

5. Region 1 And RIDEM Make Computational Errors In Determining The Total Nitrogen Limit, Failing To Take Into Account Facts Presented Which Demand A Different Total Nitrogen Limit.

Should the Board conclude, even in the face of the uncertainty associated with the lack of a TMDL for the Narragansett Bay basin, issues with extrapolating a numeric standard from a narrative, and adopting an incorrect ecosystem model, that Region 1 may proceed to impose numerical standards for total nitrogen, the limits chosen by Region 1 nonetheless should be vacated for clear error, as Region 1's analysis fails to take into account facts presented by RIDEM that demand different limits for the UBWPAD discharge. Even if the District were prepared to accept the MERL experiments for modeling of the Providence and Seekonk Rivers, and agreed that the 87% delivery factor utilized by the Region was appropriate in this instance, the calculations would nonetheless result in a 5.75, rather than a 5.0, mg/L concentration limit. Such computational mistakes indicate that the limit imposed by the Region was based on clear error and, as such, the Board should vacate it.

The District had commented that RIDEM and Region 1 failed to properly account for all sources of nitrogen in the River system, which would serve to underestimate the delivery factor of the District's nitrogen to Narragansett Bay, and had improperly averaged the delivery factors for Woonsocket and the District, even though the District discharge is almost twice as far from Narragansett Bay as is the Woonsocket discharge, and thus the opportunity for attenuation is significantly greater.

First, Region 1 does not respond to the comment that its attenuation calculations ignore contributions from the other treatment plants in the Blackstone River Watershed. As was

indicated in the District's comments, these other plants account for approximately 400 kg/d of nitrogen discharged to the river. Including these discharges would serve to further increase the nitrogen attenuation of the District's discharge. The Response to Comments also appears to indicate that there is no non-point source load in dry summers, when it suggests that "[d]uring these conditions, non point source discharges would be expected to be minimized due to the minimal storm water runoff" *See* RTC, R#F17, p. 45. While they may be minimized, they are presumably not zero as the Region has assumed. More importantly, since the travel time from the top of the watershed to Narragansett Bay can range upwards of a month, nitrogen discharged during storms is transported to the river, and can then take days or weeks to travel downstream to the Bay. Thus, nitrogen discharged by stormwater runoff may well show up in the discharge to the Seekonk River at times when there has been no rain for days. Moreover, nitrogen leaching from the plethora of unsewered communities which abut the Blackstone River may elevate levels in the river even at times of no precipitation. *See* Exhibit B, Attachment A. Failure to include these sources of nitrogen underestimates the attenuation of the District's nitrogen.

The Region goes on to indicate that under conditions of the 2001 Permit the delivery factor for nitrogen would be reduced to 73 % based on analyses conducted by RIDEM. This reflects 92 % delivery to the state line, and 79 % from the state line to the Bay. The Region then enters into speculation as to how reduced phosphorus loading to the levels required under the proposed permit would presumably result in lesser algae growth, which would presumably result in reduced attenuation in the River. Although the Region had a model available to it to quantify this presumption as RIDEM had done (the same model used by RIDEM), it did not do so.

Rather, it quotes studies by Nixon et al that concluded that "[t]he simple interpretation of these results is that we see no direct evidence of DIN attenuation or removal in the lower Blackstone [from the State line to the Bay]." (Nixon et al. 2005). RTC, R#F17, p. 46. That may be the simple conclusion, but the Region's own Response to Comments provides an explanation for this simple conclusion. Region 1 observes:

> The study showed that the average nitrogen load actually increased in the segment, even when the load discharge by the two treatment plants discharging to the segment (Woonsocket and Burriville) were removed. The data indicates that the load from processes adding nitrogen to this segment are greater than the load attenuated.

RTC, R#F17, p. 46.

Based on Region 1's analysis, other nitrogen sources not considered by Nixon are at least offsetting the attenuation that occurs in this stretch of the River. It is thus clear that these other sources of nitrogen are complicating the picture, and to ignore them understates the attenuation factor. This erroneously low attenuation factor has led the Region to impose a more stringent limit than is necessary to achieve water quality standards.

Compounding this error is the fact that RIDEM's analysis to produce the 87% value is conceptually flawed. According to the supporting materials, the 87% factor reflects that the amount of nitrogen discharged to the Blackstone River in 1995/1996 (1,552 kg/day) was 87% of the amount of nitrogen discharged from the Upper Blackstone and Woonsocket treatment plants (1,782 kg/day). But this analysis ignores the baseload associated with the watershed, which RIDEM has separately estimated at 370 kg/day, and the nitrogen discharge of other facilities in the Blackstone River Watershed. RIDEM makes no separate estimate of the load from their

eight (8) facilities. A reasonable estimate suggests that the loadings from these plants could approach an additional 400 kg/day, which would make the delivery factor for the combined Woonsocket and Upper Blackstone facilities' discharge drop to 61%. With the corrected river delivery factor, the appropriate limit to total nitrogen discharge by UBWPAD, to ensure an equivalent 5 mg/L discharge at the mouth of the Blackstone River, is 8.2 mg/L. This concentration is within the range expected to result from the planned improvements already underway at the District. Given the range of possible limits and the sensitivity of the calculations, the Region could have equally validly chosen to maintain the limit which justified those improvements already underway. Given the costs associated with their choice to impose a numerical limit, it was an abuse of discretion to choose a limit which could not be satisfied by the improvements the District has already voluntarily undertaken.

The Region's decision to ignore other sources of nutrients in the watershed directly conflicts with the recommendations presented by the Agency's own SAB almost a decade ago. In its review of the Blackstone River Initiative ("BRI"), the SAB concluded:

> Emphasis by the Committee on a subsequent phase of the BRI reflects the Committee's view that the current BRI results will not provide an adequate scientific basis for some of the management decisions that are under consideration for the Blackstone River-Narragansett Bay system. For example, load allocation decisions will require an improved understanding of the relative contributions of point and non-point sources within the watershed; selection of remedial options for the river (including possible removal of some of the dams) will require a better understanding of the cycling of metals and other contaminants within the impoundments, as well as watershed sources of such contaminants; and management decisions to control nutrient loadings to Narragansett Bay would be improved by a more rigorous approach to forecasting pollutant loads from the Blackstone River to the Bay.

Cover Letter, SAB review of the Blackstone River Initiative

The approaches used in the current assessment of the delivery of nutrients from the Blackstone are not different from the approach used in the BRI, and suffer the same deficiencies.

Region 1 adds to this error by selectively adopting numbers from each of the two studies. In an apparent effort to make the delivery factor look as large as possible, it combines its erroneous conclusions from the Nixon study (100 %) with the delivery factor developed by RIDEM for the Massachusetts section of the River (92 %), to justify the use of 87 %. But even if 87 % is correct, there is no response to the District's observation that the limits should take into account the delivery factor which would result in a 5 mg/L discharge to the Seekonk River. In this case, that limit would be 5.75 mg/L assuming 87 % delivery.

E. The Phosphorus Limit Is Based On Clear Errors Of Fact And/Or Conclusions Of Law.

For the several reasons set forth, the Permit's phosphorus limits should be stricken and/or the determination of such limits should be deferred to the future completion of a TMDL. There is no adequate technical and legal basis for imposing the reduced phosphorus limits proposed in the Permit. The limit set in the existing Permit should remain in effect.

1. Region 1 Relies On Irrelevant And Outdated Data To Establish The Phosphorus Limit In The Final Permit

The new phosphorus limits are based on outdated (1968, 1973, 1986) and irrelevant assessments. The manner in which the modified limits were developed is too simplistic, and does not reflect actual conditions. There are many sources of nutrients that feed into the Blackstone River and the Region is clearly in error in its belief that it can address cultural eutrophication exclusively by ratcheting down the District's effluent limits, without taking any

steps to address non-point sources of phosphorus. EPA has erroneously concluded that compliance with the proposed limits will have an effect on the cultural eutrophication of the Blackstone River.

Notwithstanding the extensive upgrades and phosphorus limit adjustments to several plants discharging into the Blackstone River, and the improved water quality associated with or expected from those upgrades and permit adjustments, the Region, without any assessment of the beneficial effect of these upgrades and adjustments for phosphorus, issued a Permit to the District containing phosphorus limits that are significantly more stringent than the limits in its 2001 Permit. The phosphorus levels that allegedly led to the water quality conditions described in the Permit's Fact Sheet are not the same conditions that will exist after completion of the ongoing upgrades/improvements, but rather reflect the same loadings that compelled the implementation of the 0.75 mg/L phosphorus limitation. EPA should look to its wasteload allocation studies to determine if there is evidence of cultural eutrophication once the dischargers have complied with the limits in the modified 1999 permits. See below for further discussion of the available studies. Given the costs associated with their choice to impose this limit, it was an abuse of discretion for Region 1 to change the limits in the permit at this time without information on how the improvements already underway will function and to choose a limit which could not be satisfied by the upgrades the District has already undertaken to comply with their existing permits.

2. A Limit Of 0.1 To Control Cultural Eutrophication Is Not Authorized By Massachusetts Water Quality Standards

In its Response to Comments, the Region indicates that the limit it has established is designed to prevent cultural eutrophication. *See* RTC, R#F13, p. 41. It has argued that earlier efforts that established permit limits for phosphorus in the District's discharge were based on consideration of DO, and not in consideration of cultural eutrophication. However, the Massachusetts water quality standards do not authorize the wholesale application of limits to protect against cultural eutrophication. Rather, the standards require that nutrients be controlled such that the waters of the Commonwealth are "free from nutrients in concentrations that would cause or contribute to impairment of designated uses." Even where cultural eutrophication is invoked as a rationale for nutrient control, it is to "ensure protection of existing and designated uses." 314 C.M.R. § 4.05(5)(c).

Thus it is improper to simply cite cultural eutrophication as the basis for imposition of a numeric permit limit. Rather, the limit must be justified by connecting the reduced level of phosphorus with a specific impairment in designated uses. To do otherwise decouples the essential requirement that the limit be set to protect uses and invites arbitrary application of guidelines that are not relevant to the District's setting. This is exactly what the Region has done in this instance. In contrast, in other locations in Massachusetts, the Region has worked with the State to develop specific relationships between differing levels of phosphorus and relevant measures of use impairment. In the case of the Assabet River, this was done by connecting varying levels of phosphorus control with DO and reductions in biomass. In the lower Charles

River, it was done by correlating reduced phosphorus loading and water clarity leading to improved opportunities for swimming.

Despite EPA's assertion that the QUAL2E model, which is discussed in greater detail later in this petition, was prepared to address matters of DO, the fact is that EPA once believed that the model was capable of simulating DO, and can thus be used to assess the protection of aquatic life criteria. In the same manner, it does estimate chlorophyll a productivity and can be used to address issues of water clarity and biomass production. Indeed, elsewhere in the Response to Comments, the Region uses some results of the same model to justify conclusions about changes in nitrogen attenuation associated with enhanced phosphorus removal. As discussed further, below, Region 1's attempts to discredit the conclusions of the model are based on errors of fact.

3. The Region Selectively Presents Data To Support Its Position.

The District commented that the Region erred in relying on data collected in the 1990's and early 2000 to justify the 0.1 mg/L limit, since these were the data that were used to justify the 0.75 mg/L limit, and the Region ought await the implementation of the planned plant upgrades before proceeding with lower phosphorus limits.

In response to this observation, the Region cites data from 2003 to buttress its claim that that the 0.75 mg/L limit is an inappropriate limit. The Region says:

> The most recent data set collected under low flow conditions by MassDEP (August 28, 2003) indicates that UBWPAD was discharging total phosphorus at a level very close to the current permit limit of 0.75 mg/L (August monthly average discharge was 0.8 mg/L). *At the first station downstream of the UBWPAD discharge, instream aquatic vegetation was described as being "extremely abundant, covering virtually the entire river bottom and dominated by rooted*

> *submergent macrophytes (coontail, Ceratophyllum sp.; waterweed, elodea sp.; pondweed, Potamogeton crispus). Slight turbidity in the water column was noted during sampling. A luxuriant algal community was also observed, with green filamentous algae attached to submergent vegetation and a brown flock covering much of the rocky substrates."*

RTC, R#F9, p. 35, emphasis supplied.

The italicized portion of the above quotation is excerpted from the DEP's *Technical Memorandum TM-51-11 Blackstone River Watershed 2003 Biological Assessment.* That report indicates that the field assessments that supported this description were undertaken on September 15, 2003, so the District is at a loss to understand why the Region uses August as a benchmark of plant performance. Indeed, in the month of September the plant was operating much differently than it did in August. For the two weeks prior to the biomonitoring, the plant discharged an average of 681 pound per day of phosphorus, at an average concentration of 2.75 mg/L. Given the average plant flow during this period (29.75 mgd), the plant would have discharged approximately 150 pound per day of phosphorus if the facilities now under construction had been in operation. This would reflect a 78 % reduction in phosphorus as compared to the actual conditions of early September, 2003. Because Region 1 used factually incorrect information to make its case, the data presented cannot be relied upon to dismiss the applicability of a 0.75 mg/L limit.

The District commented that it was unnecessary to apply a 0.1 mg/L limit to the flow of outfall 001A because this operates only during high flows when the river flow is comparably high, and not during low flow conditions upon which the Permit was based. During these high flow discharge conditions there would be greater dilution in the receiving waters. EPA's