BEFORE THE ENVIRONMENTAL APPEALS BOARD
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C.

In the Matter of:	
Upper Blackstone Water Pollution Abatement District	NPDES Appeal Nos. 08-11, 08-12, 08-13, 08-14, 08-15, 08-16, 08-17, 08-18
NPDES Permit No. MA 0102369	

RESPONDENT REGION 1'S MEMORANDUM IN OPPOSITION TO PETITIONS FOR REVIEW

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The central dispute over this National Pollutant Discharge Elimination System ("NPDES") permit is whether the New England Region of the U.S. Environmental Protection Agency ("the Region") imposed appropriate numeric effluent limitations for phosphorus and nitrogen on the Upper Blackstone Water Pollution Abatement District ("the District") to address severe and undisputed nutrient-induced water quality impairments in the Blackstone River and in upper Narragansett Bay. The Blackstone River, with its headwaters in Massachusetts, is a nationally recognized American Heritage River and is a major source of freshwater to Narragansett Bay in Rhode Island. Narragansett Bay is an estuary of national significance under the National Estuary Program and is an important New England fishery and recreational resource.

The District, a regional treatment facility serving several communities in central Massachusetts, argues that the permit's water quality-based phosphorus and nitrogen effluent limits are too stringent and that the Region erred in not waiting for the development of a total maximum daily load ("TMDL") or a mathematical water quality model. The Conservation Law Foundation, an environmental advocacy organization, counters that the limits for both nutrients are too lax in light of the extent of impairments and significance of the District's loadings. The Massachusetts Department of Environmental Protection supports the District only in opposing the nitrogen limit, which the Region established to meet the water quality standards of Massachusetts' downstream neighbor, Rhode Island.

In addition to challenging the nutrient limits, the District also seeks review of effluent limitations for metals, various monitoring protocols and the timing of reporting, the expression

of ammonia limits in both mass and concentration, and the absence of a compliance schedule in the permit. Finally, the District and several "satellite" systems also object to the Region's decision to treat each of them as "co-permittees" directly responsible for reporting sewer overflows and for operation and maintenance of their respective collection systems.[1]

In their challenges to the permit, each petitioner falls far short of the threshold necessary for review, and is unable to demonstrate clear error or abuse of discretion by the Region. Because the Region's determinations, made in an area of unavoidable technical and scientific complexity and uncertainty, were sound, review of the permit should be denied.

I. STATEMENT OF THE CASE.

A. The Applicable Legal Standards.

The central issue on appeal is whether the Region established appropriate numeric water effluent limitations for phosphorus and nitrogen based on its interpretation of narrative water quality standards established by Rhode Island and Massachusetts. The Clean Water Act ("CWA") provides for two types of effluent limitations to be included in NPDES permits: "technology-based" limitations and "water quality-based" limitations. *See* CWA §§ 301, 303, 304(b), 33 U.S.C. § 1311, 1313, 1314(b); 40 C.F.R. Parts 122, 125, 131. Technology-based limitations, generally developed on an industry-by-industry basis, reflect a specified level of pollutant-reducing technology available and economically achievable for the type of facility being permitted. *See* CWA § 301(b). Water quality-based effluent limits are designed to ensure that state water quality standards are met regardless of the technological and economic factors

[1] Trout Unlimited appealed the Region's decision not to impose an effluent limit for total aluminum. After review of the petition, the Region intends to propose a modification to the permit to incorporate an effluent limit for total aluminum and associated monitoring requirements. The Region anticipates issuing the draft modification in January 2009, after the uncontested provisions of the permit go into effect. The Region will notify the Board upon issuance of the proposed modification.

that inform the derivation of technology-based limitations. In particular, section 301(b)(1)(C) of the CWA requires achievement of "any more stringent limitation [than the technology-based requirements set forth in Section 301(b)(1)(A) and (B)], including those necessary to meet water quality standards...established pursuant to any State law or regulation...." Thus, NPDES permits must contain effluent limitations necessary to attain and maintain water quality standards, without consideration of the cost, availability or effectiveness of treatment technologies. *See U.S. Steel Corp. v. Train*, 556 F.2d 822, 838 (7th Cir. 1977); *In re City of Moscow, Idaho* 10 E.A.D. 135, 168 (EAB 2001) (quoting *In re City of Fayetteville, Ark.*, 2 E.A.D. 594, 600-601 (CJO 1988)).

Water quality standards under the Act consist of three elements, two of which are relevant here:[2] (1) designated "uses" of the water, such as for public water supply, aesthetics, recreation, propagation of fish, or agriculture; and (2) "criteria," which specify the amounts of various pollutants that may be present in those waters without impairing the designated uses, expressed either in numeric form for specific pollutants or in narrative form (*e.g.*, waters shall contain no phosphorus or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring). *See* CWA § 303(c)(2)(A), 33 U.S.C. § 1313(c)(2)(A); *see* 40 C.F.R. §§ 130.3, 130.10(d)(4), 131.6, 131.10 and 131.11. EPA's long-standing CWA regulations expressly authorize the establishment by states of narrative water quality criteria. *See* 40 C.F.R. §§ 131.3(b), 131.11(b)(2).

Under the federal regulations implementing the NPDES program, permit issuers are required to determine whether a given point source discharge "causes, has the reasonable

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[2] The third component of the overall water quality standards program is the antidegradation policy, which is not at issue here.

potential to cause, or contributes to" an exceedance of the narrative or numeric criteria set forth in state water quality standards. *See* 40 C.F.R. § 122.44(d)(1)(ii). If a discharge is found to cause, have the reasonable potential to cause, or contribute to an exceedance of a numeric or narrative state water quality criterion, a permit *must* contain effluent limits as necessary to achieve state water quality standards. *See* 40 C.F.R. §§ 122.44(d)(1), 122.44(d)(5) (providing in part that a permit must incorporate any more stringent limits required by CWA § 301(b)(1)(C)).

The regulatory mechanism used by permit writers to interpret narrative water quality criteria and establish numeric water quality-based effluent limits is set forth at 40 C.F.R. § 122.44(d)(1)(vi). Where a state has not established a numeric water quality criterion for a specific chemical pollutant, the permitting authority must establish effluent limits in one of three ways: (i) based on a "calculated numeric criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and fully protect the designated use"; (ii) on a "case-by-case basis" using CWA § 304(a) recommended water quality criteria, supplemented as necessary by other relevant information; or (iii) in certain circumstances, based on an "indicator parameter." 40 C.F.R. § 122.44(d)(1)(vi)(A)-(C).

Section 401(a)(1) of the CWA precludes issuance of a federal permit unless the state where the discharge originates, in this case Massachusetts, certifies that the discharge will comply with state water quality standards, or waives certification. Section 401(a)(2) of the CWA directs EPA to consider the views of a downstream State concerning whether a discharge would result in violations of the State's water quality standards. When a point source discharge affects a downstream state, EPA must condition the NPDES permit to ensure compliance with the water quality standards of the downstream State. *See* CWA § 401(a)(2), 40 C.F.R. § 122.44(d)(4). *See*

also CWA § 301(b)(1)(C); 40 C.F.R. § 122.4(d) (prohibiting issuance of an NPDES permit "[w]hen the imposition of conditions cannot ensure compliance with applicable water quality requirements of all affected States."); 40 C.F.R. § 122.44(d)(5). It is undisputed that both Massachusetts and Rhode Island are "affected" states in this permitting proceeding within the meaning of 40 C.F.R. § 122.4(d).

B. Factual Background.

1. The District, its Effluent and Impairments to the Receiving Waters.

The District owns and operates a wastewater treatment facility in Millbury, Massachusetts, that serves several communities in central Massachusetts. *See Fact Sheet* at 1 (Ex. 1; AR 6).[3] This large facility has a permitted maximum discharge flow of 56 million gallons per day (mgd) and discharges near the headwaters of the Blackstone River. *Id.* at 2. Average annual flow has ranged from 34 to 43 mgd in recent years. *See Response to Comments (RTC)* at n.3 (Ex. 2; AR 5). Because of the large volume of its discharge and location near the headwaters of the River, the District's effluent dominates the river flow during low flow conditions. The 7Q10 flow of the River is only 4.4 mgd. *See Fact Sheet* at 2. Under 7Q10 receiving water conditions and permitted flow conditions, accordingly, the authorized discharge is 13 times the receiving water flow (56 mgd vs. 4.4 mgd).

The District is nearing completion of the first major upgrade to its facility. *Fact Sheet* at 5 (Ex. 1); *RTC* at 24 (Ex. 2). One of the main objectives of the work is to upgrade the facility's aging infrastructure; the facility first went on line in 1976. *RTC* at 24. The work will also enable the District to handle a higher volume of wet weather flows, including providing primary treatment to peak flows from the nearby Worcester combined sewer system. *Fact Sheet* at 5.

[3] "Ex." refers to copies of documents the Region has appended to this response for the Board's convenience. The "AR" citations provide the numeric references of these documents in the Administrative Record.

Advanced treatment will have capacity to handle an hourly peak flow up to 120 mgd, while primary treatment will have an hourly peak flow capacity up to 160 mgd. *Id.* The District's upgrades, which involve enhanced biological processes, will also improve nutrient control but will not achieve the nutrient limits in the new permit without further modifications. *RTC* at 23 (Ex. 2).

The Blackstone River is an interstate water which has its headwaters in Worcester, Massachusetts. *See Fact Sheet* at 5 (Ex. 1). It flows south into Rhode Island where it discharges into the Seekonk River, which is a marine water, and the beginning of upper Narragansett Bay. *Id. See also Map* (Ex. 8; AR 206). The Seekonk River joins the Providence River, also a marine water, which ultimately flows into the lower reaches of the Bay. *Id.*

Excessive nutrients, generally phosphorus in fresh water (such as the Blackstone River) and nitrogen in marine water (such as the Seekonk and Providence Rivers) can contribute to eutrophication. *See RTC at* 79-80, 92 (Ex. 2). The Blackstone River and the Seekonk and Providence Rivers have suffered from severe cultural eutrophication for many years. *Id.* at 21, 29-30. *See also Fact Sheet* at 8-12 (Ex. 1). Cultural eutrophication refers to the human induced increase in nutrients beyond the assimilative capacity of the water body, which can result in the acceleration of plant productivity. *See, e.g., Massachusetts Surface Water Quality Standards ("Massachusetts Standards")* at 314 CMR 4.02 (defining cultural eutrophication) (Ex. 4; AR 112); *Rhode Island Surface Water Quality Regulations ("Rhode Island Standards")* at Rule 7 (same) (*Ex.* 5; AR 115). Under undisturbed natural conditions, nutrient concentrations are very low in most aquatic ecosystems. *See RTC* at 106 (Ex. 2). Typically, elevated levels of nutrients will cause excessive algal and/or plant growth, which may prevent waters from meeting their designated uses. *Id.* Phosphorous and nitrogen promote the growth of nuisance levels of

macrophytes (rooted aquatic plants), phytoplankton (free floating algae), and periphyton (attached, including filamentous, algae). *Id.*

Noxious aquatic plant growth degrades aesthetic and recreational uses in a variety of ways. Unsightly algal growth is unappealing to swimmers and reduces water clarity. Algae on rocks can make streambeds slippery and difficult or dangerous to walk on. Aquatic vegetation can foul fishing lures and equipment, and can tangle boat propellers and oars. Excessive plant growth can also result in a loss of diversity and other changes in the aquatic plant, invertebrate, and fish community structure and habitat. *Id.* at 106.

Through respiration, and the decomposition of dead plant matter, excessive algae and plant growth can reduce in-stream dissolved oxygen concentrations to levels that could negatively impact aquatic life. During the day, primary producers (*e.g.*, algae, plants) provide oxygen to the water as a by-product of photosynthesis. At night, however, when photosynthesis ceases but respiration continues, dissolved oxygen concentrations decline. Furthermore, as primary producers die, they are decomposed by bacteria that consume oxygen, and large populations of decomposers can consume large amounts of dissolved oxygen. Many aquatic insects, fish, and other organisms become stressed and may even die when dissolved oxygen levels drop below a particular threshold level. *Id.* at 106.

Decomposing plant matter also produces unpleasant sights and strong odors, again negatively impacting recreational and aesthetic uses. Nutrient-laden plant detritus can also settle to bottom of a water body. In addition to physically altering the benthic environment and aquatic habitat, nutrients in the sediments can become available for future uptake by aquatic plant growth, further perpetuating and potentially intensifying the eutrophic cycle. *Id.*

The Blackstone River demonstrates severe and substantial phosphorus-driven eutrophication. *Fact Sheet* at 7-10 (Ex. 1). *See also RTC* at 32 (Ex. 2). From the District's treatment plant to the Massachusetts/Rhode Island border, the Blackstone River is listed on the Massachusetts 303(d) impaired waters list as impaired for unknown toxicity, priority organics, metals, ammonia, chorine, nutrients, organic enrichment/low dissolved oxygen, flow alterations and other habitat alterations, pathogens, suspended solids, turbidity, and objectionable deposits. *Massachusetts 2004 and 2006 Integrated List of Waters* (which incorporates the §303(d) list) (Ex. 6; AR 113 and 114); *Fact Sheet* at 6 (Ex. 1).

Members of the public and watershed associations who offered comment noted the extensive aquatic growth and objectionable odors in the Blackstone River downstream of the District's discharge. *See, e.g, Transcript of Public Hearing,* May 9, 2007 at 45 (AR 18) ("[I]t's not EPA that tells me there's too many nutrients, it's my nose.); *id.* at 60 ("If you stand on the Blackstone bikeway bridge where the river collects the treatment discharge you can see a remarkable increase in vegetation just downstream.") Studies of the River also have documented the extensive macrophytic growth and other adverse impacts immediately downstream from the District's discharge. Photographs taken as part of an U.S. Army Corps in July 2003, for example, show the abundant macrophytic growth in the reach of the River immediately downstream of the District's discharge. *Phase I: Water Quality Evaluation and Modeling of the Massachusetts Blackstone River, Draft – 2004 (U.S. Army Corps of Engineers)("U.S. Army Corps Evaluation")* at Figure 38 (Ex. 9.2; AR 126). During evaluations conducted over the spring and summer of 2003, MassDEP also noted at the first station below the District's discharge there was excessive macrophypte growth, which "increased dramatically over the course of the summer." *Blackstone River Watershed 2003 DWM Water Quality Monitoring*

Report, TM-51-10, MassDEP)("MassDEP 2003 Water Quality Monitoring") at 13 (Ex. 10; AR 124). Nearing the end of the summer, instream acquatic vegetation covered "virtually the entire river bottom." *Id.* MassDEP's monitoring at this location indicated in-stream dissolved oxygen below 5.0 mg/l in July, August and September of 2003. *Id.* at 20. Biological assessments conducted by MassDEP at the first station downstream of the District's discharge showed substantial impairments to the macroinvertebrate community. *Blackstone River Watershed 2003 Biological Assessment, TM-51-11 (MassDEP)* ("*MassDEP 2003 Biological Assessment*") at 13 (Ex. 11; AR 125). MassDEP concluded that the benthic community at this location was "moderately/severely impacted" and "was easily the worst benthic community assessment received by a biomonitoring station in the 2003 Blackstone River watershed survey...." *Id.*

The Blackstone River discharges directly into the upper part of the Seekonk River, which is the most severely impaired section of Narragansett Bay. *See RTC* at 17, 27 (Ex. 2). On a per unit areas basis, current total nitrogen loads to the Seekonk River are 24 times higher than the nitrogen load to Narragansett Bay as a whole. *Id.* at 17. In upper Narragansett Bay, cultural eutrophication has resulted in periodic low dissolved oxygen levels and fish kills and contributed to dramatic declines in eelgrass. *See Fact Sheet* at 11; *RTC* at 27. *See also Governor's Narragansett Bay and Watershed Planning Commission (Nutrient and Bacteria Pollution Panel,* 2004) at 4 (Ex. 12; AR 136). Historic estimates of eelgrass in Narragansett Bay ranged from 8,000-16,000 acres. *See Fact Sheet* at 11. Eelgrass provides important spawning, nursery, foraging and refuge habitat for many fish and invertebrate species, including commercially important species. *RTC* at 27. Winter flounder, striped bass and lobsters are just a few of the species that utilize this habitat. *Id.* Current estimates of eelgrass indicate that fewer than 100

acres remain, and no eelgrass remains in the upper two thirds of Narragansett Bay. *See Fact Sheet* at 11; *RTC* at 80.

The Seekonk River is listed on Rhode Island's 2004 and 2006 CWA 303(d) List of Impaired Waters as impaired for nutrients, low DO, and excess algal growth/chlorophyll *a*. The Providence River is listed for these same impairments as well as for pathogens. (Ex. 7; AR 109-111).

The District is the dominant point source of nutrient loadings to the Blackstone River. *RTC* at 27, 32 (Ex. 2). The total permitted municipal wastewater volume to the Blackstone River is 80.4 mgd and the District represents approximately 70% of this volume. *Fact Sheet* at 14; *RTC* at 32. Studies have documented that the District is, by far, the dominant point source of phosphorus to the Blackstone River under a range of flow conditions. *See, e.g., U.S. Army Corps Evaluation* at Figure 31 (Ex. 9.1; AR 126). The District is also the dominant point source of nitrogen loadings to the Blackstone, and from the Blackstone to the Seekonk River. *RTC* at 32. *See also Fact Sheet* at 13 (noting that the loadings data in a 2004 study conducted by RIDEM indicated that the District contributed approximately 64% of the total nitrogen load from the Blackstone River to the Seekonk River).

2. Applicable Massachusetts and Rhode Island Water Quality Standards, Including the Narrative Nutrient Criteria.

Massachusetts Standards list the Blackstone River, from its source to the Rhode Island border, as a Class B Warm Water Fishery. Its uses include habitat for fish, other aquatic life and wildlife and for primary (*e.g.*, swimming) and secondary (*e.g.*, fishing and boating) contact recreation. *See* 314 C.M.R. §§ 4.05(3)(b) and 4.06 (Table 12) (Ex. 4; AR 112). Such waters must have consistently good aesthetic value. *Id.* at § 4.05(3)(b). In addition to criteria specific

to Class B waters, Massachusetts imposes minimum narrative criteria applicable to all surface waters, including aesthetics ("free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life"); bottom pollutants and alterations ("free from pollutants in concentrations or combinations or from alterations that adversely affect the physical or chemical nature of the bottom, interfere with the propagation of fish or shellfish, or adversely affect populations of non-mobile or sessile benthic organisms"); toxics ("free from pollutants in concentrations that are toxic to humans, aquatic life or wildlife"); and nutrients ("unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses..."). *See* 314 C.M.R. § 4.05(5)(a), (b), (e) and (c). Massachusetts Standards do not establish a numeric criterion for total phosphorus.

Rhode Island Standards list the Blackstone as a Class B1 water from the Massachusetts border to the Newman Avenue Dam in East Providence, and as a Class B water from the Newman Avenue Dam to the Seekonk River. *See Rhode Island Standards* at Appendix A (Ex. 5; AR 115). The Seekonk River and Providence River are marine waters. *Id.* Rhode Island has categorized the Seekonk River as a Class SB1{a} water. *Id.* The Providence River has also been designated as a Class SB1{a} water from its confluence with the Moshassuck and Woonasquatucket Rivers until a point in Warwick, Rhode Island, and from that point as a Class SB{a} water until the Upper Narragansett Bay Subbasin. *Id.*

Rhode Island Class B waters' designated uses include primary and secondary recreational uses and fish and wildlife habitat. *See* Rhode Island Standards, Rule 8.B.(l)(c). Class B1 waters have the same designated uses, except that primary contact recreational uses may be impacted by

pathogens from approved wastewater discharges. *See Id.* at Rule 8.B.(l)(d). Rhode Island Class SB{a} waters' designated uses include primary and secondary contact recreation; fish and wildlife habitat; shellfish harvesting; and must have good aesthetic value. *See Id.* at Rule 8(B)(2)(b). Class SB1{a} waters share the same designated uses as Class SB{a}, with the exception of shellfish harvesting. *See Id.* at Rule 8(B)(2)(c).

Class B waters are subject to generally applicable minimum criteria, as well as a variety of class-specific criteria. At a minimum, all Rhode Island waters shall be free of pollutants in concentrations that: (i) adversely affect the composition of fish and wildlife; (ii) adversely affect the physical, chemical, or biological integrity of the habitat; (iii) interfere with the propagation of fish and wildlife; (iv) adversely alter the life cycle functions, uses, processes and activities of fish and wildlife; or (v) adversely affect human health. *See Id.* at Rule 8.D.(1)(a). In addition, all waters of the State shall be free from pollutants in concentrations or combinations that: (i) settle to form deposits that are unsightly, putrescent, or odorous to such a degree as to create a nuisance, or interfere with the existing or designated uses; (ii) float as debris, oil, grease, scum or other floating material attributable to wastes in amounts to such a degree as to create a nuisance or interfere with the existing or designated uses; (iii) produce odor or taste or change the color or physical, chemical or biological conditions to such a degree as to create a nuisance or interfere with the existing or designated uses. *See Id.* at Rule 8.D.(1)(b). Rule 8.D.(1)(d) (General Criteria; Nutrients) of the Rhode Island Standards provides that "nutrients shall not exceed the limitations specified in rule 8.D.(2) [Class Specific Criteria - Freshwaters] and 8.D.(3) [Class Specific Criteria - Seawaters] and/or more stringent site-specific limits necessary to prevent or minimize accelerated or cultural eutrophication."

Rules 8.D.(2) and (3) set forth various criteria (DO, taste and odor, chemical constituents) for Class B and B1 freshwaters and Class SB{a} and Class SB1{a} seawaters, including nutrient criteria. Nutrient criteria for freshwaters and seawaters include: "None in such concentration that would impair any usages specifically assigned to said Class, or cause undesirable or nuisance aquatic species associated with cultural eutrophication ...." Rule 8.D.(2)(10)(b)(freshwaters) and Rule 8.D.(3)(10)(seawaters). Rhode Island Standards do not include numeric criteria for nutrients applicable here.

Both Massachusetts and Rhode Island Standards require water quality criteria to be met even during severe hydrological conditions, *i.e.*, periods of critical low flow when the volume of the receiving water is able to provide relatively little dilution. In Massachusetts, NPDES permit limits for discharges to rivers and streams must be calculated based on the "7Q10," or "the lowest mean flow for seven consecutive days to be expected once in ten years." *See* 314 C.M.R. § 4.03(3) (Ex. 4). Similarly, in Rhode Island, "water quality standards apply under the most adverse conditions," meaning "the acute and chronic aquatic life criteria for freshwaters shall not be exceeded at or above the lowest average 7 consecutive day low flow with an average recurrence frequency of once in 10 years (7Q10)." *See* Rhode Island Standards, Rule 8.E.

3. Reasonable Potential Analysis.

During the permit reissuance process, the Region evaluated the sources of phosphorus and nitrogen loading into the Blackstone River, Seekonk and Providence Rivers, as well as the physical, chemical and biological impacts of the nutrient loading in the receiving water. *See Fact Sheet* at 8-10, 11-14 (Ex. 1). *See also RTC* at 25-30, 32-33 (Ex. 2). The Region determined that the Blackstone River and the Seekonk and Providence Rivers are severely eutrophic due to

excessive phosphorus loading to the freshwater segments and nitrogen loading to the marine segments. *Fact Sheet* at 10, 11.

As to phosphorus, the Region found that even when the District completes its ongoing upgrades and is able to consistently achieve the total phosphorus effluent limit of 0.75 mg/l allowed under its expired permit, this discharge of phosphorus will cause or contribute to or has the reasonable potential to cause or contribute to excursions about the Massachusetts narrative water quality criteria for cultural eutrophication. *Id.* at 9-10; *RTC* at 41, 106. As the Region explained in the proceedings for the previous NPDES permit issued in 1999 and modified in 2001 (and now expired), the 0.75 mg/l limit in the expired permit was based on a dissolved oxygen model and designed solely to meet dissolved oxygen criteria. *Response to Comments in Support of the 1999 Permit* at 5 (Ex. 23; AR 74). *See also RTC* at 105 (Ex. 2). The Region expressly cautioned that even at 0.75 mg/l total phosphorus, the model indicated that chlorophyll *a* values and diurnal dissolved oxygen variations would still be at levels of concern relative to eutrophication impacts. *1999 Response to Comments* at 5 (Ex. 23).

As detailed above, studies of the River conducted by MassDEP and the U.S. Army Corps since the issuance of the expired permit provide further documentation of the severity of the cultural eutrophication in the River. *See MassDEP 2003 Water Quality Monitoring* (Ex. 10); *MassDEP 2003 Biological Assessment* (Ex. 11); *U.S. Army Corps Evaluation* (Ex. 9). The data in these studies show extensive growth of aquatic vegetation, low in-stream dissolved oxygen levels, and adverse impacts to the benthic community. *Supra* at Section I.B.1.

Given the lack of any significant dilution of the District's discharge under 7Q10 conditions, the Region determined that a total phosphorus discharge of 750 ug/l (0.75 mg/l) would result in an in-stream concentration of 682 ug/l (assuming zero upstream phosphorus and

a discharge at design flow). *Fact Sheet* at 9-10 (Ex. 1). The Region's calculation assumed a background concentration of zero, meaning that the District's discharge on its own would cause this in-stream concentration in the absence of any other sources. Although Massachusetts Standards do not contain a numerical nutrient criterion for phosphorus, an in-stream concentration of 682 ug/l is far in excess of recommended values contained in EPA's national technical guidance and the peer-reviewed scientific literature pertaining to nutrients. *Id.* at 9-10. *See also RTC* at 108-109 (Ex. 2). These sources recommend protective in-stream phosphorus values ranging from 10 ug/l (0.01 mg/l) to 100 ug/l (0.1 mg/l). *See Fact Sheet* at 9-10; *RTC* 108-109.

The Region also concluded that excessive nitrogen loading from the District's facility has the reasonable potential to contribute to violations of Rhode Island Standards in the Seekonk and Providence Rivers. *See Fact Sheet* at 13; *RTC* at 80, 99. Municipal wastewater treatment facilities in Massachusetts and Rhode Island are the predominate source of the nitrogen loading in Narragansett Bay. *See RTC* at 24, 27 (Ex. 2); *Evaluation of Nitrogen Targets in WWTF Load Reductions for the Providence and Seekonk Rivers* (RIDEM, December 1, 2004) (*"2004 RIDEM Load Reduction Evaluation")* at 18-21 (Ex. 13; AR 139*)*; *Plan for Managing Nutrient Loadings to Rhode Island Waters (RIDEM 2005) ("2005 RIDEM Nutrient Loading Plan") at 3* (Ex. 14; AR 137). The District is one of several municipal POTWs in Massachusetts that discharges nitrogen into tributaries of the Seekonk River, which is the most severely impaired section of the upper Narragansett Bay. *See RTC* at 17, 24; *Total Nitrogen Permit Modifications Response to Comments (RIDEM, June 27, 2005) ("RIDEM 2005 Response to Comments")* at 8 ("The Woonsocket, UPWPAD [i.e., the District], Attleborough and North Attleborough WWTFs are

significant contributors to the most highly enriched estuarine waters in RI, the Seekonk River.") (Ex. 15; AR 192).

4. Establishment of Seasonal Effluent Limitations for Phosphorus and Nitrogen.

When establishing water quality-based effluent limitations in the absence of numeric criteria for phosphorus and nitrogen, the Region looks to a wide range of materials, including nationally recommended criteria, supplemented by other relevant materials, such as EPA technical guidance and information published under Section 304(a) of the CWA, peer-reviewed scientific literature and site-specific surveys and data. *See* 40 C.F.R. § 122.44(d)(1)(vi)(A),(B). *See RTC* at 28-30, 37, 94, 96, 107-109 (Ex. 2). In accordance with the regulatory framework, the Region does not afford definitive weight to any one value or source, but rather assesses the total mix of technical, science and policy information available to it when determining an appropriate and protective limit. *RTC* at n.7.

When permitting nutrient discharges, the Region analyzes available record materials from a reasonably conservative standpoint. *Id.* at n.12. This protective approach is appropriate because, once begun, the cycle of eutrophication can be difficult to reverse due to the tendency of nutrients to be retained in the sediments. *Id.* Nutrients can "be re-introduced into a waterbody from the sediment, or by microbial transformation, potentially resulting in a long recovery period even after pollutant sources have been reduced." *See Nutrient Technical Guidance Manual: Rivers and Streams (US EPA 2000) ("Rivers and Streams Nutrient Guidance")* at 3 (Ex. 18; AR 99). Eutrophic conditions are often exacerbated around impoundments and in other slow moving reaches of rivers, where detention times increase relative to free flowing segments of rivers and streams. In addition, "[i]n flowing systems, nutrients may be rapidly transported downstream and the effects of nutrient inputs may be uncoupled from the nutrient source, [which]