UBWPAD RESPONSE TO COMMENTS

On March 23, 2007, the United States Environmental Protection Agency began the public comment period for a draft permit for the Upper Blackstone Water Pollution Abatement District (UBWPAD). A public meeting and a public hearing were held in Worcester, MA on May 9, 2007. At the public hearing, EPA extended the public comment period until May 25, 2007. Comments were received from UBWPAD, its consultant Camp Dresser and McKee and its attorneys, as well as from numerous other organizations and individuals. After review of the comments, EPA has determined to issue a final National Pollutant Discharge Elimination System (NPDES) permit for the UBWPAD facility.

The final permit is issued only by EPA. The permittees should contact the Massachusetts Department of Environmental Protection regarding authorization to discharge pursuant to the requirements of the Massachusetts Clean Water Act, as amended, Mass. Gen. Laws ch. 21, §§ 26-53. In addition, EPA has determined that Massachusetts has waived certification pursuant to Section 401(a)(1) of the Clean Water Act (CWA), 33 U.S.C. § 1341(a)(1) and 40 C.F.R. Section 124.53.[1]

The following responses address both written and oral comments provided to EPA during the comment period. Where comments are similar, we have cross-referenced rather than repeated relevant responses. This document also describes changes and clarifications EPA has made to the final permit.

This response is generally organized as follows:

Part A responds to comments from the following individuals and organizations: Massachusetts Department of Fish and Game, Riverways Program; Mark A. Briggs Blackstone River Watershed Council; Trout Unlimited; Mass Audubon; Blackstone River Valley National Heritage Corridor Commission; Blackstone Headwaters Coalition; Stephanie D. Matheny; Blackstone River Watershed Association; Narragansett Bay Estuary Program; Blackstone River Coalition; Rhode Island Bays, Rivers, & Watersheds Coordination Team; Senator Richard T. Moore; Save The Bay; Donald Pryor; Conservation Law Foundation; The Smart Growth Task Force, Bristol, Rhode Island Preserve Bristol; and Jan Reitsma.

Part B addresses comments received from Grace Ross; Tatnuck Brook Watershed Association; and City Councilor Frederick Rushton**.**

Part C addresses comments from Dr. Mauri S. Pelto.

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[1] The final permit reflects that the permit is issued solely by EPA pursuant to its authority under the CWA. Please note we have modified footnote 4 of the permit which relates to limits for DO, pH range and seasonal fecal coliform to make clear that the limits are consistent with historical state certification requirements and are required by antibacksliding requirements.

Part D responds to comments from the Rhode Island Department of Environmental Management.

Part E responds to comments submitted by the Massachusetts Department of Environmental Protection.

Part F addresses comments received from the Upper Blackstone Pollution Abatement District, including from its technical consultants and legal counsel.

Part G responds to comments received from the following: New England Plating Co., Inc.; Town of Holden; City of Worcester (City Manager); Town of West Boylston; Worcester Regional Chamber of Commerce; City of Worcester (DPW); UBWPAD Board of Directors; Town of Leicester; and Pepe & Hazard

PART A.

Comments were received from many organizations and individuals noting the significance of the UBWPAD permit relative to water quality in the Blackstone River and/or Narragansett Bay and expressing support for the nutrient limits in the draft permit. These organizations and individuals include:

Massachusetts Department of Fish and Game, Riverways Program
Mark A. Briggs
Blackstone River Watershed Council
Trout Unlimited
Mass Audubon
Blackstone River Valley National Heritage Corridor Commission
Blackstone Headwaters Coalition
Stephanie D. Matheny
Blackstone River Watershed Association
Narragansett Bay Estuary Program
Blackstone River Coalition
Rhode Island Bays, Rivers, & Watersheds Coordination Team
Senator Richard T. Moore
Save The Bay
Donald Pryor
Conservation Law Foundation
The Smart Growth Task Force, Bristol, Rhode Island
Preserve Bristol
Jan Reitsma

Other comments from the above individuals and organizations include the following:

Comment #A1: The Narragansett Bay Estuary Program, and Rhode Island Bays, Rivers,

& Watersheds Coordination Team commented that the available science supports the conclusion that attenuation of nitrogen in the Blackstone River is low.

Response #A1: Attenuation is defined as the difference between the amount of nitrogen released to the river and the amount delivered to the mouth of the river. We agree that the available science indicates that the majority of nitrogen discharged from the UBWPAD is delivered to the Providence and Seekonk River system (Upper Narragansett Bay). *See also* Response #F17 below.

Comment #A2: Several commenters, including Blackstone River Watershed Council, Trout Unlimited, Blackstone River Valley National Heritage Corridor Commission, Blackstone River Coalition, Stephanie D. Matheny, Senator Moore, Mark A. Briggs, and Save The Bay indicated that compliance with the permit limits should be pursued with urgency. A few specifically commented that the Massachusetts Department of Environmental Protection (MassDEP) proposed schedule (*see* MassDEP Comment #E2) is too long.

Response #A2: EPA recognizes the severity of the water quality impacts in the Blackstone River and Upper Narragansett Bay and the contribution of the UBWPAD discharge to these impacts. Consequently, we intend to establish a compliance schedule that is reasonable but that also ensures compliance with the permit limits as soon as possible. We believe that the UBWPAD can achieve compliance with its total nitrogen limit in the same time frame as the Rhode Island facilities, which will expedite the process of assessing the water quality response in Upper Narragansett Bay.
See also Response #E2.

Comment #A3: The Blackstone Headwaters Coalition, Mark A. Briggs, and the Blackstone River Coalition all commented that a phosphorus total maximum daily load (TMDL) for the Blackstone River should be completed but that the current permit limits are necessary and should not wait for the TMDL.

Response #A3: Pursuant to 40 CFR §130.7(c), States are required to prepare TMDLs for impaired waters. While we believe that a TMDL can be a useful tool for ensuring that all sources of phosphorus are adequately addressed, EPA has a clear obligation to establish water quality based limits that will ensure attainment of water quality standards even in the absence of a TMDL. In fact, the relevant regulations <u>require</u> that EPA include an effluent limit for any pollutants which EPA determines "are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." 40 CFR §122.44(d)(1)(i). Where a TMDL has been established, EPA is required to ensure that the effluent limits are "consistent with the assumptions and requirements of any available wasteload allocation" applicable to the discharger. 40 CFR §122.44 (d)(1)(vii)(B).

Comment #A4: The Riverways Program commented that the infiltration/inflow removal requirements are important to minimize partially treated discharges.

Response #A4: We concur that the infiltration/inflow (I/I) removal requirements are important. A large percentage of the annual flow to the UBWPAD is a result of infiltration/inflow in the system. In its NPDES permit re-application, UBWPAD indicated that I/I is approximately 15 million gallons per day. *See* NPDES Permit Application at page 7. Improved control of I/I would minimize discharges that do not receive full treatment and would also reduce energy and chemical use associated with the transport and treatment of the extraneous flow. *See also* Response #F8 below.

Comment #A5: The Riverways Program commented that continuous chlorine monitoring is an important addition to protect aquatic life.

Response #A5: We agree that continuous chlorine monitoring is an important addition to the permit's monitoring requirements and will help to protect aquatic life by providing instantaneous detection of equipment or operational problems with the disinfection system. We do not believe that the use of grab samples alone to measure chlorine is sufficient where wastewater flow and chlorine demand vary significantly throughout the day. The fluctuation of flow at this facility is of particular concern in light of CSO contributions and the high volume of I/I in the sewer system.

Comment #A6: The Riverways Program commented that whole effluent toxicity testing of outfall 001A is appropriate.

Response #A6: We concur. Because discharges through outfall 001A will receive only primary treatment and disinfection, whole effluent toxicity testing during periods when outfall 001A is activated is necessary to ensure that the resulting discharge does not have a toxic effect on the receiving water.

Comment #A7: Trout Unlimited commented that the permit should address concerns with aluminum toxicity.

Response #A7: We agree that aluminum toxicity is a potential concern. The final permit contains a monitoring requirement in order to obtain more information relative to the potential to violate receiving water criteria for aluminum. If the data indicate that there is a reasonable potential to violate receiving water criteria, future permit actions will include an aluminum limit.

Comment #A8: The Blackstone Headwaters Coalition and the Blackstone River Coalition commented that the proposed limit of 0.1 mg/l total phosphorus may not be sufficiently low because the upstream water contains some phosphorus. Several commenters (Blackstone Headwaters Coalition, Congressman McGovern, City Councilor Frederick Rushton, John Reed) noted that impoundments should be considered.

Response #A8: The calculations assuming zero upstream phosphorus were included to demonstrate that both the limit of 0.75 mg/l in the expired permit or a limit of 0.2 mg/l (as MassDEP has interpreted the "highest and best practicable treatment" requirement in

its standards in the context of certain other permitting decisions) are insufficient to ensure that the downstream concentration of phosphorus does not exceed 0.1 mg/l. Because the available dilution is very small relative to the design flow of the treatment facility, and because the upstream dilution water will contain some phosphorus, we have established the effluent limit at 0.1 mg/l to ensure that the discharge does not cause or contribute to a downstream exceedance of the 0.1 mg/l target.

We agree that downstream sediments may be a source of phosphorus. While the improved treatment required by this permit will have a beneficial effect relative to the accumulation of phosphorus in downstream sediments, we believe that this issue warrants further evaluation upon completion of the treatment upgrades. If sediment sources of phosphorus are demonstrated to be causing or contributing to non-attainment of water quality standards, then either sediment remediation and/or lower permit limits may be pursued. In addition, the permit includes a winter phosphorus limit from November through March to ensure that the higher level of phosphorus discharged in the winter period does not result in the accumulation of phosphorus in downstream sediments. MassDEP has indicated its intent to develop a phosphorus TMDL (*see* Comment #E3 below). A better understanding of the role of downstream sediments should be an important component of any TMDL effort.

Comment #A9: The Blackstone River Coalition, Save The Bay, Conservation Law Foundation, and Stephanie D. Matheny all commented that cost is not an appropriate basis for establishing permit limits. Save The Bay also commented that the limits do not represent an unfair and disproportionate burden to sewer ratepayers. Donald Pryor commented that water and sewer costs in Worcester are a lower percentage of median household income than costs in Rhode Island. Mass Audubon noted that the costs of the current upgrade are primarily to address CSO issues rather than nutrient reduction and that, while we do need to be mindful of Worcester's sewer fees, we also need to note that other communities are doing more than their share to improve water quality by paying $750 million to address CSO issues. Mark A. Briggs commented that necessary funding to bring the facility up to current standards must be supplemented from sources beyond Worcester and the Blackstone Valley. The Blackstone River Valley National Heritage Corridor Commission commented that a number of downstream communities are strenuously working to achieve higher water quality standards and that the UBWPAD also must achieve improved water quality discharge.

Response #A9: We agree that cost and technological considerations are not appropriate factors to consider in establishing water quality-based effluent limits. *United States Steel Corp. v. Train*, 556 F.2d 822, 838 (7th Cir. 1977); *see also In re City of Moscow*, 10 E.A.D. 135, 168 (EAB 2001). We also recognize, however, that the improvements necessary to meet the new permit limits will result in sewer rate increases. As discussed earlier, if a permittee cannot immediately meet new water quality-based limits because of the need to design and construct additional treatment facilities, EPA may establish a compliance schedule, which we intend to do for this discharge (*see* Response #A2).

State regulations also include provisions for allowing a revision or variance from water quality standards under specific conditions. One of the conditions is if the cost of controls necessary to attain the existing water quality standards would result in widespread economic and social impact. If such a condition were shown to exist, relief could be granted through a revision or variance to water quality standards (*see* Massachusetts Surface Water Quality Standards, 314 CMR 4.03(4); Rhode Island Water Quality Regulations, Rules 19 and 20. *See also* EPA's Use Attainability Analysis regulations at 40 CFR §131.10(g) and Interim Economic Guidance for Water Quality Standards, March 1995.

For additional discussion regarding evaluation of cost impacts in the context of setting water-quality based effluent limitations, *see* Responses #F1, #F2 and #F4 below.

Comment #A10: The Conservation Law Foundation (CLF) commented that the warm weather total nitrogen limit should be no higher than 3 mg/l (limit of technology as defined by Rhode Island Department of Environmental Management) and that the warm weather total phosphorus limit should be no higher than 0.1 mg/l. CLF further indicated that the permit must quantify any further contribution of nitrogen and phosphorus to the present water quality standards violations and must include further conditions and limitations designed to ensure that there is no remaining contribution from the UBWPAD to the violations. CLF commented that such additional conditions and limitations should be an offset to known discharges from the plant.

Response #A10: While RIDEM's nitrogen reduction analysis (referenced in the comment) suggests that permit limits for nitrogen based on the limit of technology may be necessary to achieve water quality standards, there 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 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. *See* Response #F18A. Consequently, we believe that the significant nitrogen reductions required by the permit, as well as other permits in the watershed, are consistent with achieving water quality standards. Further limitations (including offsets) are not warranted at this time. We also recognize the importance of monitoring the receiving water response to these nitrogen reductions; as noted in the Fact Sheet at page 14, RIDEM has, in partnership with several research and academic institutions in Rhode Island, established an extensive monitoring network in order to provide the data necessary to evaluate compliance with water quality standards upon implementation of the recommended nitrogen reductions. If warranted, further reductions will be required.

The final permit includes a phosphorus limit of 0.1 mg/l. We concur it cannot be higher and ensure attainment of water quality standards. The phosphorus limit in the permit is based on an analysis of the limit necessary to achieve water quality standards. It is not a

technology-based limit nor does it reflect the limits of available technology. Available technology is capable of achieving phosphorus limits lower than 0.1 mg/l.

Comment #A11: CLF commented that, in addition to the currently documented dissolved oxygen stress in Narragansett Bay, the NPDES permit should consider the added impacts that will result from global warming over the life of the permit. CLF argues that this supports that no higher TN limit than that technically achievable should be permitted.

Response #A11: We agree that this is a concern that needs further consideration in the future. While temperature changes in Narragansett Bay are expected to be small over the life of this permit (five years), increasing temperatures are a significant concern over the longer term. EPA will work with RIDEM to ensure that the post nitrogen reduction monitoring and evaluation effort includes consideration of the effects of global warming on water quality standards attainment.

Comment #A12: CLF commented that the seasonal CBOD of 10 mg/l should be required year round. Acknowledging that the 10 mg/l limit is of maximum benefit in the warm months, CLF comments that the River system should benefit year-round from UBWPAD's investment to achieve 10 mg/l.

Response #A12: Treatment plants designed to meet a CBOD limit in the summer period may not be able to meet the same limit in the winter period due to the effects of colder temperatures on treatment efficiencies. In addition, the dissolved oxygen waste load allocation used to establish the effluent limits for CBOD in both the previous permit and this reissued permit indicates that minimum dissolved oxygen criteria will be met in the receiving water during the winter period. (Note that the CBOD limits are the same in the expired permit and this reissued permit).

Comment #A13: CLF commented that the limited flushing capacity of this system, combined with the persistence of phosphorus and nitrogen in the system, warrant consideration of year round application of nutrient controls.

Response #A13: In typical wastewater treatment plant effluent, both phosphorus and nitrogen are present in the dissolved phase. Typical effluent also includes particulate phosphorus, but very little particulate nitrogen. The predominate form of nitrogen in municipal wastewater discharges is dissolved inorganic nitrogen (primarily ammonia, nitrite and nitrate). Also, dissolved inorganic N forms, especially nitrite and nitrate, are highly soluble and do not precipitate easily or sediment out when freshwater enters the brackish zone of estuaries as inorganic P is likely to do. *See* Nutrient Criteria Technical Guidance Manual, Estuarine and Coastal Marine Waters (EPA-822-B-01-003, October 2001).

The RIDEM nitrogen reduction analysis and supporting scientific documentation indicates that the winter contribution is not significant. *See, e.g.*, RIDEM Response to Comments on Total Nitrogen Permit Modifications, June 27, 2005, page 26. However,

in light of the uncertainties with the fate and transport of winter contributions of nitrogen through the system and the potential that these contributions will add to the pool of nitrogen available during critical periods, the permit requires that UBWPAD optimize the treatment facilities in the winter period in order to minimize the potential for higher winter loadings to prevent attainment of water quality standards.

For phosphorus, we agree that there is a significant potential for particulate phosphorus loadings to settle and accumulate in downstream impoundments during non-growing seasons and to contribute to impairments in the Blackstone River during the summer growing period. Consequently, the permit includes a winter phosphorus limit of 1.0 mg/l to ensure that the particulate fraction of the phosphorus is removed prior to discharge to the River. The limit assumes that the vast majority of the phosphorus discharged will be in the dissolved fraction and that dissolved phosphorus will pass through the system and not accumulate in the sediments. The limitation is higher than the seasonal limit of 0.1 mg/l because EPA has assumed, based on experience with other treatment facilities, that achieving a limit of 1.0 mg/l will result in the removal of the majority of the particulate fraction of phosphorus in the discharge. For instance, water quality surveys conducted in the Assabet River indicate that 90% of the total phosphorus in the discharge of four wastewater treatment facilities was in the dissolved form. *See* Assabet River TMDL for Total Phosphorus, Report Number: MA82B-01-2004-01. To verify the dissolved fraction of phosphorus discharged, a dissolved orthophosphorus monitoring requirement is included in the permit; if water quality monitoring indicates that it is accumulating, then lower winter limits will be required in the future.

Comment #A14: The Blackstone River Watershed Council commented that EPA "should re-invest its efforts to forge a watershed-wide planning team and enable this team to engage both RIDEM and MADEP (and their legislators) to sync the actions to be taken to invest and improve upon the whole watershed. Whether it's the planning for a 'river wide' TMDL, fish passage planning and implementation strategies, bike path connections, or standardized NPDES permits to limit nutrients and other impairments, we believe EPA needs to play a larger role." Several other commenters noted the importance of coordinated efforts to improve water quality in the River and watershed.

Response #A14: EPA will continue to support the Blackstone River Watershed Council/Friends of the Blackstone and its partner, the Blackstone River Coalition, in their many efforts to bring about improvements along the Blackstone. EPA, RIDEM, MassDEP and the watershed organizations all play important roles in protecting and improving water quality in the Blackstone River watershed. We agree that coordination of efforts is important. Currently, EPA is working closely with both MassDEP and RIDEM to ensure that we address nutrient discharges from municipal treatment plants in a coordinated fashion. We intend to continue to play an active role in this and other issues related to improvement of the watershed.

PART B.

Some commenters (including Grace Ross, Tatnuck Brook Watershed Association, and City Councilor Frederick Rushton) focused on alternatives to the low nutrient limits.

Comment #B1: Wastewater source reductions (phosphate free detergents and alternative chemicals for copper control in the water supply) and non-point source reductions (organic lawn care and other storm water controls) should be pursued instead of another expensive upgrade.

Response #B1: Regarding the attainment of the new water quality-based effluent limitations for UBWPAD, the Clean Water Act (CWA) and EPA's regulations do not dictate the method by which UBWPAD must meet the new water quality-based effluent limits. While the suggested source controls would have positive benefits and we encourage the permittee to pursue them, they would not be sufficient to achieve the necessary effluent limits. The commenters' suggested source controls for phosphorus would have the benefit of reducing phosphorus in the influent, which should reduce the chemicals and energy used to treat for phosphorus. However, there is a significant amount of phosphorus that is inherent to human waste and will not be affected by source controls. The level of treatment to be provided in the current upgrade is not sufficient to meet the permit limits, even with a significant reduction in the influent concentration of phosphorus from other sources.

While efforts to reduce non-point sources of phosphorus and nitrogen are encouraged and would have beneficial effects, the available science indicates that the significant majority of the total phosphorus loads to the Blackstone River (*see* Reports cited in the Fact Sheet at page 8) and of the total nitrogen loads to Narragansett Bay (*see* Response #F40 below) are from point sources. Even a high level of non-point source nutrient reductions would not preclude the need for significant point source reductions. *See also* Response #C1 below.

Several commenters in addition to UBWPAD (including elected officials, representatives of organizations and members of the public) expressed concern as to the lack of funding to meet the new permit limits. With regard to cost considerations in establishment of water quality-based effluent limits, please see Response #A9. Some suggested that the new permit limits represent an unfunded mandate.

Comment #B2: The need to comply with the limits is an unfunded mandate.

Response #B2: We interpret the reference to "unfunded mandates" as a reference to the requirements of the Unfunded Mandate Reform Act of 1995 (UMRA). The UMRA, however, is inapplicable to this permitting action. The UMRA applies to rulemaking, and not individual NPDES permit decisions. For example, in *In re City of Blackfoot Wastewater Treatment Facility*, NPDES Appeal No. 00-32 (EAB September 17, 2001)

the Environmental Appeals Board denied a petition for review of compliance with UMRA on grounds that UMRA applies only to regulations, not to individual NPDES permits, which are more akin to licenses than a regulation.

In addition, EPA helps to finance the cost of treatment needed to achieve compliance with the Clean Water Act through the Clean Water Act State Revolving Fund (SRF). Through the SRF program, Massachusetts maintains revolving loan funds to provide low-cost financing for a wide range of water quality infrastructure projects. Funds to establish or capitalize the SRF program are provided through federal government grants and state matching funds (equal to 20% of federal government grants). EPA has provided Massachusetts with a total of $956,861,571 in Clean Water Act SRF grant funds for the period from 1989 through July, 2008.

PART C.

Comments were received from Dr. Mauri S. Pelto, Department of Environmental Science, Nichols College on May 24, 2007. Dr. Pelto's letter, in its entirety, is included below:

Comment #C1: The goal of everyone is to achieve a clean Blackstone River by 2015. I have spent seven years working with the BRC (Blackstone River Coalition), BHC (Blackstone Headwaters Coalition), and BRWA (Blackstone River Watershed Association) to setup a system to monitor the water quality and quantity of the Blackstone River Watershed. My role with the BRC has been to establish rating curves at monitoring stations in all significant tributaries to the Blackstone River in Massachusetts. On the second Saturday of each month from April-November, the BRC volunteers and coordinators collect data from throughout the watershed. Through use of the rating curves established by myself, discharge is also determined at many of the locations. Availability of discharge data allows determination of phosphorus load, or more appropriately the mass balance, in the system on a given day based on the measured concentrations. These data fill a key gap in data collected by the DEP and EPA, which have not routinely monitored tributaries to the Blackstone.

One key to achieving a healthy Blackstone River is to minimize the tremendous load of nutrients in the river. The question is how best to do this, given the limited monetary resources that can be allocated. I feel that informed management decisions cannot be made until we attempt to determine the mass balance of phosphorous in this watershed. Data collected by the BRWA provide the ability to do this for select days, although a more continuous mass balance would be ideal. The latter can only be provided by a model, tested against the field data.

I have developed a mass balance for the watershed based on orthophosphate concentrations and discharge measured by the BRWA in 2005 and 2006. These data provide a conservative (low) estimate for total phosphorous loading from the tributaries at the time of measurement as other forms of phosphorus are not accounted for. In addition, not all tributaries are monitored every month, thus additional loading can be

expected from unmonitored tributaries. I was careful to include only non-redundant measurements, that is not utilizing an upstream station and a downstream measurement station that is fed by that upstream station. Values were utilized from either Middle River or Leesville Outflow for the Worcester Headwaters. The main stem tributaries utilized include the Mumford River, West River, Mill River, Mill Brook, Emerson Brook, Cold Spring Brook, Peters River, Quinsigamond River Singletary Brook and Broad Meadow Brook. In each case, the most downstream station for which data were available was used. Data for all of the above noted stations were only available during one month. Thus, as noted above, the measured load in kg/day is conservative because of the use of orthophosphate measurements and the lack of completely comprehensive data.

The attached file has the loading data for 2005 and 2006 measured by BRC and that discharged by waste water treatment plants along the river. Treatment plant load data were provided by Paula Rees, from UMass, based on data acquired from the plants to facilitate their model development at UMass. Data for plants other than the Upper Blackstone plant are not yet available for 2006. Tributary loading has been compared to discharge from the Upper Blackstone plant on two figures, one for 2005 (Figure 1) and one for 2006 (Figure 2). Note that on figures 1 and 2, there are two values presented for the phosphorous load emitted from the Upper Blackstone plant on each date (provided by Dr. Rees), in addition to the load monitored in the tributaries, based on the BRWA data. The first plant load estimate is based on the observed plant effluent discharge and total phosphorus concentration for the given day. The second plant load estimate is based on the observed plant effluent discharge and a total phosphorus concentration of 0.6 mg/L total phosphorus. The concentration of 0.6 mg/L is the target total phosphorus concentration the on-going construction at the plant is designed to meet (or 80% of the allowed limit of 0.75 mg/L). It is conservatively assumed that all of the total phosphorus is actually dissolved orthophosphorus. Additional figures (not numbered) compare tributary loading against loading from other treatment plants along the river in addition to the Upper Blackstone. In these figures, a third estimate of load from the Upper Blackstone has been added. This load is based on the observed plant effluent discharge and a total phosphorus concentration of 0.09 mg/L, or 90% of the proposed future total phosphorus limit for the plant. Load estimates for both the on-going construction and proposed limit were also provided by Dr. Rees.

The data suggest that the main source of phosphorous after the current upgrades are in place will not be from the Upper Blackstone waste water treatment facility. It is also worth noting that the current loading from the treatment plant is typically of the same magnitude as the conservative measure of phosphorous loadings from the tributaries feeding the Blackstone River. This leads me to several conclusions;

1. I have spent more than 300 different days in our streams, and seen countless examples of cappuccino colored brooks indicating the substantial nutrient loading and turbidity issues of our brooks feeding the Blackstone River.
2. That after the current upgrades with respect to phosphorous, Upper Blackstone's output except during low water events, will be much smaller than contributions from the basin's non-point sources. This needs our attention.

3. That support of BRC-BRWA-BHC is providing us with the data to identify these problems specifically and through their advocacy to try to address them.
4. These preliminary investigations indicate the value that can be gleaned from this system of volunteer monitoring and professional coordination. This system needs to be further supported to enhance the data, and to provide a better answer to the TMDL question for the Blackstone River Watershed, sooner rather than in 2013.
5. This field data in combination with the UMASS model can provide us with a preliminary understanding of the phosphorous mass balance of the watershed, that in turn would allow quantitative determination of the best management practices to reduce nutrient loading.

As noted in a letter from the BRC, by Donna Williams, "DEP also calls for a TMDL for Phosphorous to be performed for the Blackstone by 2013. The BRC supports the development of TMDLs for nutrients on the Blackstone, however the TMDL should be completed as soon as possible. It could, in fact, indicate the need for even stricter limits." The BRC, through its tireless efforts, has acquired the resources and the data to provide a preliminary answer to this question and spurs us to do more. This organization is invaluable in addressing this question today and in the future and spreading solutions in the communities through its advocacy.

I look forward to continuing to work with the many people and organizations seeking to clean the Blackstone River and seeing the results with my own eyes, in clearer water.

Response #C1: We commend the efforts of organizations such as the Blackstone River Coalition and volunteers to monitor water quality and to improve the Blackstone River and its watershed.

The analysis provided is difficult to review given the lack of supporting information. Flow and concentration data, sampling locations, and precipitation information are not provided. Key to the loading estimates are the rating curves for estimating flow, but no information is provided as to how the rating curves were developed or how well they calibrate to data from USGS permanent gage sites.

In addition, most of the data provided is not from low flow conditions. The only data set in 2005 from typical low flow periods was the July data set and it rained 2.5 inches the day before the sampling. In 2006 there were only two data sets from typical low flow periods (July and September) and the non-point source loadings during July and September were much lower than at other times of the year.

The permit limits are established to meet water quality criteria under 7Q10 low flow conditions. Under these conditions, non-point sources are minimal and controlling the point source discharges is critical. Under 7Q10 conditions, point sources will continue to be the dominant source of phosphorus loadings even after the current upgrade is completed. However, on an annual basis, loadings from non-point sources are significant and are an issue that warrants further attention, especially to the extent that these loadings may accumulate in downstream impoundments. The storm water permits issued to most

communities in the Blackstone River watershed will help address the non-point sources but more targeted Best Management Practices (BMPs) in future storm water permits will likely be necessary. We agree with the commenter's statement that the usefulness of this type of data is to help allow a quantitative determination of BMPs.

PART D.

Comments were received from the Rhode Island Department of Environmental Management (RIDEM) in a letter dated May 18, 2007. RIDEM noted the significance of the UBWPAD permit relative to water quality in the Blackstone River and Narragansett Bay and expressed support for the nutrient limits in the draft permit. RIDEM also commented that the available science supports the conclusion that attenuation of nitrogen in the Blackstone River is low and urged EPA to ensure the expeditious implementation of WWTF modifications. (See Responses #A2 and #E2 relative to a compliance schedule). Other specific comments are as follows:

Comment #D1: The assumption that the concentration of metals in the upstream water is zero is not reflective of actual conditions and when coupled with allocation of the entire criteria, results in permit limits that cause violations of the downstream Rhode Island Water Quality Standards. Copper, zinc, and cadmium criteria at the state line, based on a hardness value of 50 ug/l which RIDEM has determined is appropriate for the Rhode Island portion of the Blackstone River, would be exceeded by 18%, 16%, and 5% respectively.

In addition, the Fact Sheet indicates that MassDEP has submitted revised site-specific water quality criteria for dissolved copper of 18.1 ug/l chronic and 25.7 ug/l acute. The Fact Sheet further indicates that if EPA approves these criteria, the limits in the final permit will be based on the revised criteria, the available dilution at 7Q10 flow, and the upstream concentration of copper under low flow conditions. Using these new criteria and EPA's monthly average permit limit calculation procedures, the copper concentration at the state line will be 17.6 ug/l, or 241% over the Rhode Island criteria of 5.2 ug/l. RIDEM strongly objects to establishment of permit limits using the site-specific criteria. The metals limits in the draft permit must ensure that Rhode Island water quality criteria will be met at the state line.

Response #D1: The assumption of pollution concentrations of zero above the UBWPAD discharge has a minor effect on the calculations because the UBWPAD discharge reflects over 90% of the receiving stream flow at the point of the discharge. In addition, the Rhode Island analysis of in-stream metals concentrations indicating exceedances of the Rhode Island criteria at the state line assumes that metals are 100% conservative in the water column. However the river flows for approximately 28 miles from the UBWPAD discharge to the state line. Analyses of metals in the receiving water conducted under near 7Q10 flow conditions indicate that there is a significant reduction in metals concentration and loads from the UBWPAD discharge to the state line. The average results for two low flow surveys – conducted in July and August 2001 – indicate that the

reduction in copper loading between the UBWPAD discharge and the state line is approximately 20%. The surveys showed an average reduction of cadmium of approximately 52%. Zinc was not included in these analyses. (The data from these surveys can be found in the Blackstone River Initiative, May 2001). These reductions were measured notwithstanding other point source discharges downstream from the UBWPAD facility. Taking into account the reduction of metals concentrations as the discharge flows downstream, we believe that the metals limits in the permit are sufficient to ensure that Rhode Island water quality standards are met at the state line.

With regard to the new Massachusetts site-specific criteria for copper, we concur that a significant increase in the draft permit limit based on the recently approved Massachusetts site-specific criteria would result in a reasonable potential to exceed the Rhode Island criteria at the state line. The revised chronic criterion for dissolved copper is 18.1 ug/l and the revised acute criterion for dissolved copper is 25.7 ug/l. Using a dilution factor of 1.1 (*see* Attachment B to the Fact Sheet), the new criteria would result in the following limits:

Monthly Average Limit = (chronic criterion) (dilution factor) = (18.1 ug/l)(1.1) = 19.9 ug/l
Daily Maximum Limit = (acute criterion) (dilution factor) = (25.7 ug/l)(1.1) = 28.3 ug/l

Even accounting for an approximate 20% reduction of copper concentration as the discharge flows downstream, it appears that copper concentrations would be well in excess of the Rhode Island water quality standard for copper of 5.2 ug/l at the state line. Accordingly, the final permit limits for copper are the same as in the draft permit. We note, however, that Rhode Island has also been evaluating development of a site-specific water quality criteria for copper. If such criteria are adopted by the State and approved by EPA, it may be appropriate to evaluate a modification of the copper limit.

Comment #D2: EPA should utilize effluent data collected as part of the bioassay testing to determine whether reasonable potential exists for the UBWPAD facility to cause or contribute to water quality violations for additional pollutants. Since EPA does not enter pollutant data collected as part of the bioassay testing into ICIS, RIDEM was unable to evaluate reasonable potential for the following pollutants: Chromium, lead, nickel and aluminum. At a minimum, based on typical lead levels seen in effluent from Rhode Island waste water treatment facilities, it appears that the UBWPAD would have "reasonable potential" for lead and therefore would require lead limits. To ensure that bioassay pollutant monitoring data is readily available for review, RIDEM requests that EPA list the pollutants monitored during the bioassay testing in Part I.A.1 of the permit.

Response #D2: We reviewed the bioassay reports from 2005 and 2006. The effluent chromium data are all below detection levels (detection levels ranged from 5 – 10 ug/l) and well below the applicable ambient criteria values in state standards. The effluent nickel data ranged from 5 – 20 ug/l which also is well below ambient criteria values. The effluent lead data are all below detection levels (detection levels ranged from 5 – 10 ug/l). However, the detection levels are higher than the ambient criteria values. Consequently,

we have included a monthly lead monitoring requirement in the final permit, with a quantification level of 0.5 ug/l, in order to be able to assess the need for a permit limit in a future permit action. Effluent aluminum levels are of concern. Effluent values ranged from 70 – 240 ug/l. As indicated in Response #A7, we have included a monthly monitoring requirement for aluminum in the final permit. A permit limit will be established if the data indicate a reasonable potential to exceed criteria.

We concur that requiring reporting of selected effluent data from bioassay testing on Discharge Monitoring Reports (in addition to submitting the information to EPA in a separate report) would make it easier to review these results. Copper, zinc, cadmium, aluminum and lead are all required to be monitored more frequently than quarterly. Accordingly, for these metals, the final permit requires that the effluent results from the WET tests must be included in the required discharge monitoring reports. For nickel, a quarterly monitoring requirement has been included in the final permit in order that effluent results for nickel from the WET tests are also included in the required discharge monitoring reports.

Comment #D3: Pursuant to footnote 10 of the permit, compliance with the phosphorus limitation is evaluated based on a 60-day rolling average. Use of a 60-day rolling average is not consistent with the Fact Sheet which refers to the limit as a monthly average. The permit does not provide an explanation of how it was determined that a 60-day average will ensure compliance with water quality standards. The fact sheet notes that the national ambient criteria recommendations range from 24 ug/l (based on the Ecoregional Nutrient Criteria) to 100 ug/l (based on the Gold Book Criteria) and the proposed limit will result in River concentrations just below 100 ug/l. Therefore, the permit should evaluate compliance based upon a 30-day average.

Response #D3: The reference to a monthly average limit in the Fact Sheet is an error and should have said "60-day rolling average."

Water quality-based limits that are developed to protect against chronic impacts such as eutrophication are typically established as monthly average limits. For the phosphorus limit in this permit, the 60-day rolling average limit possesses advantages over a monthly average limit: it provides the permittee with flexibility to deal with occasional, perhaps unavoidable, excursions above limits, while at the same time necessitating that such excursions are short-term and that optimum removal efficiencies are maintained overall. Short-term exceedances of the phosphorus limit are unlikely to result in a significant response in the receiving water relative to aquatic plant growth. Longer term exceedances capable of eliciting a response in plant growth would likely result in a violation of the rolling average limit.

The 60-day rolling average ensures the best possible performance on any given day since the results for that day will be averaged with the next 59 days to determine compliance. The uncertainty of future results that will be used for determining compliance dictates the best possible performance on any given day. Short-term excursions will have to be responded to quickly in order to ensure compliance. In contrast, a 30-day (monthly)

average limit can result in relaxed performance towards the end of the 30-day period if performance early on in the period exceeded what was necessary to meet the permit limits.

Comment #D4: The language in Footnote #7 is not consistent with other footnotes regarding minimum levels. It should be revised to read that "sample results less than 20 ug/l" rather than "sample results of 20 ug/l or less" shall be reported as zero on the DMR.

Response #D4: We concur and have made this change.

Comment #D5: Footnote #8, regarding the use and reporting of a total residual chlorine analyzer, is somewhat confusing since these analyzers are not approved under 40 CFR Part 136 for reporting on compliance with NPDES permits. EPA should consider using language similar to language included in the 2006 permit modification issued to the Newburyport Waste Water Treatment Facility which required continuous monitoring of TRC both before and after dechlorination of the effluent, as well as installation of a low TRC level alarm of the pre-dechlorination TRC analyzer.

Response #D5: Analytical methods (not sampling methods) are approved under 40 CFR Part 136. The final permit clarifies EPA's intent that the permittee use an analyzer that employs an EPA approved analytical method. In addition, while serving as a supplement to grab samples, the continuous monitor results are report-only. Continuous monitoring is required based on our concern that grab samples alone may not be adequate for determining compliance with the permit limits for such a fast acting toxicant as chlorine. The data reported from use of the continuous monitor will help to further evaluate the effectiveness of relying on grab samples. *See also* Response #F33.

We do not believe it is necessary to include all of the requirements in the Newburyport permit. The Newburyport requirements were due to concerns we had with both the effectiveness of the chlorine dosing system ***and*** with the adequacy and reliability of the dechlorination system at that particular facility. Our concern with the UBWPAD facility relates to the adequacy and reliability of the dechlorination system in light of flow fluctuations -- not with the effectiveness of the kill of fecal coliform bacteria. Accordingly, we have required continuous monitoring of the final effluent only.

We do believe, however, that some limited additional reporting is warranted to allow for better evaluation of the data submitted from the continuous chlorine monitor. A recent review of results reported by other facilities with a continuous chlorine monitoring requirement indicate that reporting this data via weekly charts alone does not provide enough detail to fully evaluate the continuous monitoring data. (These facilities include: Greenfield, Haverhill, Westfield and Plymouth). Consequently, in addition to submission of weekly charts, we have included in the final permit additional reporting requirements related to the data collected by the continuous monitor. These include the following: monthly maximum daily value, monthly average value, monthly maximum instantaneous value, and duration of time that recorded values were in excess of the permit limits.

PART E.

Comments were received from the Massachusetts Department of Environmental Protection (MassDEP) in a letter dated May 9, 2007. Because the permit is jointly issued by MassDEP and EPA, MassDEP limited its comments to the nitrogen limit which is a federal requirement only.

Comment #E1: The effluent limit for nitrogen in the draft permit is expressed as milligrams per liter. However, EPA permitting requirements at 40 CFR 122.45(f)(1) state that "All pollutants limited in permits shall have limitations, standards or prohibitions expressed in terms of mass."[2] The expressed results needed to reduce impairments to Narragansett Bay are a reduction in mass loading. While no Total Maximum Daily Load (TMDL) has been calculated to ascertain how to allocate load reductions, it is important to note that in the case of Long Island Sound, a TMDL has been completed for nitrogen that calls for a reduction in mass loading of nitrogen. In this case the discharge permits issued by Connecticut correctly contain only mass limits. Finally, mass limits for nitrogen in the UBWPAD discharge permit would give the facility the needed flexibility to manage the treatment plant while attaining strict effluent requirements and would encourage the facility to reduce its discharge volume, a notable goal unto itself. Consequently we believe that EPA should express any nitrogen limit in terms of a mass only limit.

Response #E1: An exception to 40 CFR 122.45(f)(1) applies when applicable standards and limitations are expressed in terms of other units of measurements (*see* 40 CFR 122.45(f)(1)(ii)). In this instance, we believe expression of limits on total nitrogen as concentration limits is necessary to meet Rhode Island's water quality standards. A key report underlying the proposed permit limits is the December 2004 report, *Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, completed by RIDEM. The report documents that the Seekonk River is the most nutrient impacted area of Narragansett Bay: current total nitrogen loads to the Seekonk River are 24 times higher than the total nitrogen load to all of Narragansett Bay on a per unit area basis. If the concentration limitations recommended by the report were used to establish mass limits using the design flows of the waste water treatment facilities, the Seekonk River would receive nitrogen loads of approximately 10 times higher than the Bay-wide loads per unit area. With the limitations established as concentration limits, at current flows the Seekonk River would receive nitrogen loads of approximately 6.5 times higher than the Bay wide load. *See, e.g.,* Evaluation of Nitrogen Target and WWTF Load Reductions for the Providence and Seekonk Rivers, RIDEM, December 2004 at 28. Based on the MERL tank experiments, a nitrogen loading of between 2 times and 4 times the Bay wide loading may be necessary to achieve water quality standards. We have established UBWPAD's limit at 5.0 mg/l in light of uncertainties in the physical model. As indicated in the Fact Sheet and in Response #F6, EPA believes that the limit cannot be any less stringent than 5.0 mg/l under all flow conditions and ensure that water quality standards will be met. Concentration based total nitrogen limits have also been

[2] There are exceptions but they do not apply in this instance.

established in permits for other municipal treatment facilities in Massachusetts and Rhode Island that discharge to Narragansett Bay in order to achieve a nitrogen loading of approximately 6.5 times the Bay-wide loading. Further, at least in the short term, all these facilities will be discharging at flows approximating current flows, not design flows.[3] Setting the limits in terms of concentration will enable assessment of the response to a loading of 6.5 times the Bay-wide loading. Finally, we note that MassDEP did not raise this issue in the context of other recently issued permits containing nitrogen limits expressed as concentration limits, including Attleboro and North Attleboro.

Comment #E2: The Draft permit contains limits for nitrogen and phosphorus that the UBWPAD facility cannot currently attain and therefore a schedule for the facility to come into compliance with those limits is necessary. The nitrogen effluent limit is meant to address impairments for Rhode Island waters and we understand that the Rhode Island Water Quality Standards for surface waters do not allow for compliance schedules to be included in a discharge permit. However, the phosphorus effluent limit addresses impairments to waters within Massachusetts and the Massachusetts Water Quality Standards for surface waters do allow for compliance schedules to be included in discharge permits. Therefore we suggest that a schedule for compliance with the phosphorus limit be incorporated into the final permit. From an engineering and economic standpoint it only makes sense that when a compliance schedule for the nitrogen limit is established, the schedule should be consistent with the schedule outlined below that we are proposing for compliance with the phosphorus limit and we encourage EPA to follow this approach.

Below is MassDEP's suggested schedule for UBWPAD to attain the phosphorus effluent limits:

1. August 2009- Complete construction of ongoing upgrade
2. January 2011- initiate engineering evaluation of necessary upgrades to meet phosphorus effluent limit.
3. January 2012- complete engineering evaluation of necessary upgrades to meet phosphorus effluent limit.
4. January 2013- complete design of necessary upgrades to meet phosphorus effluent limit.
5. July 2013- initiate construction of necessary upgrades to meet phosphorus effluent limit.
6. December 2014- complete construction necessary upgrades to meet phosphorus effluent limit.
7. May 2015- obtain operational level to meet phosphorus effluent limit.

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[3] Recent annual average flows from the UBWPAD facility have been as follows: 34 mgd in 2002; 41 mgd in 2003; 36 mgd in 2004; 43 mgd in 2005; 35 mgd in 2006; and 30 mgd in 2007. While the flows demonstrate some variation, due at least in part to inflow/infiltration, flows are well below the permitted design flow and there is no upward trend.

Response #E2: Compliance schedules to meet water quality based effluent limits may be included in permits only when the state's water quality standards clearly authorize such schedules and where the limits are established to meet a water quality standard that is either newly adopted, revised or interpreted after July 1, 1977. As noted in the Fact Sheet supporting the draft permit, EPA recognizes that it is unlikely that UBWPAD will be able to comply immediately with the water quality based effluent limits proposed for total nitrogen and phosphorus. With regard to nitrogen, the limits on total nitrogen are necessary to ensure compliance with the Rhode Island Water Quality Standards, not Massachusetts Water Quality Standards. Rhode Island has not included provisions in its Water Quality Regulations for surface waters allowing for schedules in permits. Rhode Island's practice is to incorporate any appropriate schedules in an Administrative Compliance Order or a Consent Agreement. While Massachusetts Water Quality Standards do allow schedules in permits, the decision of whether to include a compliance schedule is discretionary. *See* 314 CMR 4.03(1)(b)(indicating that a "permit may, when appropriate, specify a schedule leading to compliance…").[4] Thus, even if only Massachusetts standards were applicable, the standards do not mandate that a schedule be included in the permit itself. In this matter, there are many overlapping issues related to the planning, design and construction of facilities to meet the limits for phosphorus and nitrogen. Indeed, as MassDEP notes in its comment, the schedules for nitrogen and phosphorus should be consistent from an engineering and economic standpoint. Compliance issues should be handled comprehensively based on the best information when more is known about such issues as modes of compliance and costs. In light of these overlapping issues and the fact that Rhode Island standards do not include provisions allowing for schedules, EPA intends to issue a compliance schedule to meet both the phosphorus and nitrogen limits in a separate administrative order.

There are many factors to be considered in establishing a schedule and these will be fully evaluated prior to establishing a schedule in an administrative order. Several commenters have noted the importance of ensuring compliance expeditiously (*see* Comment #A2 above). As stated in Response #A2, it is our intent to establish a compliance schedule that is reasonable in light of the necessary treatment upgrades but that, consistent with our regulations, also ensures compliance with the permit limits as soon as possible. It is also our intent to ensure that the UBWPAD achieves compliance with its total nitrogen limit in a similar time frame as the Rhode Island facilities achieve compliance with their nitrogen limits in order to facilitate the process of assessing the water quality response in Upper Narragansett Bay.

Comment #E3: Finally, MassDEP is concerned that the effluent limits for phosphorus and nitrogen were established without the benefit of scientific guidance provided by TMDLs and the water quality goals they establish. So as to avoid a large capital expenditure without the benefit of a TMDL, MassDEP is committed to completing a

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[4] The Mass. Standards referenced above are those adopted in 2007. By letter dated September 19, 2007, EPA approved certain modifications to the Mass. Standards, including modifications to the cited provision related to compliance schedules. Like the 1996 version of the Standards, however, the 2007 version provides that incorporation of schedules into permits is discretionary.

TMDL for phosphorus for the Blackstone River prior to the start of construction in the above schedule. We expect that EPA will require Rhode Island to similarly complete a nitrogen TMDL for Narragansett Bay.

Response #E3: The Clean Water Act requires states to complete TMDL analyses for receiving waters listed on the 303(d) list. We do not agree, however, with the suggestion that the establishment of water quality-based nutrient limits in this permit is dependent on completion of TMDLs. While water quality-based effluent limitations in NPDES permits must be "consistent with the assumptions and requirements of any *available* wasteload allocation," (emphasis added) 40 CFR §122.44(d)(1)(vii)(B), an approved TMDL is not a precondition to the issuance of an NPDES permit for discharges to an impaired segment nor is it a precondition for compliance with limits established in the permit. Where a TMDL does not exist, EPA cannot abdicate its responsibility to establish effluent limits necessary to achieve water quality standards and protect existing and designated uses of the receiving water. *See* 40 CFR 122.4(d) and 40 CFR 122.44(d)(1)(i). Until development and approval of TMDLs, EPA will base effluent limits for nutrients on its interpretation of the narrative nutrient criteria in approved water quality standards.

This interpretation is consistent with the preamble to 40 C.F.R. § 122.44(d)(1), which expressly outlines the relationship between subsections 122.44(d)(1)(vi) (*i.e.*, procedures for implementing narrative criteria), and (d)(1)(vii):

> The final point about paragraph (vi) is that in the majority of cases where paragraph (vi) applies waste load allocations and total maximum daily loads will not be available for the pollutant of concern. Nonetheless, any effluent limit derived under paragraph (vi) must satisfy the requirements of paragraph (vii). Paragraph (vii) requires that all water quality-based effluent limitations comply with "appropriate water quality standards," and be consistent with "available" waste load allocations. Thus for the purposes of complying with paragraph (vii), where a wasteload allocation is unavailable, effluent limits derived under paragraph (vi) must comply with narrative water quality criteria and other applicable water quality standards.

See 54 Fed. Reg. 23,868, 23,876 (June 2, 1989). If a TMDL is completed and approved by EPA, the effluent limitation in any subsequently issued NPDES permit must be consistent with the wasteload allocation assigned to the UBWPAD facility. In the meantime, relevant regulations *require* that EPA include an effluent limit for any pollutants which EPA determines "are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." 40 C.F.R. § 122.44(d)(1)(i).

It is also important to note that phosphorus TMDLs are very difficult to develop and often take much longer than anticipated. For example, the recently completed draft

Nashua River phosphorus TMDL was more than five years overdue, and there are still many issues to be addressed before it can be approved by EPA. Simulating the fate and transport of phosphorus in river systems is very complex, due to the variety of types of aquatic plants utilizing and then releasing phosphorus after the plants die and decay. Likewise, a nitrogen TMDL for Narragansett Bay has proven to be very difficult to develop, as demonstrated by the extensive resources expended to date and the documented complexities of the Upper Narragansett Bay system. See, e.g., *Evaluation of Nitrogen Target and WWTF Load Reduction for the Providence and Seekonk Rivers,* RIDEM, December 2004 at page 1. *See also Plan for Managing Nutrient Loadings to Rhode Island Waters* (RI-DEM, February 1, 2005) at 3. As described in the RIDEM 2004 Evaluation, "It has recently been determined that due to problems encountered when modeling the interaction between deep channel and shallow flanks of these water bodies, the mass transport component of the system cannot be successfully calibrated and validated. This problem has been encountered in other estuaries and has not been resolved with state of the art numerical solution techniques. Because water doesn't mix in the model as it does in the rivers, we are unable to simulate the chemical and biological behavior of the system in the water quality phase of the modeling effort."

While well-developed TMDLs for the Blackstone River and Narragansett Bay may be very useful in determining what, if any further reductions of phosphorus and nitrogen may be necessary, the Clean Water Act does not allow delay until completion of a TMDL. This is particularly important given the extensive and documented adverse impacts of cultural eutrophication in the Blackstone River and in Upper Narragansett Bay. *See also* Response #A8, and Response #F5, #F6 and #F9 below.[5] In the time that RIDEM has been attempting to develop a dynamic model, for instance, the Seekonk/Providence River system and waters downstream have continued to suffer from the effects of severe cultural eutrophication, including occasional fish kills. *See* www.dem.ri.gov/bart/fishkill.htm. The approach proposed by the commenter – to await the conclusion of complex TMDLs that may take years to complete – would forestall water quality improvements and would be inconsistent with EPA's regulatory obligations. *See also* Response #F47(a)(3)(i)-(iii).

PART F.

Comments were received from the Upper Blackstone River Water Pollution Abatement District in a letter dated May 24, 2007. The letter includes two attachments: Attachment A (Technical Issues/Comments) prepared by CDM and Attachment B (Legal and Policy Issues/Comments) prepared by counsel. The comments are repeated here in their entirety.

Comments raised in UBWPAD's cover letter dated May 24, 2007 are addressed below.

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[5] EPA's response to the comments above are applicable to comments raised by participants at the public hearing urging delay pending TMDLs or further scientific study.

Comment #F1: The Upper Blackstone facility treats waste water from Worcester and eight surrounding communities. The District and its members do not question the intent or the noble goal of restoring the Blackstone River to a place where we can safely swim and fish. We embrace it. We want a clean Blackstone River and a healthy Narragansett Bay. But we want to achieve these conditions using common sense with careful planning, guided by proven science and based on sustainable and cost-effective engineering. To that end, we are sponsoring development of an advanced model of the Blackstone River that will be capable of broad use in evaluating the condition of the River and in assessing management options. Through development of the model we are also supporting work by the U.S. Army Corps of Engineers to preserve and develop habitat along the River, as well as River assessments being completed by U.S. Geological Survey and DEP. We want the benefits of our investments to justify the costs that will burden our rate payers (not the federal or state governments that impose these mandates).

Response #F1: While we recognize the investment made by UBWPAD in water quality modeling, permit issuance cannot await conclusion of these modeling efforts. Where EPA determines that a discharge of a pollutant causes or contributes to an excursion above any State water quality standard, including State narrative criteria for water quality, EPA must include an effluent limitation in the permit for that pollutant. *See also* Response #E3, Response #F6 and Response #F47(a)(3)(i)-(iii) (relative to arguments that this permit await the completion of TMDLs or other studies). If the results of UBWPAD's efforts yields information indicating that any final effluent limit is more or less stringent than necessary to attain water quality standards, a permit modification can be pursued. *See* 40 CFR §122.62. *See also* Response #F43 for additional discussion of the timing of this permit issuance and UBWPAD's modeling efforts.

We recognize that improvements to meet the new limits will increase costs. Cost considerations or technological feasibility, however, are not permissible factors in **setting** water quality based effluent limits. *United States Steel Corp. v. Train*, 556 F. 2d 822, 838 (7th Cir. 1977); *see also In re City of Moscow*, 10 E.A.D. 135, 168 (EAB 2001). Such factors can be taken into account, however, in establishing a compliance schedule. In addition, under certain circumstances, permittees can conduct an analysis of affordability issues for the purposes of determining whether a designated use cannot be obtained or for obtaining a variance. In determining affordability for such an analysis, EPA uses *Interim Economic Guidance for Water Quality Standards*, EPA-823-B-95-002 (March 1995). *See also* Massachusetts Surface Water Quality Standards, 314 CMR 4.03(4); Rhode Island Water Quality Regulations, Rules 19 and 20; 40 CFR §131.10(g). *See also* Response #A9 and Response #F2 and #F4 below for more discussion on the affordability evaluation.

The need for and benefits of the nutrient limits are detailed below. *See, e.g*, Responses #F5, #F6, #F9, #F18, #F51.

Comment #F2: The District believes that the draft discharge permit is not supported by current science, and it is not justified for several reasons. It is an expensive order that fails to consider $180 million in ongoing capital improvements at the District, and as

such imposes an unfair burden on District ratepayers, many of them members of Environmental Justice populations. Without evidence, it will require costly treatment changes that are not environmentally sustainable.

Response #F2: There is an extensive amount of science documenting the need for the permit limits as outlined in the Fact Sheet and detailed throughout this Response to Comments. Further, the upgrades currently being undertaken to meet the limits in the expired permit will be unable to achieve limits that are necessary to ensure attainment of water quality standards. *See* Response #F5. As noted above in Response #F1, EPA can take cost into consideration in establishing a compliance schedule and applicable regulations include a process to evaluate whether, under certain circumstances, relief from requirements to meet water quality standards may be available. While upgrades necessary to meet the new limits will result in increased costs, UBWPAD has not provided the basis for its cost estimates (which vary in its oral and written comments from $100 to $200 million). It is premature to evaluate costs until UBWPAD has had the opportunity to evaluate alternative treatment technologies to meet the limits. In establishing a schedule to meet the new permit limits, EPA will include a reasonable amount of time for UBWPAD to conduct facilities planning including an alternatives evaluation. When UBWPAD has a better understanding of the most cost effective treatment options, we can work with UBWPAD to evaluate the associated economic impacts and the availability of any relief from meeting permit limits. Such an evaluation includes consideration of the timing of design and construction, how the project will be funded, and the resulting impact on ratepayers.

We are aware of Environmental Justice populations within the UBWPAD sewer area. In addition, we note that for these communities and the significant Environmental Justice populations downstream from the UBWPAD discharge,[6] the use and enjoyment of waters has been adversely affected by the associated water quality degradation. While we are mindful of cost impacts to communities in the UBWPAD sewer area, we also are mindful that the Environmental Justice populations in these communities are affected by water quality degradation to the point that designated uses such as swimming and fishing have been impaired.

Comment #F3: The permit imposes legal and administrative burdens on the District for management of member sewers through the co-permittee process that are not allowed in our enabling legislation and that the District has no authority to accept.

Response #F3: The co-permittee language makes the co-permittees directly responsible for controlling flow and maintaining their own sewer systems. *See also* Response #F45.

Comment #F4: The District is financed by each of our member communities based on use, with Worcester paying nearly 90 percent of our costs. For the City of Worcester, the current $180 million upgrade has increased treatment costs more than 300 percent in four

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[6] See GIS map dated October 24, 2007 depicting Environmental Justice populations among the communities that discharge to UBWPAD and among communities downstream of the discharge.

years - and more cost increases will come to finance remaining construction. As a result, the city's sewer rates have more than doubled in four years. Median household income in Worcester is $37,000, 35% below the state's median. To impose further costly requirements on Worcester and our other member communities without justification is simply wrong.

Response #F4: *See* Response #A9, #F1 and #F2 as to the role of cost in the process of establishing water quality-based effluent limitations.

We understand that rates have increased and the importance of this issue to residents and public officials in Worcester and the UBWPAD service area. One of the reasons that Worcester residents have experienced recent increases is that they have been paying below average rates for many years. The UBWPAD facility went on line in 1976. The first major upgrades ever undertaken are those currently ongoing, and one of the main objectives was to bring the aging facility up to standards. In 2006, the consulting firm, Tighe & Bond, compiled statewide annual sewer use rates for a typical household. The sewer use rate for the typical household in Worcester was $338 while the statewide average was $485. The water quality of the Blackstone River is clearly not attaining water quality standards, in part due to the UBWPAD discharge. Again, if UBWPAD believes the added costs of treatment necessary to meet the new limits will be unaffordable under EPA's guidelines, the appropriate course is to pursue such a demonstration.

Finally, it is worth noting that other communities are also required to reduce nutrients to address the downstream water quality impairments. *See* Comment #A9. The predominant sources of the nutrient loading in the Providence and Seekonk Rivers are municipal wastewater treatment facilities in Rhode Island and Massachusetts. The State of Rhode Island has recently reissued several Rhode Island Pollutant Discharge Elimination System (RIPDES) permits for POTWs which discharge to the Providence and Seekonk Rivers. These permits include limitations on the discharge of total nitrogen in order to address the cultural eutrophication in these waters and Narragansett Bay. There are several municipal POTWs in Massachusetts, including UBWPAD, which discharge nitrogen into tributaries of the Seekonk and Providence Rivers. To date, EPA has issued final permits with nitrogen and phosphorus limits to North Attleborough and Attleboro, Massachusetts. *See* Response #F47(b)(iv) for additional detail on these other permits.

Comment #F5: In 2001, the District and EPA negotiated a discharge limit for phosphorus (P) of 0.75 milligrams per liter (mg/L) in summer; with no limit on total nitrogen (TN). EPA based these limits on its river model, even though its own Science Advisory Board recommended against doing so. This model remains EPA's only scientific basis for effluent limits on the river today. EPA determined then that these were the limits needed to improve conditions in the Blackstone and to benefit Narragansett Bay (40 miles away). The current proposal lowers the P limit to 0.1 mg/L in summer and to 1.0 mg/L in winter; and TN is set at 5 mg/L in summer. Our new facilities will achieve less than 0.75 mg/L P and less than 8.0 mg/L TN year-round. We

will be approaching the 40-50% summer TN reduction legislated by the Rhode Island Governor's Special Committee by 2009. We note that this goal was set without benefit of having set numerical water quality standards, or completion of a Total Maximum Daily Load (TMDL) assessment as required in EPA regulations.

Response #F5: In the draft 2001 permit, EPA established a phosphorus limit of 0.75 mg/l based on a waste load allocation for achieving minimum dissolved oxygen criteria [*Blackstone River Watershed Dissolved Oxygen Waste Load Allocation for Massachusetts and Rhode Island* (November 1997)]. A final permit was subsequently issued with the 0.75 mg/l phosphorus limit. The District appealed the permit and a settlement of the appeal was negotiated that left the phosphorus limit unchanged.

It is well documented in the 1997 Dissolved Oxygen Waste Load Allocation, the 1999 Response to Comments for the expired permit, and in the Fact Sheet for the current draft permit that the 0.75 mg/l total phosphorus limit was based on meeting dissolved oxygen criteria in the Blackstone River only and did not address eutrophication related impairments in either the Blackstone River or Narragansett Bay. In its response to UBWPAD's comments on the expired permit, EPA cautioned that future permit limits might include more stringent phosphorus limits if warranted by eutrophication impacts. As documented in the Fact Sheet for the current permit, the 0.75 mg/l limit does not ensure that eutrophication related criteria will be met in the Blackstone River and the addition of a total nitrogen limit is necessary to control eutrophication in Narragansett Bay. With regard to nitrogen, the 1998 Fact Sheet for the expired permit noted that the Blackstone River Initiative and the Narragansett Bay studies have shown that dry weather loadings of nitrogen to Narragansett Bay are significant and may be contributing to excessive productivity and DO concerns in the Bay. The Fact Sheet for the expired permit further stated that total nitrogen limits might be recommended in future permits and urged UBWPAD to consider denitrification capability at its treatment plant during future facility planning efforts.

The admonitions regarding more stringent nutrient limits in the administrative record for the expired permit reflect EPA's growing awareness of nutrient-related issues and commitment to resolve those issues. Nutrients (nitrogen and phosphorus) are one of the leading causes of water quality impairment in our Nation's rivers, lakes and estuaries. Virtually every State and Territory is impacted by nutrient-related degradation of our waterways. Massachusetts has listed Clean Water Act Section 303(d) nutrient-related impairments for numerous water bodies. Over the last nine years, EPA has taken a number of steps to provide leadership and to work in partnership with states, territories and authorized tribes to address nutrient impairments. EPA issued a National Strategy for Development of Nutrient Criteria in June 1998, and followed with a November 2001 national action plan for the development and establishment of numeric nutrient criteria. EPA published technical guidance for developing criteria for lakes and reservoirs in May 2000, rivers and streams in June 2000, and estuaries and coastal waters in October 2001. EPA also published recommended nutrient criteria for most streams and lakes in 2001.

In the facility planning conducted for the current upgrade, UBWPAD considered the possibility of more stringent effluent limits for nutrients than required by the expired permit. We understand that UBWPAD has designed treatment consistent with achieving total nitrogen levels of 8 to 10 mg/l and consistent with treatment that would be necessary to achieve a total phosphorus level of 0.2 mg/l. While UBWPAD may achieve even better performance, the current design will not be able to achieve the 0.1 mg/l limit for total phosphorus or the 5 mg/l limit for total nitrogen.

The scientific basis for the nutrient limits in the new permit is documented in the Fact Sheet and in this response to comments. The permit limits are not based on the 1997 Dissolved Oxygen Waste Load Allocation or on Rhode Island legislation requiring reduction in nitrogen loading at point sources in that State [R.I. Gen. Laws § 46-12-2]. *See also* Response #F43 below.

In addition, we disagree with the suggestions in the comment that numeric water quality criteria and a TMDL are necessary in order for EPA to establish water quality-based effluent limits. *See also* Responses #A3 and #E3.

Finally, we disagree with UBWPAD's characterization of the comments made by EPA's Science Advisory Board ("SAB") regarding the dissolved oxygen model developed in conjunction with the Blackstone River Initiative. To promote interstate assessment and cleanup of the Blackstone River, EPA established the Blackstone River Initiative (BRI) in 1991. The BRI included an intensive environmental sampling and assessment program to describe interstate water quality, biology and toxicity in the river system under both dry and wet weather conditions, and to develop a wasteload allocation model and a toxics model to predict impacts of contaminant loadings to the system. It is one of several sources of data documenting the severe eutrophication in the Blackstone River and the significance of the nitrogen loadings to Narragansett Bay from the Blackstone River. The University of Rhode Island, MassDEP, and RIDEM all participated. The Region requested that the SAB review the results of the BRI. In no way did the SAB recommend that the use of the dissolved oxygen model be restricted in establishing effluent limits in NPDES permits. To the contrary, the SAB noted that the model was specifically suited for modeling BOD/DO in rivers and streams. The SAB did recommend some additional calibration to "fine tune" the model so that it could be used with more confidence under flow conditions other than dry weather. In addition, EPA and the other participants developed a response to the SAB's report, which fully addressed all points (including those related to the dissolved oxygen model) and was posted on the SAB website. [Letter dated February 4, 1999 from John P. DeVillars, Regional Administrator to Drs. Joan M. Daisey and Dr. Mark A. Harwell.] In any event, UBWPAD's comment is irrelevant to establishment of nutrient limits in this permit; as detailed above, EPA did not use the 1997 Dissolved Oxygen model as the basis for the phosphorus or nitrogen limits in the current permit.

Comment #F6: There is no defensible evidence that the proposed TN limits will improve the water quality in the Blackstone River or Narragansett Bay. DEP, the Narragansett Bay Commission and other Rhode Island dischargers all have challenged

the science of the new nitrogen limit. In its comments on analysis conducted by Rhode Island Department of Environmental Management, DEP said that the limits were based on incomplete science at best and that it was more appropriate for the District to complete its ongoing upgrades and analyze what needs to be done next. In addition, DEP is undertaking studies with USGS of sediment transport in the Blackstone River to assess nitrogen attenuation and DEP is also studying the cost of TN compliance to better understand the financial impact of plant upgrades.

While we know some of potential negative impacts, we don't know what the benefits will be from the new limits. The District believes that our ratepayers, many of them members of Environmental Justice populations – should know if another $200 million to improve sewers and build the plant, plus an additional $3.7 million to operate it annually will provide a commensurate or discernable benefit.

Response #F6: The need for nitrogen limits is based on an extensive amount of water quality/use impairment data and scientific knowledge regarding the environmental impacts of excessive nitrogen loadings on the receiving waters. For many years, it has been recognized that Rhode Island and Massachusetts municipal wastewater treatment facilities are a significant source of nutrients to the Seekonk River, Providence River and Upper Narragansett Bay. Excessive nitrogen loadings are significantly impairing water quality criteria and uses in Narragansett Bay. Impairments include low dissolved oxygen, which is so severe that it causes occasional fish kills, and dramatic loss of eel grass (which provides important spawning, nursery, foraging and refuge habitat for many fish and invertebrate species, including commercially important species). The *Governor's Narragansett Bay and Watershed Planning Commission, Nutrient and Bacteria Pollution Panel, Initial Report* (March 3, 2004) summarizes and references many of the studies and reports that have evaluated these impacts and loadings to the Bay.

The Blackstone River discharges directly into the upper part of the Seekonk River, which is the most severely impaired section of Narragansett Bay. On a per unit area basis, current total nitrogen loads to the Seekonk River are 24 times higher than the nitrogen load to Narragansett Bay as a whole**.** The predominant sources of the nitrogen loading are municipal wastewater treatment facilities in Rhode Island and Massachusetts. As reflected in the Blackstone River Initiative and RIDEM's 2004 study (*Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, RIDEM, December 2004), the UBWPAD is the dominant source of nitrogen loading to the Blackstone River. The UBWPAD facility represents approximately 70% of the municipal wastewater flow to the Blackstone River.

The nitrogen limit in this permit is based upon an application of the requirements of the federal Clean Water Act and has been imposed to meet Rhode Island's water quality standards. The Act and EPA's regulations require EPA to condition any permit to ensure compliance with applicable water quality standards of the state where the discharge originates *and* any downstream affected state. Rhode Island, like most states, has not yet developed statewide numeric total nitrogen criteria or numeric response variable criteria, nor has Rhode Island developed site-specific numeric criteria for total nitrogen or response variable for Narragansett Bay. Until such numeric criteria values are available,

EPA must base effluent limits on its interpretation of the narrative criteria in the currently approved water quality standards. *See* Rhode Island Water Quality Regulations, Rule 8(D)(1)(d) and Table 2, Rule 8(D)(3)(10). Water quality-based effluent limits imposed through NPDES permits must ensure that all components of water quality standards are achieved. *See* CWA 301(b)(1)(C); 40 C.F.R. §§ 122.4(d), 122.44(d)(1).

When imposing an effluent limit on a particular point source in order to implement a narrative water quality criterion, EPA is not required to have a TMDL, a dynamic water quality model, or comparable analysis that comprehensively allocates loads to all point and nonpoint pollutant sources that are contributing to an impairment. Instead, when calculating a numeric permit limit to achieve a narrative criterion, EPA's regulations direct the Agency (in relevant part) to use one or more of the following methodologies:

> (A) Establish effluent limits using a calculated numeric water quality criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and will fully protect the designated use. Such a criterion may be derived using a proposed State criterion, or an explicit State policy or regulation interpreting its narrative water quality criterion, supplemented with other relevant information which may include: EPA's Water Quality Standards Handbook, October 1983, risk assessment data, exposure data, information about the pollutant from the Food and Drug Administration, and current EPA criteria documents; or
> (B) Establish effluent limits on a case-by-case basis, using EPA's water quality criteria, published under section 304(a) of the CWA, supplemented where necessary by other relevant information[.]

40 C.F.R. §§ 122.44(d)(1)(vi)(A), (B). EPA is clearly authorized, even in technically and scientifically complex cases, to base its permitting decision on a wide range of relevant material, including EPA technical guidance, state laws and policies applicable to the narrative water quality criterion, and site-specific studies. Nothing in the foregoing regulation, or its preamble, suggests that EPA is required to await the completion of approved TMDLs or dynamic water quality models as predicates to imposing a water quality-based effluent limit.[7]

In the absence of a dynamic model or TMDL, EPA relied on the best information reasonably available to it to establish the permit limit for nitrogen. The agency considered more than 15 years of water quality data, studies and reports evaluating nitrogen levels and response variables in Narragansett Bay. These materials included

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[7] In keeping with the regulation, EPA does not believe that any one source of information should necessarily be given definitive weight, nor does it believe that the absence of a particular information source should necessarily preclude EPA from establishing an effluent limit. The approach of utilizing available guidance and materials generated by the EPA and States, as supplemented by other information reasonably available at the time of permit reissuance, makes sense in light of federal regulations requiring EPA to include requirements that will achieve state water quality standards when reissuing a permit and prohibiting issuance of a permit when the imposition of conditions cannot ensure compliance with the applicable state water quality requirements of all affected States. *See* 40 C.F.R. §§ 122.4(d), 122.44(d)(1).

EPA's *Nutrient Criteria Technical Guidance Manual: Estuarine and Coastal Marine Waters* (EPA, October 2001) and a variety of site-specific reports commissioned by Rhode Island to address nitrogen loading and control the effects of cultural eutrophication in the receiving waters. *See, e.g., Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers* (December 2004); *Plan for Managing Nutrient Loadings to Rhode Island Waters* (RI-DEM, February 1, 2005); *Nutrient and Bacteria Pollution Panel – Initial Report* (Governor's Narragansett Bay and Watershed Planning Commission, March 3, 2004); and *Massachusetts Estuaries Project – Site-Specific Nitrogen Thresholds for Southeastern Massachusetts Embayments: Critical Indicators*, July 21, 2003 as revised).

In addition, EPA relied on the results of a physical water quality model operated by the Marine Ecosystems Research Laboratory (MERL) at the University of Rhode Island that was designed to predict the relationship between nitrogen loading and several trophic response variables in the Narragansett Bay system.[8] In establishing the nitrogen limit in this permit and evaluating the MERL model, EPA also considered actual measurements of nitrogen loadings from point source discharges, including a 1995-96 study by RIDEM Water Resources. The basic relationship demonstrated by the MERL tank experiments between the primary causal and response variables relative to eutrophication corresponds to what is actually occurring in the Providence/Seekonk River system. Both the MERL tank experiments and the data from the Providence/Seekonk River system indicate a clear correlation between nitrogen loadings, dissolved oxygen impairment and chlorophyll *a* levels. *See* Response #F18A for additional detail on EPA's use of the MERL experiments and water quality data in establishing the nitrogen limits in the permit.

The CWA requires EPA to establish water quality-based effluent limits that ensure that standards are met. The limits in this permit are based on the available science, which in this case is quite extensive. EPA cannot avoid its responsibility to establish water quality-based limits simply because further studies are underway, especially since there is no reasonable likelihood that a less stringent limit will meet standards. In making its decision to move forward with nitrogen limits at this time, EPA also considered the need to expeditiously address the severe existing nitrogen-driven cultural eutrophication in the receiving waters. In the time that RIDEM has been attempting to develop a dynamic model, the Seekonk/Providence River system and waters downstream have continued to

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[8] EPA's guidance document Nutrient Criteria Technical Guidance Manual, Estuarine and Coastal Marine Waters cites the MERL experiments as compelling evidence that nitrogen criteria are necessary to control enrichment of estuaries. Specifically, the guidance states: "Three case studies provide some of the strongest evidence available that water quality managers should focus on N for criteria development and environmental control (see NRC 2000 for details). One study involves work in large mesocosms by the University of Rhode Island (Marine Ecosystem Research Laboratory–MERL) on the shore of Narragansett Bay. Experiments showed that P addition was not stimulatory, but N or N+P caused large increases in the rate of net primary production and phytoplankton standing crops. (Oviatt et al. 1995)." RIDEM has also embraced the model as a basis to impose permit limits on Rhode Island facilities to control the effects of cultural eutrophication.

suffer from the effects of severe cultural eutrophication. These adverse affects have included fish kills (see www.dem.ri.gov/bart/fishkill.htm).

Moreover, the tendency for nitrogen to not only exacerbate existing water quality impairments but to persist in the environment in a way that contributes to future water quality problems counsels in favor of imposing a nitrogen limit on UBWPAD's discharge based on information currently available to EPA. EPA also notes that the permit was last issued to the facility in 2001, has expired, and has been administratively continued for several years.

The ongoing upgrades at the UBWPAD are designed to achieve total nitrogen levels of approximately 8.0 - 10.0 mg/l. While actual performance might result in lower levels, the upgrade will not achieve 5.0 mg/l and, therefore, will not ensure water quality standards will be met. While we welcome further analyses of sediment transport in the Blackstone River, the current evidence indicates that attenuation of nitrogen in the Blackstone River is small and further reductions in phosphorus-driven eutrophication levels in the Blackstone are likely to result in even lower nitrogen attenuation rates in the future. *See also* Response #F17 below.

The loading reduction targeted in the RIDEM December 2004 report represents a significant reduction and reflects an appropriate and reasonable determination of water quality-based limits necessary to achieve water quality standards. The reductions required at the UBWPAD facility through this permit in conjunction with reductions at other facilities will have substantial environmental benefits, including significant reductions in algal growth and associated dissolved oxygen impairments. The reductions and anticipated improvements are necessary to address the ongoing severe impairments to the marine fish community and to restore the recreational use of Narragansett Bay.

In establishing the nitrogen limit in the permit, EPA took into account uncertainties in extrapolating the physical model to a complex, natural setting such as Upper Narragansett Bay. *See* Response #F18A for additional detail on this issue. The uncertainties in extrapolating the physical model may ultimately mean that additional nitrogen reductions are needed, but there is no realistic likelihood that water quality standards could be met with a less stringent nitrogen limit than 5.0 mg/l. With the limitations established as a concentration limit of 5.0 mg/l, at current flows, the Seekonk River would receive nitrogen loads of approximately 6.5 times higher than the Bay-wide load. In the event future permit issuances result in an even lower nitrogen limit, the technologies to reduce beyond 5 mg/l can be added to the facilities installed to meet the requirements in this permit. We encourage UBWPAD to evaluate compatibility of add-on technologies in selecting the treatment necessary to achieve the 5 mg/l limit.

With regard to the proceedings related to RIDEM's issuance of permits to facilities in Rhode Island, RIDEM prepared a response to significant comments as part of the referenced permitting proceedings. In addition, the appeals in NBC Fields Point, NBC Bucklin Point and East Providence have all been resolved with final permits including the proposed nitrogen limits – 5.0 mg/l for the NBC facilities and 8.0 mg/l for the East

Providence facility. RIDEM recently resolved the appeal of the Woonsocket permit with an agreement that the facility will meet a nitrogen limit of 3.0 mg/l. *See* Consent Agreement, In re: AAD No. 05-004/WRA dated June 27, 2008.

As to UBWPAD's cost estimates (which range in oral and written comments from $100 to $200 million), EPA has not seen the basis for these estimates and cannot evaluate their validity. Further, implicit in UBWPAD's comment is the notion that, in establishing water quality-based effluent limits, EPA must conduct a cost-benefit analysis and evaluate the costs of treatment against quantified benefits to the receiving water. As noted above, EPA cannot set water quality-based effluent limits based on the cost of treatment. *See* Response #A9. Relief is available where a permittee can demonstrate that costs warrant a variance or modification of the state's water quality standards. In addition, it is EPA's intent to establish a reasonable schedule for UBWPAD to come into compliance with the new nutrient limits. *See* Response #E2.

Comment #F7: The timing of the permit revisions is premature and illogical. Given that the District is scheduled to complete its current upgrade project in two years, it makes sense to operate the new plant for two full seasons beyond the completion date to assess its capabilities. At that time we will know what levels of P and TN the new plant can achieve. Other facilities along the river and around Narragansett Bay are also being upgraded and it makes sense to see how the river fares with all of these upgrades before imposing further mandates. Moreover, by December [2007], the results from a new model of the river developed by University of Massachusetts School of Engineering and the District's environmental consultants, CDM, will be known. The model, together with the results obtained by operating the improved plant, will provide the needed science to guide rational decision making – and complete required TMDLs. It would make sense to continue under the terms of the current permit until we have all had a chance to assess these results.

The District believes that a more common sense approach to establishing discharge limits for the Blackstone River is to complete the new river model; finish the current wastewater treatment improvements; optimize and fine-tune the new facilities; and monitor the results for two years. In 2012 we could review and revise river management decisions as needed based on science, experience and a true cost-benefit analysis. If we find that more stringent effluent limits than the new plant can achieve are needed to make a proven difference in water quality, the District can then undertake reasonable upgrades. We think this common sense cost-effective approach can be accomplished more cooperatively and with equal expedience to the alternative approach of drawn out court battles.

Response #F7: The CWA and EPA's regulations require that permits be issued for fixed periods of time not to exceed five years. 33 U.S.C. §§1342(a)(3) and (b)(1)(B); 40 CFR §122.46(a). EPA revisits all aspects of NPDES permits when the term expires, consistent with the CWA's goal of restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters. The clear intent of the statute is to ensure that permit

requirements are updated on a regular basis rather than left in effect, unexamined and unchanged for long periods of time.

The facilities planning for the current upgrade makes clear that these upgrades will not achieve the new permit limits of 5 mg/l for total nitrogen and 0.1 mg/l for total phosphorus and, therefore, cannot ensure attainment of water quality standards. The UBWPAD is the dominant source of nitrogen to the receiving waters. The UBWPAD is approximately 70 percent of the municipal wastewater flow to the Blackstone River based on its permitted design flow of 56 MGD and a total permitted municipal wastewater flow to the Blackstone River of 80.4 MGD. The loadings data utilized in RIDEM's 2004 study indicate that UBWPAD represented approximately 64% of the nitrogen load discharged to the Blackstone River from municipal wastewater treatment facilities for the period of time considered in the study. After accounting for attenuation, UBWPAD is also the dominant source of nitrogen loadings from the Blackstone River into the Seekonk River. *See* Response #F17. In addition, the Blackstone River discharges into the headwaters of the Seekonk River, where the greatest impairments in the Narragansett Bay Basin have been measured.

As reflected in the Blackstone River Initiative and other reports cited in the Fact Sheet, UBWPAD is also the dominant source of phosphorus loadings to the Blackstone River and the Blackstone River demonstrates substantial phosphorus-driven eutrophication. *See* Response #F9 and #F10 below.

Water quality standards will not be met if UBWPAD does not further reduce discharges of nitrogen and phosphorus beyond treatment planned as part of the current upgrade. *See* UBWPAD Regional Wastewater Treatment Facilities Plan (May 2001). Under these circumstances, the CWA and EPA's regulations mandate that EPA establish water quality-based effluent limitations to control discharges of nutrients. It is not appropriate to adopt a "wait and see" approach following the current upgrades, because there is no reasonable likelihood that water quality standards relative to eutrophication will be achieved with less stringent limits.

UBWPAD's concerns regarding the timing of permit issuance as it relates to the ongoing upgrades are more appropriately addressed through compliance scheduling, rather than through delay of permit issuance. For example, it may be appropriate to allow some period of time to operate the new plant before making a final decision on all aspects of additional treatment facilities to enable UBWPAD and its consultants to determine the most cost-effective technologies for achieving the new limits. (With regard to the specifics of establishing the compliance schedules, *see also* Response #E2 and Response #F21 below).

With reference to UBWPAD's modeling efforts, if the model being developed for the UBWPAD, together with any other relevant evidence, makes it clear that alternative limits will result in attainment of water quality standards, EPA will modify the permit accordingly. In order to be used for development of water quality based effluent phosphorus limits, UBWPAD's model needs to be calibrated and verified to 7Q10 flow

conditions. In addition, use of any model to establish phosphorus limits must also ensure that both Massachusetts' and Rhode Island's relevant water quality standards are met. If the intent is to also simulate the role of non-point sources of phosphorus, the model must be able to not only simulate non-point source phosphorus loadings but also must be able to simulate the fate of the phosphorus in the river system as it is taken up by a variety of aquatic plants and then released as the plants die and undergo the decay process. *See also* Response #F1 and Response #F43 below. As detailed above, phosphorus models and TMDLs can be very difficult to develop. *See* Response #E3.

Relative to nitrogen limits, we note that the model will not simulate Narragansett Bay water quality and thus will not be able to evaluate the full range of nitrogen sources, the responses to the nitrogen sources, or reductions necessary to achieve water quality standards. The model may, however, provide further information on attenuation rates of nitrogen in the Blackstone River. While much is currently known relative to attenuation rates (*see* Response #F17 below), EPA will evaluate any significant new information relative to attenuation to determine if a permit modification is appropriate.

Comment #F8: The facilities currently being built by the District have predictable costs that are based on reliable treatment processes. If new facilities are to be built to achieve the latest proposed limits, the treatment processes will not be as sustainable, using large quantities of chemicals (including an energy source such as methanol) and about 20 percent more electricity. Chemical addition will increase sludge production, and since the inert chemicals in the sludge are more difficult to burn, the District will have to use more fuel for incineration, increasing air emissions, and landfill volume needed to dispose of more ash. We wonder if these negative environmental consequences were fully evaluated in assessing the draft permit limits.

Response #F8: We are supportive of UBWPAD's efforts to plan and design the most environmentally sustainable treatment processes necessary to meet the effluent limits. These considerations, however, come into play in selection of the appropriate treatment technologies – not in setting water quality-based effluent limits. As noted above, cost and technological considerations are not factors in establishment of water quality-based limits. *See* Response #A9.

The improved treatment will result in additional sludge being generated and the most cost-effective and environmentally sustainable method of managing sludge should be carefully considered as part of facilities planning. There are treatment processes that can be pursued that minimize the need for chemical addition and/or minimize the chemicals in the discharge and the sludge. In light of heightened scrutiny on energy costs and advances in engineering designs, we would expect the current and future upgrades to be much more energy efficient than current or previous designs.

We also believe it is important to examine energy efficiency holistically, across a utility's management and operations. *See also* Response #52. Examination of current incineration processes presents one opportunity for improving efficiency and sustainability. Another opportunity for gains in energy efficiency at UBWPAD is

through control of flow volumes to the treatment facility. A large percentage of the total annual flow volume reaching the UBWPAD is the result of storm water and groundwater entering separate sewer pipes and, to a lesser extent, combined sewer flows. UBWPAD estimates that 15 million gallons per day of the total current average flow to the facility of 37 million gallons per day is inflow/infiltration. *See* NPDES Permit Application. The estimated CSO flow to the treatment plant is currently about 3 million gallons per day. *See* CSO Phase II CSO Long-Term Control Plan Report (February 2004). Pumping and treating all of this flow is a very energy-intensive process. A more aggressive infiltration/inflow control program should be an important component of an overall plan to reduce energy consumption. In addition, further sewer separation within Worcester's combined sewer service area may be appropriate to reconsider in light of the energy and chemical use concerns related with pumping and treating peak flows that cannot be treated at the Quinsigamond CSO Facility**.**

EPA is very supportive of efforts to reduce power use and associated costs at wastewater treatment facilities. Energy is the largest expense for many facilities and one of the top three expenses at almost all of them. By working to reduce the amount of energy these facilities use without compromising the quality of treatment, we can help to save public money and protect the environment at the same time. We applaud UBWPAD for participating in a MassDEP pilot to reduce energy use at wastewater treatment facilities. EPA staff assisted in the initial energy benchmarking of the facility through the use of EPA's new ENERGYSTAR® benchmarking tool. We look forward to continuing to support MassDEP and UBWPAD in efforts to save energy and to realize the associated financial and environmental benefits.

Comments raised in Attachment A (Technical Issues/Comments) prepared by CDM on behalf of UBWPAD are addressed below.

Comment #F9: The information cited in the Fact Sheet to create the impression that the proposed permit limits are justified is erroneously applied. The Fact Sheet states:

> The impacts associated with the excessive loading of phosphorus are documented in the following reports: *Blackstone River Initiative Report*, May 2001 (EPA New England); *Blackstone River Basin 1998 Water Quality Assessment Report* (Mass DEP); *Blackstone River Watershed 2003 DWM Water Quality Monitoring Data*, May 2005 (Mass DEP); *Phase I: Water Quality Evaluation and Modeling of the Massachusetts Blackstone River, Draft - March 2004* (US Army Corps of Engineers (http://www.nae.usace.army.mil/projects/ma/blackstone/wqe.htm); and Blackstone River Watershed 2003 Biological Assessment, April 4, 2006 (Mass DEP), as well as in the Massachusetts and Rhode Island 303(d) Lists of Impaired Waters as discussed above.

But, as the EPA well knows, the District is in the process of constructing facilities to comply with the phosphorus limit contained in the 2001 permit, according to a schedule agreed to by the EPA. Thus the "excessive phosphorus levels" alluded to by the EPA that led to the conditions cited in the Fact Sheet are not the conditions that will exist after

the completion of the ongoing construction, but rather reflect the same loadings that compelled the implementation of the 0.75 mg/1 phosphorus limitation. In that respect, it was misleading to suggest that the referenced information compelled the draft limits. Moreover, the cited reports contain no quantitative data on the occurrence of macrophytes and or periphyton. Development of quantitative data with respect to these two metrics is a necessary precursor to the development of programs to reduce their existence to acceptable levels.

Response #F9: EPA is aware of the ongoing upgrade and discusses it in the Fact Sheet. As explained in the Fact Sheet, the limit of 0.75 mg/l in the expired permit was established to address dissolved oxygen criteria only. *See* Response #F5 for a description of the establishment of the limit in the expired permit. The reference to excessive phosphorus loadings is made relative to phosphorus loadings that would be necessary to control cultural eutrophication. As documented in the Fact Sheet for this permit issuance, federal recommended criteria and guidance documents clearly indicate that a limit of 0.75 mg/l would result in instream concentration far in excess of levels that would be necessary to control cultural eutrophication.

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."

This qualitative/quantitative data on macrophytes and periphyton is a clear indicator of cultural eutrophication and reinforces the conclusions based on discharge concentrations of phosphorus and appropriate instream phosphorus concentration targets. The *Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition* (EPA 1999) states that > 40% cover by macroalgae is an indication of nutrient or organic enrichment.

See also Response #F48 for additional detail regarding EPA's establishment of the phosphorus limit in this permit.

Comment #F10: The permit references The 1986 Quality Criteria for Water as the source document for its recommend instream concentration. The 1986 document is clear that there is no national criteria for control of Phosphorus. (*See* Attachment Al to this document.) It begins by saying "Although a total phosphorus criterion to control nuisance aquatic growths is not presented, it is believed that the following rationale to support such a criterion, which currently is evolving, should be considered." (Gold Book, page 240 of 477). It goes on to describe various recommendations and

observations of Mackenthun and Hitchinson concerning tolerable levels of phosphorus in receiving waters. It also suggests that:

> The majority of the Nation's eutrophication problems are associated with lakes or reservoirs and currently there are more data to support the establishment of a limiting phosphorus level in those waters than in streams or rivers that do not directly impact such water. 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 limit is substantially diminished*. Such conditions are described in the last paragraph of this rationale. (Gold Book, page 241 of 477)

The last paragraph contains a number of caveats that need to somehow be taken into account in the development of the criterion. The factors include the following

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.

6. In some waters a nutrient other than phosphorus is limiting to plant growth: the level and nature of such limiting nutrient would not be expected to increase to an extent that would influence eutrophication.

7. In some waters phosphorus control cannot be sufficiently effective under present technology to make phosphorus the limiting nutrient. (Gold Book, page 243 of 477)

Thus, although there was no criterion established in the 1986 document, and the rationale was only evolving and proposed for consideration, the EPA elected to ignore the caveats about its use. This was improper because, as discussed below the EPA had the tools to make substantive assessments that could incorporate these caveats, and which would not have relied on the irrelevant field data to support its conclusions.

Response #F10: In the course of determining the trophic status of the receiving water and deriving a protective phosphorus effluent limit that would meet the narrative phosphorus criterion, the Region looked to a variety of sources, including the Gold Book, Ecoregional Nutrient Criteria (*Ambient Water Quality Criteria Recommendations: Information Supporting the Development of State and Tribal Nutrient Criteria, December 2000*) and Nutrient Criteria Guidance (*Nutrient Criteria Technical Guidance Manual: Rivers and Streams, July 2000)*. These constitute information published under CWA §304(a) and were used as *guidance* to interpret the State's narrative criterion for nutrients and not as substitutes for state water quality criteria. The Region's use of the Gold Book and other relevant materials published under Section 304(a) to develop a numeric phosphorus limit sufficiently stringent to achieve the narrative nutrient criterion is consistent with applicable NPDES regulations. When deriving a numeric limit to implement a narrative water quality criterion, EPA is authorized (40 CFR §122.44(d)(1)(vi)(B)) to: "Establish effluent limits on a case-by-case basis, using EPA's water quality criteria, published under Section 304(a) of the CWA, supplemented where necessary by other relevant information."

EPA recognizes that the Gold Book does not contain a phosphorus criterion *per se*, but instead presents a "rationale to support such a criterion." Gold Book at 240. The guidance document goes on to recommend in-stream phosphorus concentrations of 0.05 mg/l in any stream entering a lake or reservoir, 0.1 mg/l for any stream not discharging directly to lakes or impoundments, and 0.025 mg/l within the lake or reservoir.

The commenter references a statement in the Gold Book that indicates that, at the time of the Gold Book's publication, there was more data to support the establishment of a limiting phosphorus level in lakes than in streams or rivers. Much more recent data and criteria guidance published under Section 304(a) of the CWA reinforces the Gold Book recommendations related to streams and rivers.

The more recent Nutrient Criteria Guidance document, as well as the Ecoregional Nutrient Criteria, indicate that instream phosphorus concentrations need to be less then 100 ug/l (0.1 mg/l) in order to control cultural eutrophication. The Nutrient Criteria Guidance document cites a range from 10-90 ug/l to control periphyton and from 35-70 ug/l to control plankton (*see* Table 4 on page 101). The Ecoregional Nutrient Criteria document outlines so-called "reference" conditions in waters within specific ecoregions across the country, which are minimally impacted by human activities, and thus are representative of waters without cultural eutrophication. The UBWPAD is in Ecoregion XIV, *Eastern Coastal Plain*. Recommended criteria for this ecoregion is a total phosphorus criterion of 24 ug/l.

The commenter also recites verbatim seven site-specific considerations that the Gold Book indicates can reduce the threat of phosphorus as a contributor to eutrophication in lakes. The commenter does not indicate which, if any, of the site-specific considerations is determinative in this case and how it would specifically alter the permit limits for phosphorus. For instance, the commenter does not cite and EPA is not aware of any evidence that "naturally occurring phenomena;" "steep banks, great depth and substantial

flows;" "natural silts or colors;" or a "nutrient other than phosphorus" are inhibiting plant growth in this case. To the contrary, certain characteristics of the Blackstone River exacerbate the impacts associated with phosphorus. For instance, the River is characterized by numerous shallow impoundments and low velocity. Further, management of waters "primarily for waterfowl or other wildlife" would conflict with the designated use of contact recreation. In addition, consideration of "technological or cost effective limitations" in establishment of the water-quality based phosphorus limit is inappropriate. *See* Response #A9.

The well documented cultural eutrophication in the Blackstone River does not support that site-specific factors are mitigating the effects of excessive phosphorus loadings. Rather, there is substantial evidence of extensive impairments related to phosphorus loadings, and phosphorus is widely recognized as the limiting nutrient in most freshwater systems. *See Nutrient Criteria Technical Guidance Manual – Rivers and Streams*, July 2000 (EPA-822-B-00-002). Further, there is no indication that available control technologies, which have improved greatly since the Gold Book was published, are insufficient to make phosphorus the limiting nutrient. Any such demonstration could be made as part of a Use Attainability Analysis (*see* Response #F1).

Comment #F11: The 1986 Quality Criteria for Water suggests a level of 0.1 mg/l as "a desired goal for the prevention of plant nuisances in streams or other flowing waters" and references a 1973 publication of Kenneth Mackenthun, a copy of which is included as Attachment A2 to this document. However, that document does not present information concerning the development of the 0.1 mg/1 "desired goal," but rather makes reference to a 1968 paper published in the Journal of the American Waterworks Association by the same author. A copy of the 1968 paper is included as Attachment A3 to this document. The 1968 document indicates that " ... A considered judgment suggests that to prevent biological nuisances, total phosphorus should not exceed 100 ug/1 P at any point within the flowing stream, nor should 50 ug/1 be exceeded where waters enter a lake, reservoir or other standing water body ..." (Mackenthun, 1968 p 1053). A careful reading of this document suggests that it is referencing streams which are tributary to water supply reservoirs and lakes and standing waters that serve as sources of water supply. This would explain why it was published in what would otherwise be thought to be about water supply, and not water pollution. Moreover, the 1968 document presents no information concerning the development of the recommendation – and so it presents no guidance on how it should be applied – seasonally, monthly, or over the growing season?

Response #F11: EPA disagrees with the suggestion that the Gold Book recommendation regarding in stream phosphorus concentrations is limited to sources of water supply and cannot be used as guidance in this matter. The Gold Book includes no such limitation or characterization of its recommendation. Similarly, the 1973 paper by Kenneth Mackenthun referenced by the Gold Book includes no such restrictions. The commenter does not explain how a "careful reading" of a 1968 publication by the same author supports the suggested restrictions on the recommendations. To the contrary, the 1968 article twice states "total phosphorus concentrations should not exceed 100 ug/l at any point within a flowing stream" with no reference that this recommendation is limited to

tributaries to drinking water supplies. Indeed, if Mr. Mackenthun intended such a restriction, he presumably would have explicitly included it in his 1968 or 1973 publications.

Regarding application of the recommendations, the Gold Book values are clearly referenced as values not to be exceeded at any time, not simply annual averages. The Ecoregional values represent average values during the critical growing season. *See also* Response #F10 and Response #F49 below relative to the use of Gold Book values.

Comment #F12: In recent times the EPA and Commonwealth have collaborated on the development of Total Maximum Daily Load Studies to establish nutrient management goals. These studies have been or are being conducted on the Assabet, The Nashua River and the Lower Charles River. The TMDL studies on the Assabet and Lower Charles are available on DEP's website (*see* http:/www.mass.gov/dep/water/resources/tmdls.htm). Studies on the Nashua are reported to be underway and supportive of phosphorus effluent limits proposed for the City of Leominster, but are not yet available for public review. The studies of the Lower Charles and the Assabet clearly attempted to take into account the myriad of factors presented as caveats in the EPA's 1986 guidance, as well as others. In the case of the waste water plants discharging to the Assabet River, limits were developed based not on the diluted concentration of phosphorus in the receiving waters, but rather on the reduction in aggregate biomass (measured as chlorophyll a) achieved in response to reductions in waste water loads and sediment phosphorus sources. For the Charles River, required reductions in phosphorus loadings from various sources were developed based on seasonal average chlorophyll a levels, rather than in- stream, dilution driven phosphorus levels. This criterion was declared to be adequate to "satisfy all 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 MAWQ" (Draft Nutrient TMDL Development for the Lower Charles River Basin, Massachusetts, page vii). Such investigations attempt to address the many factors that impact the growth of nuisance algae; comparable studies should have been undertaken on the Blackstone, rather than resorting to overly simplistic concentration and dilution based analyses.

Response #F12: Of the three examples of TMDL development cited in the comment, the Assabet River is the most similar to the Blackstone River, i.e., effluent dominated with many shallow impoundments. The Assabet River TMDL concluded that total phosphorus limits of 0.1 mg/l for each of four POTWs is necessary to control eutrophication and additionally, 90% of the sediment sources of phosphorus in the river system need to be remediated.

The Nashua River TMDL, was more than five years overdue with much work remaining for it to be approvable by EPA. *See also* Response #E3. In the absence of an approved TMDL, EPA issued a final permit to the City of Leominster, and is preparing a draft permit for the City of Fitchburg with phosphorus effluent limitations developed using an approach similar to this permit – i.e., the Region looked to a variety of sources, including the Gold Book, Ecoregional Nutrient Criteria and Nutrient Criteria Guidance to develop a

numeric phosphorus limit sufficiently stringent to achieve the state's narrative nutrient criterion.

The Lower Charles is very different than the Blackstone River. The Lower Charles acts more like a large lake, and the phosphorus contributions to the Lower Charles are predominately from non-point sources. The average total phosphorus concentration in the Lower Charles River necessary to meet the seasonal chlorophyll a target was determined to be 28 ug/l, much lower than the instream target of 100 ug/l used for the Blackstone River.

In light of the existing nutrient impairments documented in the Blackstone River, the fact that MassDEP has only recently announced plans to initiate a phosphorus TMDL (which, according to MassDEP's proposed schedule, would not be completed until July 2013 – *see* Comment #E3), and the difficulty of conducting nutrient TMDLs, it is not appropriate for EPA to delay issuance of the phosphorus limit in the permit. Neither the CWA nor EPA regulations require that a TMDL be completed before a water quality-based effluent limit may be included in a permit. Rather, water quality-based effluent limitations in NPDES permits must be "consistent with the assumptions and requirements of any *available* [emphasis added] wasteload allocation." 40 CFR 122.44(d)(1)(vii)(B).

Comment #F13: In order to support the development of the 0.75 mg/1 permit limit contained in the existing permit the EPA developed a waste load allocation using the QUAL2E model that was developed as part of the Blackstone River Initiative (BRI). Although the EPA argues that the model was not used to assess cultural eutrophication, it was used to assess the fate of chlorophyll a under various phosphorus control strategies. Seasonal average chlorophyll a was directly used in the Charles as a measure of cultural eutrophication, and in the Blackstone model it serves as an indicator of general plant growth. The Blackstone model runs indicated that at extreme low flow conditions (as compared to seasonal average values) with the phosphorus limitations contained in the existing permit (0.75 mg/1) and with 25% reduction in sediment phosphorus flux, that chlorophyll a levels would be reduced substantially from 67 ug/1 to 22 ug/l. The increased seasonal average flow would undoubtedly have lowered the chlorophyll a limits further, both as a result of dilution and significantly reduced residence time that would serve to mitigate algal growth.

We had never thought that the previous implementation of the QUAL2E model was particularly well done. But it represented the EPA's estimate of the best science it had at the time. It seems surprising then that it was not used in the development of this permit, particularly since the Fact Sheet accompanying this permit makes reference to the response to comments from the previous permit. Those responses indicated that "We believe that the model in its current form is scientifically sound and that further refinements will have little effect on the model predictions... the model indicates that under the permit conditions chlorophyll a values and diurnal dissolved oxygen variations will still be at levels of concern relative to eutrophication impacts." (RTC, 1999 permit page 5). If the model were sufficient to indicate problems then, why was it not used in this permit development to determine an appropriate level of control? Moreover, it

should be noted that the in-stream values that the EPA seeks to apply in this permit were known as far back as 1968 – the date of their original publication and certainly 1986 when they were incorporated into the Gold Book. If these are immutable criteria that need to be met under all conditions, as the EPA now claims, why then were they not used in the BRI analyses? The answer of course, is that to adopt them and apply them in the manner now proposed is too simplistic, and does not reflect real world conditions.

Response #F13: The comment incorrectly characterizes EPA's position on the model and the basis for the previous permit limits. While the model assesses cultural eutrophication, as represented by the response variable chlorophyll a, the waste load allocation did not establish limits necessary to control eutrophication consistent with the narrative criteria in the standards. Phosphorus reductions were evaluated only to the point where the model indicated that minimum dissolved oxygen criteria would be met. As documented in the Fact Sheet for the new permit, the resulting phosphorus limit of 0.75 mg/l is insufficient for addressing cultural eutrophication.

The model was not used to develop effluent limitations addressing cultural eutrophication in the new permit because efforts to update the model in light of new data were unsuccessful. Data collected as part of the Corps of Engineers study [*Phase I: Water Quality Evaluation and Modeling of the Massachusetts Blackstone River, Draft - March 2004* (US Army Corps of Engineers [http://www.nae.usace.army.mil/projects/ma/blackstone/wqe.htm)] indicate that there have been some significant changes in the system relative to productivity since the Blackstone River Initiative study that was the basis for the dissolved oxygen waste load allocation. The Corps of Engineers study indicated high levels of productivity and resulting losses of phosphorus in the upstream reaches immediately below the UBWPAD discharge. Macrophytes were documented as dominating these upstream reaches but were not evident in downstream reaches. The plants that dominated these reaches all have in common that they grow in dense, thick, and long masses and are all indicators of eutrophic freshwater. Since the model is not able to simulate rooted aquatic plants, efforts to update the model based on the new Corps of Engineers data were unsuccessful relative to simulating instream phosphorus levels.

EPA agrees that the in-stream phosphorus recommendations in the Gold Book have been available since at least the time of the Gold Book's publication in 1986. That initial efforts to calibrate the QUAL2E model were not successful or that MassDEP has not yet initiated a phosphorus TMDL does not result in the conclusion that EPA should not address the impacts of cultural eutrophication. The record includes evidence that significant impairments of the receiving waters due to phosphorus-driven eutrophication have already occurred, as discussed elsewhere in Responses #F5 and #F9. Based on these impacts and the fact that UBWPAD is by far the dominant source of bioavailable phosphorus loading to the Blackstone River under critical low flow conditions, it is not appropriate to delay establishment of limitations to address cultural eutrophication. Absent an approved TMDL, EPA must base effluent limits for phosphorus on the narrative criteria in the currently approved water quality standards.

Comment #F14: As is required by EPA, the Commonwealth of Massachusetts is developing its own criteria for nutrients that will be used for determining compliance with its nutrient criteria. The Commonwealth periodically reports on the progress of these efforts as part of the State and EPA Performance Partnership Agreement (PPA). According to the most recent PPA, this activity is ongoing. Given that recent nutrient TMDL's in the Commonwealth have relied on response criterion (e.g. biomass reduction, water clarity or chlorophyll a levels) rather than specific numeric criterion, it would seem that the EPA should have at least attempted to use these metrics, rather than arbitrarily selecting a numeric criterion.

Response #F14: While MassDEP has begun the process of developing numeric criteria for controlling nutrients, the Commonwealth has not yet submitted any proposed revisions to its water quality standards that incorporate numeric criteria for controlling cultural euthrophication and has not proposed a specific time frame for making such a submittal. If MassDEP chooses to propose site specific criteria based on reponse variables, it must also include a procedure for translating these criteria to phosphorus limits. Further, any proposed revision to standards must then be approved by EPA after an evaluation of whether the proposed criteria are sufficient for protecting and achieving designated uses.

In the process of setting the effluent limitation for phosphorus, we did consider response variables. As detailed in the Fact Sheet, we considered the relationship of phosphorus and cultural eutrophication, as measured by response variables such as chlorophyll a, periphyton and macrophytes. (Data on response variables is contained in the studies documented in the Fact Sheet.) In interpretation of MassDEP's narrative criterion, we consulted nationally recommended criteria and other technical documents to establish effluent limitations designed to address the response variables and to ensure attainment of water quality standards. *See* 40 CFR 122.44(d)(1)(vi)(B). *See also* Response #F9 and #F13 relative to response variable considerations in setting permit limits.

Comment #F15: The Fact Sheet is in error at page 7 when it suggests that the limits on phosphorus are necessary to meet technology based standards of the Massachusetts Surface Water Quality Standards. As presented on page 10, the EPA rejects the use of its interpretation of the Commonwealth's technology based requirement for highest and best practicable treatment, suggesting that such a level of treatment is insufficient because "the receiving water does not provide sufficient dilution to ensure that a limit of 0.2 mg/1 would adequately control eutrophication to meet water quality criteria". Thus, the limits presented in this Fact Sheet are not technology based standards under Massachusetts FS page 10, contrary to the claim of page 7 of the Fact Sheet.

Note that the District does not believe that the Commonwealth's requirement for highest and best practicable treatment compels the use of a 0.2 mg/1 phosphorus limit. The actual language from the Commonwealth's water quality standards defines it as "...The best practicable waste treatment technology for publicly owned treatment works that is the most appropriate means available on a regional basis for controlling the direct discharge of toxic and non-conventional pollutants to navigable waters....". 314 CMR 4.02 and

further, that "....Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses..." 314 CMR 4.05(5)(c).

It is thus clear that if higher levels of phosphorus discharge would serve to mitigate cultural eutrophication, that those levels are acceptable under Massachusetts' Water Quality Standards.

Response #F15: As outlined in the Fact Sheet, the phosphorus limit is based on water quality criteria and is not based on technology requirements. Specifically, the limit is based on the narrative criteria for controlling cultural eutrophication. The reference on page 7 of the Fact Sheet to the "highest and best practicable treatment" for nutrients was included to provide a more complete discussion of references to eutrophication in Massachusetts Surface Water Quality Standards. We note for the record UBWPAD's interpretation of the "highest and best practicable treatment" requirement in the Commonwealth's standards.

Comment #F16: The District suggests that the most appropriate way forward is for it to complete construction of the upgraded facilities, that the District should monitor operation of these facilities for a period of not less than two full growing seasons that the District, in conjunction with others, should complete and refine its ongoing modeling efforts, which would form the basis of a TMDL by the Commonwealth. Thereafter, the permit should be modified to incorporate the appropriate level of treatment. The current consent agreement could be modified to affect these efforts. The District believes that this approach is substantially in agreement with the proposal submitted by the Commonwealth of Massachusetts at the permit hearing of May 9, 2007.

More importantly, this approach is entirely consistent with the intention of the 1999 permit. As the EPA indicated in their response to comments on that permit

> "...It is important to note that [the] permit limits reflect a phased approach and are based on a WLA designed to increase minimum predicted dissolved oxygen levels to 5.0 mg/l. The model indicates that under the permit conditions chlorophyll-a values and diurnal dissolved oxygen variations will still be at levels of concern relative to eutrophication impacts. ***If these problems persist,*** then more stringent phosphorus limits.... will need to be implemented... " RTC, 1999 permit, page 5, emphasis supplied.

It thus seems clear that the EPA expected the District to complete the upgrade of the facilities and to assess the efficacy of the improvements before moving forward with new limits.

Response #F16: *See* Response #A3, #E3, #F9 and #F12 relative to delaying establishment of more stringent nutrient effluent limitations; Responses #A2, #E2 and #F7 relative to schedules; Response #F9 relative to persistence of eutrophic impacts even with discharge levels approaching the 0.75 limit in the expired permit; and Response #F7 relative to inappropriateness of delay in setting limits pending UBWPAD's modeling efforts. With regard to the above-quoted language in the response to comments for the expired permit (and EPA's caution to UBWPAD regarding the possibility of more stringent phosphorus limits), please see Response #F5.

Comment #F17: EPA and RIDEM have used an 87% delivery factor as an estimator of the amount of nitrogen discharged at UBWPAD that is delivered to the Seekonk River (EPA Fact Sheet). However, in its response to comments, RIDEM has said the following:

> The fate and transport from the MA/RI state line to the mouth of the River expected when WWTF's meet their current permit limits, was evaluated by applying the methods described above to the results of the 1997 WLA model. It was determined that 79% of the MA loading at the state line and 86% of the Woonsocket WWTF load will be delivered to the mouth of the Blackstone River when the required WLA is met. By combining the delivery from each MA WWTF to the state line with that from the state line to the mouth of the river, refined delivery factors were computed for each MA WWTF. It was determined that between 71 and 77% of the individual MA WWTFs nitrogen loading will be delivered to the mouth of the River (72% for UBWPAD) and 86% of the Woonsocket WWTF. In the DEM evaluation, the Woonsocket and UBWPAD WWTFs were both assigned a river delivery factor equal to 87%.

Thus, while RIDEM may have used 87% as a River delivery factor, their actual analysis indicates that for the Upper Blackstone, the value is actually 72%, assuming compliance with the 2001 permit limits for phosphorus. If only 72% of the discharge makes it to the Seekonk River, then this suggests that an effluent limit of 6.94 mg/1 is more appropriate if one accepts RIDEM's analysis -- or that the limit on plants discharging directly into the Seekonk and Providence Rivers ought to have an equivalent limit of 3.6 mg/l.

Compounding this error is that fact that RIDEM's analysis to produce the 87% value used in their analysis is conceptually flawed. According to their supporting materials, the 87% factor reflects the fact that the amount of nitrogen discharged out the Blackstone River in 1995/1996 (1,552 kg/day) was 87% of the amount 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 plants in the Blackstone River Watershed in Massachusetts and Rhode Island. RIDEM makes no separate estimate of the load from these 8 plants. A reasonable estimate suggests that the loadings from these plants could approach an additional 400 kg/d, which would make the delivery factor for the combined Woonsocket and District discharge drop to 61% (1,552/(1782+370+400). If, as indicated by RIDEM that the UBWPAD river delivery factor was actually at 72% as compared to the combined 86%, then the UBWPAD river delivery factor would be 51% (61*(72/86)).

If the river delivery factor is only 51%, then the appropriate limits for the UBWPAD discharge to ensure an equivalent 5 mg/1 discharge at the mouth of the Blackstone is 9.8 mg/l.

Response #F17: The nitrogen attenuation processes in the Blackstone River will vary due to many factors, including water quality, season, weather conditions, and flow regime. The estimates prepared by RIDEM were intended to estimate attenuation during dry weather summer periods, when receiving water quality impacts due to eutrophication have been shown to be most severe. During these conditions, non point source discharges would be expected to be minimized due to the minimal storm water runoff, and in-stream nitrogen removal processes such as algal growth and biological denitrification would be maximized due to the warmer temperature and increased sunlight.

The estimated total nitrogen delivery factor of 87% used by RIDEM in its recommendation of loading reductions for facilities in Rhode Island and Massachusetts [*Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, RIDEM, December 2004] was based on an analysis of 1995/1996 data and assumed that the majority of nitrogen delivered to the system was from the two major point sources – UBWPAD and Woonsocket. Importantly, the 87% estimate was based on the conditions existing at the time of data collection, and did not attempt to predict the effect of future reductions of phosphorus loadings on nitrogen attenuation rates.

A subsequent analysis used data from 2001 and 2002 (*see* RIDEM Response to Comments document cited in the Fact Sheet) and employed a model that did account for other point sources, as well as non-point sources. The second analysis also took into account the impact of NPDES-required reductions in phosphorus loadings from the wastewater treatment plants (using the 0.75 mg/l total phosphorus limit in the expired permit for UBWPAD), assumed a total nitrogen discharge of 10 mg/l from UBWPAD, and assumed that the treatment plants were discharging at design flow. The analysis indicated that under these conditions, the UBWPAD total nitrogen delivery factor to the state line will increase from 69% to 92%, and 79% of the loading at the state line will be delivered to the mouth of the Blackstone River. This results in an overall river total nitrogen delivery factor of approximately 73%.[9]

Significantly, the second analysis showed that as phosphorus discharges to the river are reduced, the delivery of nitrogen increased. The reason for the reduced attenuation for nitrogen is that phosphorus-driven algal growth is the primary cause of nitrogen uptake. Given that the two largest sources of phosphorus to the River (UBWPAD and

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[9] The commenter suggests further adjustments based on its estimates of non-point and point source loadings, resulting in a proposed delivery factor of 51%. However, the second analysis conducted by RIDEM quantified these loadings and accounted for them in the revised estimate of attenuation. The commenter does not identify any specific concerns with the loadings in the revised analysis that warrants use of the commenter's estimated loadings.

Woonsocket) are both proposed to have limits of 0.1 mg/l total phosphorus (which are more stringent than the 0.75 mg/l limit on which RIDEM's analysis was based) and that other point sources will also be required to reduce phosphorus loadings, a further increase in the delivery of nitrogen to Narragansett Bay can be expected.

An additional analysis of attenuation in the Blackstone River (Nixon et al. 2005), as pointed out in the comments submitted by The Rhode Island Bays, Rivers, & Watersheds Coordination Team, indicates that attenuation is minimal. In this study, measurements of in-stream nitrogen concentration and stream flow for the period from April 2004 to August 2004 were used to estimate attenuation in the segment of the Blackstone River from Millville, MA to Pawtucket, RI, a distance of 32.5 river miles. 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 or, as Nixon concludes: "The simple interpretation of these results is that we see no direct evidence of DIN attenuation or removal in the lower Blackstone." (Nixon et al. 2005). The data collected during the driest month (August) -- when non point discharges of nitrogen should be minimal and nitrogen removal processes associated with algal growth and biological denitrification should be maximized -- also shows no attenuation in this segment, even when subtracting the average POTWs loadings to the segment (which will undoubtedly be lower than the calculated average load under August conditions). This study shows that the delivery factors estimated by DEM for the Blackstone River from the state line to the Seekonk River may be too low. If the delivery factor estimated in the DEM model (92%) were coupled with the delivery factor from the Nixon report (100%), a delivery factor as high as 92% could be calculated for the UBWPAD discharge.

While scientific study of attenuation is ongoing, EPA must use its judgment to establish nutrient reductions for this discharge necessary to ensure attainment of water quality standards based on the information available now. Based on all the available data and analyses, EPA's judgment is that a delivery factor of 87% for the UBPWAD discharge, based on future conditions associated with required reductions in phosphorus loadings, is within the range of values that could be calculated and is therefore reasonable and appropriate. Accordingly, EPA has used that estimate for establishing water quality-based nitrogen limits in this permit issuance.

Comment #F18: In the course of issuing permit modifications to various dischargers in Rhode Island, RIDEM received comments, and responded to many of those comments. However, they failed to respond or inaccurately responded to numerous comments of the various parties which were central to the resolution of the technical matters associated with the issuance of the permits. These comments are as follows:

A: Numerous comments indicated that extrapolation of the MERL experimental results to the Providence and Seekonk Rivers was inappropriate because of the significantly different conditions between the Rivers and those of Narragansett Bay that the MERL experiments were intended to simulate. In particular, the comments indicated that area

loading rates used by RIDEM were inappropriate because the River systems flush at substantially faster rates than the Bay. Because of this, the concentration of nutrients in the river will be less than in the Bay at the same area loading rate, and the level of algal productivity comparably lower. Comments of the City of Woonsocket, included as Attachment A4, comments of the Commonwealth of Massachusetts included as Attachment A5 and comments of the Narragansett Bay Commission, included as Attachment A6.

In its response to comments, DEM provides no information to refute this observation, or to justify its position. Instead they make a series of erroneous statements that appear to justify their analysis, but in fact do the opposite, as follows:

> In response [to] the Massachusetts Department of Environmental Protection's comment that DEM did not consider the importance of detention time and hydrodynamics of the river system, DEM characterizes the Providence and Seekonk Rivers as "poorly flushed." (RTC, page 13). In reality, according to RIDEM's own work, and as commented upon by the City of Woonsocket, (see comments of the City of Woonsocket), the Providence and Seekonk Rivers flush far more rapidly than does the Bay. Since flushing controls concentrations of nutrients, which control productivity, the use of the MERL experiments are incorrect.

In response to a comment made by the Narragansett Bay Commission concerning the same issue, DEM states that "The behavior of dissolved oxygen and algae (chlorophyll-a) observed in the Providence and Seekonk River systems is very similar to that observed in the MERL experiment." This is, however, not true, as was indicated the City of Woonsocket's comment entitled "Contradictory Data are presented in the Analysis" (see comments of the City of Woonsocket). Those comments pointed out that the MERL studies showed a congruence of low dissolved oxygen and high chlorophyll-a, while the 1995/1996 data relied on by DEM showed high DO with high chlorophyll-a, and low DO with low chlorophyll a.

Response #F18A:

The basic relationship demonstrated by the MERL tank experiments between the primary causal and response variables relative to eutrophication corresponds to what is actually occurring in the Providence/Seekonk River system. EPA recognizes and acknowledged in the Fact Sheet that the MERL tank experiments cannot *completely* simulate the response of chlorophyll a and dissolved oxygen to nitrogen loadings in a complex, natural setting such as the Upper Narragansett Bay. Part of that complexity includes spatial and temporal fluctuations in flushing rates. As is detailed below, EPA took such uncertainties into account in establishing the nitrogen limit in the permit.

The MERL enrichment gradient experiments included a study of the impact of different loadings of nutrients on dissolved oxygen and chlorophyll *a*. *See Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, RIDEM, December 2004. The experiments were conducted from June 1981 through September

1983 and consisted of 9 tanks (mesocosms), each 5 meters deep and 1.83 meters in diameter. Three tanks were used as controls, and were designed to have regimes of temperature, mixing, turnover, and light similar to a relatively clean Northeast estuary with no major sewage inputs. The remaining six mesocosms had the same regimes, but were fed reagent grade inorganic nutrients (nitrogen, phosphorus and silica) in molar ratios found in Providence River sewage. The six mesocosms were fed nutrients in multiples of the estimated average sewage inorganic effluent nutrient loading to Narragansett Bay. For example the 1X mesocosm nitrogen loading was 2.88 mM N/m^2/day (40 mg/m^2/day) and the 2X was twice that and so on (4X, 8X, 16X) up to a maximum load of 32X. During the study dissolved oxygen, chlorophyll, pH, and dissolved inorganic nutrients were measured in the water column and benthic respiration was also measured. From the collected data the investigators produced times series for oxygen, pH, temperature, nutrients, chlorophyll, and system metabolism (see *Patterns of productivity during eutrophication: a mesocosm experiment*, Oviatt, Keller, Sampou, Beatty).

Both the MERL tank experiments and the data from the Providence/Seekonk River system indicate a clear correlation between nitrogen loadings, dissolved oxygen impairment and chlorophyll *a* levels. Low dissolved oxygen levels, as well as supersaturated dissolved oxygen levels, are indicators of cultural eutrophication. Figures 1 through 3 in the *Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers* show the dissolved oxygen measurements taken from MERL tank experiment and demonstrate that the range and variability of DO increases with increased nutrient loading. As described in the text of the report, and shown in Figure 13, the DO in the Seekonk River showed patterns of DO variability similar to that of the high enrichment tanks in the MERL experiments.

Phytoplankton, as measured by chlorophyll *a* levels, is an even stronger response indicator of cultural eutrophication than DO. Coastal areas without high nutrient loads are expected to have chlorophyll *a* levels in the 1 to 3 ug/l range (*Nutrient Criteria Technical Guidance Manual – Estuarine and Coastal Marine Waters*, USEPA, October 2001). Massachusetts has identified chlorophyll *a* levels of less than 3 ug/l as representing excellent water quality and chlorophyll *a* levels similar to the levels in the Providence/Seekonk River system as representing significantly impaired waters (*Massachusetts Estuaries Project – Site-Specific Nitrogen Thresholds for Southeastern Massachusetts Embayments: Critical Indicators*, July 21, 2003 as revised). Peak chlorophyll *a* levels in the Providence/Seekonk River system have exceeded 200 ug/l (see June 29th data in Figure 15 of *Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*). The MERL tank experiments showed a correlation between nitrogen loading rates and chlorophyll *a* levels (see Figures 7, 8, and 9). These results were consistent with RIDEM data from 1995-96, which indicate that mean photoplankton chlorophyll *a* levels in the three Seekonk River monitoring stations ranged from 14 ug/l to 28 ug/l, with the highest levels in the upper reaches of the river and the lowest levels in the lower reaches of the river (see Table 3). These chlorophyll *a* levels correlate with total nitrogen levels and with the dissolved inorganic nitrogen levels shown in Figure 3.

The 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.[10] EPA recognized, however, that the MERL tank experiments cannot completely simulate the response of chlorophyll *a* and dissolved oxygen to nitrogen loadings in a complex, natural setting such as the Providence/Seekonk River system, and thus does not yield a precise level of nitrogen control required to restore uses in the system. For example, dissolved oxygen in Narragansett Bay is influenced by stratification, which was not simulated in the MERL tank experiment, in which waters were routinely mixed. In a stratified system there is little vertical mixing of water, so sediment oxygen deficits are exacerbated, due to the lack of mixing with higher DO waters above. In addition, the flushing rate used in the MERL tanks is not the same as seen in the Bay. Because the physical model does not generate a definitive level of nitrogen control that can be applied to a real world discharge, but instead a range of loading scenarios which are subject to some scientific uncertainty, EPA was required to exercise its technical expertise and scientific judgment based on the available evidence when translating these laboratory results and establishing the permit limit.

Of the various loadings scenarios available to it, EPA determined that a concentration-based limit of 5 mg/l would be necessary to address the excessive loadings from the facility, which both EPA and Rhode Island have determined are contributing to ongoing water quality impairments in the Narragansett Bay system. An effluent limit of 5 mg/l corresponds to a loading scenario in the Seekonk River of approximately 6.5 times the Bay wide loading at current facility flows and approximately 10 times at 90% design flows. *See, e.g.,* Evaluation of Nitrogen Target and WWTF Load Reductions for the Providence and Seekonk Rivers, RIDEM, December 2004 at 28. Despite the severe nitrogen-related impairments in the receiving waters, EPA opted not to impose a limit based on more stringent loading scenarios at this time in order to account for uncertainties associated with the physical model. (Based on the MERL tank experiments, a nitrogen loading of between 2 times and 4 times the Bay wide loading may be necessary to achieve water quality standards). Even with the recognition of differences between the laboratory and natural environment, the fact that water quality responses to a 10X nitrogen mass loading scenario in the MERL tank experiments resulted in a significant level of impairment was an area of concern for EPA in light of its duty under section 301(b)(1)(C) to ensure compliance with water quality standards. However, when evaluating the adequacy of the limit, EPA was also aware that the particular approach it adopted possesses conservative elements which enhance the protectiveness of the permit beyond that of the 10X mass loading scenario. Specifically, the decision by EPA to impose concentration rather than mass limits will assure that effluent nitrogen concentrations are maintained at consistently low levels and, as a practical matter, will result in actual mass loadings that are kept significantly below the 10X loading scenario

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[10] The correlation between nitrogen loadings, chlorophyll *a* levels, and dissolved oxygen impairment is well documented in the *Nutrient Criteria Technical Guidance Manual – Estuarine and Coastal Marine Waters*, USEPA, October 2001.

for the foreseeable future, as treatment plant flows remain well below the facility's permitted design flow.[11]

When establishing the limit and assessing its protectiveness, EPA took into account the fact that RIDEM has committed to ensuring adequate monitoring and assessment of water quality changes to determine if additional reductions will be necessary to meet water quality standards. RIDEM has, in partnership with several research and academic institutions in Rhode Island, established an extensive monitoring network in order to provide the data necessary to evaluate compliance with water quality standards upon implementation of the recommended nitrogen reductions (*see* RIDEM**,** February 1, 2005 report). This information will be available to check the Region's assumptions regarding the adequacy of the limit. If EPA has erred in navigating the scientific complexities and uncertainties associated with the MERL tank experiments, EPA will be able to further refine the limit in future permitting cycles.

When evaluating whether it had met its obligations under section 301(b)(1)(C) and 401(a)(2) to ensure compliance with applicable water quality standards, including those of affected states, EPA also accounted for the fact that Rhode Island, when assigning permit limits to facilities within its own borders in accordance with its own water quality standards, did not conclude more stringent limits would be necessary or appropriate at this time. Under Rhode Island's permitting approach, limits of 5 mg/l and 8 mg/l have been imposed on various Rhode Island POTWs whose discharges impact Narragansett Bay, and Rhode Island has recommended that similar limits be placed on certain Massachusetts facilities that are impacting the Bay. *See Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, RI DEM, December 2004. In arriving at its decision to impose a nitrogen effluent limit of 5 mg/l on the UBWPAD facility, EPA regarded Rhode Island's position as additional evidence that the limit was reasonable and sufficiently stringent to comply with the CWA.

EPA in addition determined that no less stringent limit could be imposed that would still ensure compliance with water quality standards in light of the severe existing eutrophic conditions in the Providence/Seekonk River system, indicating that it is significantly overallocated for nitrogen. In so concluding, EPA also weighed the fact that RIDEM has indicated that nitrogen limits as low as the limits of technology (*i.e.*, 3 mg/l) may be necessary to achieve water quality standards, with the caveat that it too has acknowledged uncertainty in the model. *See Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, RIDEM, December 2004, at p. 27.[12]

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[11] Recent annual average flows from the treatment facility have been as follows: 34 mgd in 2002; 41 mgd in 2003; 36 mgd in 2004; 43 mgd in 2005; 35 mgd in 2006; and 30 mgd in 2007. While the flows demonstrate some variation, due at least in part to inflow/infiltration, flows are well below permitted design flow and there is no upward trend.

[12] In general, the Region adopts a reasonably conservative approach when permitting nutrient discharges. This protective approach is appropriate because, once begun, the cycle of eutrophication can be difficult to reverse given the tendency of nutrients to recycle through the ecosystem. This approach is in line with EPA regulations. The Region is required to impose a limit where the reasonable *potential* exists for violations of water quality standards. *See* 40 C.F.R. § 122.44(d)(1),(5). Moreover, such a limit must

Accordingly, it is incorrect to suggest that EPA did not account for uncertainties between the model and the complex, natural setting of the receiving waters. Uncertainties in extrapolating the model to the natural environment were the major factor in our decision not to impose more stringent nitrogen load reductions at this time.

The commenter also notes that: "the MERL studies showed a congruence of low dissolved oxygen and high chlorophyll-a, while the 1995/1996 data relied on by DEM showed high DO with high chlorophyll-a, and low DO with low chlorophyll a." The MERL tank results do not indicate that low dissolved oxygen levels occur simultaneously with high cholorophyll *a* levels for any of the high treatments (i.e., high loading conditions), except the highest treatment level (32X), and even that treatment level shows simultaneous high chlorophyll and low DO only part of the time (compare chlorophyll measurements in Figure 9 to DO measurements in Figure 3). Additionally, while the MERL tank data referenced reflects minimum dissolved oxygen values, the 1995-1996 Providence/Seekonk River data reflects tidally averaged dissolved oxygen values. The commenter's conclusions are based on a direct comparison of the data, which is inappropriate as it fails to take into account the effects of these different values relative to the relationship with chlorophyll *a* levels.

Comment #F18B: DEM fails to respond to the City of Woonsocket's comment that RIDEM has not taken all potential oxygen demanding sources into account in its analysis of the dissolved oxygen problem. (See comments of the City of Woonsocket) The City is concerned that other DO "sinks" could have contributed to the low dissolved oxygen in the Providence and Seekonk Rivers, and that nutrient reductions may not serve to reduce the observed DO problem. These sinks include the large demands associated with the carbonaceous and ammonia nitrogen oxygen demand from the waste water treatment plants discharging directly into the Providence and Seekonk Rivers, the oxygen demand associated with combined sewer overflows and urban runoff, and sediment oxygen demand that could be created as a result on winter time discharges of all of the above sources, settling to the bottom and then expressing itself over the summertime. This is especially important in light of the fact that the observed 1996 and 1995 DO patterns are inconsistent with the MERL experiments, strongly suggesting that other factors may be at play. When viewed in conjunction with the comment below with respect to circulation patterns in the Providence and Seekonk Rivers, it is entirely possible that low bottom water DO is created by the trapped discharge of the Rhode Island plants being entrained in the upstream bound lower layer, which is shut off from reaeration by steep, salinity driven density gradients. This would serve not only to concentrate the plant oxygen demand in the bottom waters, but would limit the volume over which the bottom

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ensure compliance with water quality standards. This approach is also consistent with EPA nutrient guidance. For example, in the context of section 303(d) listing decisions, EPA's 2001 Nutrient Criteria Development Memorandum, recommends (at p. 19) that listing should "ideally occur prior to highly visible responses such as algal blooms to facilitate a more proactive approach to management[,]" and states should "consider excessive levels of nitrogen and phosphorus as a basis for listing regardless of the status of early response variables such as chlorophyll *a* or turbidity."

sediments would express its oxygen demands. Such a condition could produce an oxygen deficit similar to that observed in the 1995/1996 period, where the dissolved oxygen and chlorophyll a values are inconsistent with the MERL experiments.

Response #F18B: It is not necessary that there be a complete understanding of all factors that influence one response variable (dissolved oxygen) before cultural eutrophication can be addressed. This is especially true where water quality impairment – cultural eutrophication – is severe and where the cause of such impairment – excessive nitrogen loading – is known, as evidenced by numerous studies. *See, e.g., Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, RI DEM, December 2004.

Biochemical Oxygen Demand (BOD) from direct discharges to Upper Narragansett Bay has been shown to have minimal impact on dissolved oxygen levels (*see* D.R. Kester et al. / Marine Chemistry 53 (1996) 131-145, *Modeling, measurements, and satellite remote sensing of biologically active constituents in coastal waters*), and nutrient stimulation of phytoplankton production was leading to the oxygen depletion. *See* Response #F19 relative to trapped effluent. Treatment to address total nitrogen (and associated phytoplankton production) would also address ammonia, to the extent it may have a minor impact on dissolved oxygen dynamics.

The high levels of chlorophyll a and the clear relationship between nitrogen, chlorophyll a, and dissolved oxygen levels (*see* Response #18A) suggests that CSOs are not a major contributor to the eutrophication impacts in Narragansett Bay. CSO discharges in Rhode Island represent 1% of the total annual loading of ammonia and 0.2% of the total annual loading of nitrate to Upper Narragansett Bay. In addition, a very high level of CSO remediation is being implemented in Rhode Island. *See also* Response #F22 below and RIDEM Response to Comments, page 9.

Supersatured levels of dissolved oxygen can only result from photsynthesis or an outside physical aeration mechanism. Supersaturated levels of dissolved oxygen measured in Upper Narragansett Bay are entirely a function of nitrogen enrichment. The data collected in the Seekonk and Providence Rivers offers compelling evidence of excessive nutrient enrichment. Water quality data (11 sampling events during 1995 and 1996) were collected under a variety of conditions in order to reflect the dynamic physical conditions of the systems, and show that the common thread through the observed dissolved oxygen problems is nutrient enrichment. Total nitrogen and chlorophyll *a* concentrations are well above the MassDEP guidelines for TN and environmental health. To the extent that sediment oxygen demand (SOD) plays a role in the low dissolved oxygen levels, the decay of nitrogen stimulated phytoplankton that has accumulated in the sediments would be expected to contribute significantly to the SOD levels. Accordingly, given the reasonably conservative approach EPA adopts in nutrient permitting, which emphasizes the need to break the eutrophic cycle, EPA does not believe it is appropriate to completely decouple this nonpoint source of impairment from the initial point source nitrogen loading into the system.

Comment #F18C: DEM failed to answer the City's comment that substantial, newer DO data was available through the EMPACT program which it could have attempted to use to validate its conclusions. See comments of the City of Woonsocket.

Response #F18C: It is not clear how the commenter believes that EPA should specifically use the referenced EMPACT data in development of nitrogen limits for this permit. EMPACT data for the critical summer periods are available from only two sites. The data includes dissolved oxygen and chlorophyll a levels but not nitrogen levels. There are also no tributary nitrogen loading rates concurrent with the dissolved oxygen and chlorophyll a data. The data do, however, provide additional documentation of the severity of the eutrophication. For example, a review of the data for the Phillipsdale station, located in the Seekonk River just upstream of the confluence with the Ten Mile River, shows that on July 16, 2007, minimum surface and bottom DO were less than 4 mg/l, maximum surface DO reached almost 20 mg/l (250 percent of saturation), and surface chlorophyll concentrations were over 80 ug/l. These data indicate that there are frequent periods during the summer months when dissolved oxygen levels and chlorophyll a levels reflect significantly impaired water quality.

Comment #F18D: The City of Woonsocket commented that DEM erroneously attributed all the nitrogen discharged into Narragansett Bay via the Blackstone River to two waste water treatment plants, while numerous cited authors and the DEM's own Blackstone River Initiative data indicated otherwise. DEM has failed to provide any analysis of the information presented by the City, except to make reference to "several" analyses that say otherwise, while citing only one (Pryor, 2004). And that one analysis is not included in the list of references included in the document. This is a particularly important issue because if the District's discharge is a smaller fraction of the nitrogen than RIDEM asserts, then this would suggest that an even smaller fraction of the District's effluent makes it to the Providence and Seekonk River systems, as is discussed above.

Response #F18D: While UBWPAD and Woonsocket discharges represent the vast majority of the nitrogen loadings in the Blackstone River there are other sources of nitrogen to the river. Accounting for these other sources would result in an increase in the estimated attenuation rate. However, as indicated in Response #F17, the current high level of eutrophication in the Blackstone River has the effect of increasing the attenuation rate. The large reductions in levels of phosphorus discharged will result in a significant reduction of the attenuation rate in the future. Consequently, we believe that the estimate of an 87% delivery factor to the mouth of the River for UBWPAD nitrogen discharges is reasonable. As indicated in Response #F17, a more recent study (Nixon, 2005) indicated that attenuation is minimal.

Comment #F18E: Both the City of Woonsocket and the Massachusetts Department of Environmental Protection observed that RIDEM, in establishing 5 mg/1 limits for the Woonsocket facility and the District's facility did not appear to take into consideration the reductions in nitrogen load that would result from attenuation in the watershed. Put simply, if there is an 87% attenuation factor in the river, then a discharge of 5.74 mg/1 is

the equivalent of a 5 mg/1 discharge into the Seekonk River, as is required of other RI facilities. If the delivery factor is lower then the value is proportionately higher as presented above. It is unclear as to why the District's limits were not adjusted for the river attenuation factor.

Response #F18E: EPA established a nitrogen limit of 5.0 mg/l for the UBWPAD facility based on consideration of both the facility's relative nitrogen contribution and the location of the discharge. Both the Woonsocket and UBWPAD discharges enter Upper Narragansett Bay through the headwaters of the Seekonk River, which is the most impaired section of Upper Narragansett Bay. The RIDEM 2004 study indicates that this segment of the Bay currently receives nitrogen loads at a rate 24 times higher than the average Bay-wide loading. The limit EPA believes necessary to attain water quality standards (i.e., 5.0 mg/l) will result in a loading to the Seekonk River of 6.5 times the Bay-wide loading. UBWPAD is the dominant source of nitrogen to the Blackstone, even after accounting for attenuation, from the Blackstone to the Seekonk. In addition, the estimated nitrogen delivery factor for the Blackstone River will increase in the future as actions are taken to address phosphorus driven eutrophication (*see* Response #F17). Accordingly, EPA determined that a limit of 5.0 mg/l total nitrogen for UBWPAD's discharge is necessary in order to achieve water quality standards. RIDEM required a similar limit in the permit initially issued to Woonsocket. In settlement of an appeal of the permit, Woonsocket has agreed to a compliance schedule that will require construction of facilities to meet a total nitrogen limit of 3.0 mg/l. *See* Consent Agreement, In re: AAD No. 05-004/WRA, June 27, 2008).

Comment #F19: RIDEM's analysis is based on area loadings of nitrogen to various portions of the bay, and comparison of those area loadings to area loading of the MERL experiments. In addition to this approach being an improper application of the MERL experiments because of the significant differences in flushing times that would lead to significant differences in concentrations, the analysis ignored certain critical aspects of the circulation of the upper portion of the Bay. In constructing their analysis RIDEM used reaches of the upper bay that were originally developed by Nixon and Chinman to assess flushing times in the bay as a whole (*Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, page 9). RIDEM then calculates the area loading as the sum of the loads discharged in that reach and above, divided by the area of that reach and the reaches upstream. Thus, for example, the loads from the Upper Blackstone plant are distributed to the Seekonk River reach, as are those of the Woonsocket plant and the Bucklin Point plant, together with the plants on the Ten Mile River. As calculated by RIDEM, the load to this reach does not include the discharge from the Fields Point plant, or the East Providence plant, as their point of discharge is further down river into different reaches. This approach ignores the following factors:

- For half the day, the flood tide will actually carry the discharges from East Providence and Fields Point up river, in the direction of the Seekonk reach. Absent information showing that the tidal excursions are insufficient to transport the discharges as far as the Seekonk reach, all or part of the loadings to the reach should have been included in the calculation.

- Information suggests that the Providence and Seekonk Rivers may exhibit classic estuarine circulation — shoreward (or upriver) flow in the denser, bottom layer, and seaward, or downstream in the less saline upper layer (see Attachment A7). This would suggest that under stratified conditions the lower layer discharges would all be transported up into the Seekonk reach, and that all of the loads from the two downstream plants should have been included in RIDEM's analysis.

The fact that RIDEM relies on conceptually inaccurate and incorrect representations of the circulation of Narragansett Bay system compels the conclusions that one cannot rely on their analyses to justify the reductions in Nitrogen, and that it is wholly inappropriate to suggest that levels as low as 5mg/1 in the Upper Blackstone discharge are absolutely necessary to restore the health of the Providence and Seekonk Rivers.

Response #F19: The Providence and Seekonk Rivers do exhibit classic estuarine circulation. As such, wastewater discharges, which are fresh water, would be expected to stay in the upper fresh water layer and not be subject to significant transport upstream. Dye studies conducted for the Narragansett Bay Commission (NBC) on the Fields Point Wastewater Treatment Facility discharge in August 1989, indicate that there is minimal upstream transport of wastewater effluent. See *Preliminary Report - Summer Survey Dye Dilution Studies Field's Point Wastewater Treatment Facility Providence, Rhode Island.*

EPA recognizes that the MERL tank experiments cannot exactly replicate the complex dynamics of the Providence/Seekonk River systems. These differences include flushing rates. In establishing the nitrogen limit in this permit, EPA took into account uncertainties in extrapolating the MERL experiments to the natural setting of Upper Narragansett Bay. *See* Response #18A.

Comment #F20: The proposed permit requires compliance with the nitrogen limit of 5 mg/1 for the period May 1 through October 31. Achieving such low limits in the early and late part of this period can become problematic if high flows and or low temperatures limit the ability of the biological treatment systems to convert and remove nitrogen or phosphorus. The same factors would also serve to limit adverse impacts in the receiving waters. High flows decrease residence time, thereby limiting the growth of algae, and low temperatures suppress biological kinetics, causing the same effect. For this reason, we suggest that the permit limits be tied to both flow and temperature. The EPA should attempt to develop these limits using the tools it has available -- such as the QUAL2E model or it should await the development of other models by the District or the Narragansett Bay Commission. Failing that, the approach used by RIDEM to set limits for the City of Warwick could be used as guidance. In that permit, there is no limit for May, and in the months of June and October, the limit is 12 mg/l. And for the months July through September, the limit is 10 mg/1 if the flow is below a certain level, or 8 mg/1 if the level is above a certain level. In any event, the EPA should explain why there are permit limits for some plants in the month of May, but not for others.

Response #F20: To the extent the commenter suggests establishment of water quality based effluent limits must await a TMDL or UBWPAD's modeling efforts, EPA

disagrees. *See* Responses #A3, #E3 and #F7. In addition, efforts to update the QUAL2E model were unsuccessful relative to simulating in stream phosphorus levels. *See* Response #F13. It is unclear what, if any, modeling work is being undertaken by NBC or that the modeling being undertaken by UBWPAD will be able to accurately simulate water quality in the Blackstone River.

The period for which the nitrogen limits are applied in the permit corresponds to the peak growing season. Minimizing the potential for nitrogen uptake throughout the growing season, including May and October, is necessary to achieve water quality standards. The purpose of the seasonal limits is to minimize the potential for nitrogen to accumulate in the system through uptake by phytoplankton and then to settle into the sediments and potentially resuspend into the water column. As is detailed above, the Region employs a reasonably conservative approach when permitting nutrient discharges because, once begun, the cycle of eutrophication can be difficult to reverse given the tendency of nutrients to recycle through the ecosystem. *See* Response #18A.

Further, the Technical Advisory Committee for RIDEM's water quality modeling and TMDL development work recommended the seasonal limits (*see* RIDEM Response to Comments document, page 26), and such limits have been incorporated into recently issued permits for MA and RI facilities. With regard to Warwick, RIDEM has advised EPA that when the permit is reissued, it will include limits that correspond to the peak growing season in line with other facilities.

Comment #F21: Although it might appear that most dischargers in Rhode Island have accepted the permit limits that have arisen from the RIDEM analysis, careful inspection suggests that it will be many years before the limits will be achieved, if ever. Rather, the consent agreements implementing the limit provide substantial time for compliance, and provide for consideration of data that might defer achievement of the limit far off into the future. The main direct dischargers to the Providence are the Narragansett Bay Commission's Fields Point and Bucklin Point plants. Although both of the permits for nitrogen for these plants were appealed, the appeals have been dropped by virtue of a consent agreement entered between the State and NBC. Careful inspection of the consent agreements reveals that:

The consent agreement for the Fields Point plant (see Attachment A8 to this document) provides that the Commission will develop a facilities plan amendment, and design and construct certain initial facilities. These are essentially the facilities that NBC has been studying for several years, the components of which RIDEM was well aware. For a period following completion of the initial upgrades to the facility, the NBC will run the plant to determine if the facility can meet the 5 mg/1 permit limit. If the facilities cannot meet the 5 mg/1 limits, then the NBC is afforded the opportunity to propose the construction of additional facilities. And as part of doing the studies on the new facilities, NBC may take into consideration the costs and benefits of providing additional treatment in developing its schedule for constructing these new facilities. (See consent agreement, paragraph 11.b.(ii)).

We understand that NBC is moving forward expeditiously to complete construction of its initial upgrade. The final facilities plan amendment has been submitted for RIDEM's review, and work on the design phase has begun. But we find it hard to believe that the initial facilities will be complete before about late 2012 at the earliest. Assuming that the initial facilities do not meet the 5 mg/1 level, and then making allowances for further studies, planning and design, we might expect that compliance with the 5 mg/1 limit may not happen until as late as 2016 to 2018.

We think it odd that the consent agreement associated with a permit that explicitly requires a 5 mg/1 limit has a provision for what to do if the limit isn't met. Why would this be? The answer is found in the draft facilities plan prepared by the Narragansett Bay Commission, copies of which are included as Attachment A9 to this document. This document makes it clear that complete compliance with the 5 mg/1 limit is not certain, and will be achieved only under favorable conditions. Accordingly, we believe that the agreement struck between the NBC and RIDEM essentially says: we will build a treatment facility of a certain configuration. That configuration is constrained by space and cost considerations. If the facility meets 5 mg/1 then we will continue to operate the facility according to the permit. If we cannot meet the limit, we will then get additional time to propose new facilities. And, when we are proposing those new facilities, the schedule we propose may take into consideration the marginal costs and water quality benefits of the new facilities.

We actually believe that this is a rational way forward for the construction of nitrogen removal facilities: One should build facilities to a cost effective end-point, operate those facilities to the maximum extent feasible and then see if additional facilities are needed.

Response #F21: We disagree with the characterization of the Consent Agreement as not requiring that the Fields Point facility actually achieve a 5.0 mg/l permit limit. The commenter's assertion that the nitrogen effluent limits that have been imposed by RIDEM on Rhode Island facilities are illusory, and that it would be unfair to impose actual limits on Massachusetts facilities, is inaccurate. The Consent Agreement for the Fields Point facility requires that NBC (the entity responsible for operation of the facility) complete major upgrades and optimize operations as soon as possible in order to achieve a nitrogen limit of 5.0 mg/l. These upgrades are currently under design with a design completion date of November 2008. The commenter references a provision in the Consent Agreement (paragraph 11.b.(ii)) that allows NBC a longer period of time to achieve final compliance in the event that initial major upgrades do not result in achievement of the 5.0 mg/l limit. Pursuant to this provision, NBC may consider a number of factors in proposing a schedule for additional upgrades, including the extent of noncompliance in achieving the 5.0 mg/l limit, costs and extent of additional modifications needed, whether a permit modification is pending and anticipated water quality benefits. The Consent Agreement nowhere, however, indicates that NBC does not need to meet the 5.0 mg/l, or that such considerations can be used to revisit the limit. The permit limits are final limits that remain in effect regardless of any analyses NBC wishes to do relative to scheduling. Changing the permit limit would require a permit

modification, and a cost benefit analysis is not an appropriate basis for modifying a water quality based permit limit (*see* Response #A9). [13]

Where appropriate, Rhode Island and EPA establish compliance schedules for new permit limits that allow for a reasonable amount of time to complete necessary treatment upgrades while achieving compliance as soon as possible. Rhode Island's Water Quality Standards do not include provisions allowing for schedules in permits; Rhode Island's practice is to incorporate schedules in an Administrative Compliance Order or a Consent Agreement. Because the nitrogen limit in the UBWPAD permit is based on Rhode Island's standards, EPA is not including a compliance schedule in the permit. In light of overlapping issues related to design of treatment to meet the nitrogen and phosphorus limits in the permit, EPA intends to handle compliance issues comprehensively when more is known about such issues as modes of treatment. *See* Response #E2. Further, as we have indicated in Response #A2, #E2, and #F7, a compliance schedule for UBWPAD will be reasonable and consistent with the requirements of the Clean Water Act. Facilities in Massachusetts have been and will continue to be afforded the same considerations as facilities in Rhode Island in the establishment of schedules. It is EPA's intent to work closely with MassDEP and RIDEM to ensure that the facilities in each state are on the same approximate schedules. *See* Letter dated January 8, 2007 from Ken Moraff, Deputy Director, Office of Ecosystem Protection, EPA to Glenn Haas, Director, Bureau of Resource Protection, MassDEP and Alicia Good, Assistant Director, Water Resources, RIDEM. In this way, we will be able to best assess improvement to water quality.

Comment #F22: The effluent limits and monitoring requirements established in Part I.A.1 apply to both outfall 001 and 001A (the wet weather discharge). These are excessive and inconsistent with permits issued in the watershed.

The District's Phase I water treatment facility improvements increased the capacity of the preliminary and primary treatment facilities to handle a peak hour flow of 160 mgd. The Phase II waste water treatment facility improvements now under construction and expected to be completed in August 2009, are designed to handle an average daily flow of 45 mgd, a maximum daily flow of 80 mgd, and a peak hour flow of 120 mgd. The advanced treatment facilities were designed to meet the total phosphorus limit of 0.75 mg/L and a total nitrogen limit of 8 to 10 mg/L (even though the 2001 permit did not require a total nitrogen limit). During high flow events, the analysis performed during design revealed that the 2001 permit limits for TSS, CBOD, ammonia and total phosphorus could be achieved by blending the advanced treatment effluent with the wet

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[13] EPA believes it is reasonable to assume that technically achievable reductions associated with the legally enforceable permits issued to Rhode Island dischargers will actually occur. To second guess the motives of the state and the discharger with respect to implementation of compliance with permits terms, as the commenter invites EPA to do, would be mere speculation and would not amount to a reasonable or rational basis to assess UBWPAD's permit limit for nitrogen. When accounting for existing controls on other point sources, EPA instead believes that is reasonable to assume that validly issued permits will be complied with and pollutant reduction contemplated thereunder achieved. EPA will also be closely involved in overseeing limits in future permits for facilities in Rhode Island.

weather discharge, given the expected frequency and duration of blending events. It will not be possible to meet the permit limits for total nitrogen and phosphorus proposed in the draft permit without pumping and treating the full 160 mgd peak hour flow through advanced treatment. The cost to achieve this provides no benefit to the receiving waters.

Since the proposed total phosphorus limit is based on 7Q10 conditions, discharge 001A, which only occurs under an extreme wet weather event, should not be held to the total phosphorus limit of 0.1 mg/L. In addition, as presented above, it would be more prudent to complete construction of the ongoing facility upgrades, monitor operation of these facilities for a period of at least two full growing seasons, complete and refine the ongoing modeling to better assess the fate and transport of phosphorus under wet weather events, and then determine if permit modifications are required.

Since the total nitrogen limit is driven by conditions in Narragansett Bay, and both the Narragansett Bay Commission's facilities (Fields Point and Bucklin Point) have wet weather discharge outfalls that are not subject to the nitrogen limit, not to mention the numerous CSO outfalls under the jurisdiction of NBC that discharge to the Seekonk, Moshassuck and Blackstone Rivers during rainfall events, UBWPAD should not be held to a nitrogen limit at discharge 001A which would likely activate concurrently with the overflows in Providence.

The Bucklin Point Facility is designed to receive a maximum daily flow of up to 116 mgd. Flow to the WWTF's headworks is reported. All flows up to 46 mgd on a maximum day basis receive secondary treatment. Flows received in excess of the 46 mgd secondary treatment capacity receive primary treatment and disinfection and is diverted through the North Diversion Structure (outfall 002A). No sampling or reporting is currently required for the discharge from outfall 002A with the exception of the quantity of flow discharged.

For the Fields Point facility, all [flow] to the waste water treatment facility headworks is reported. All flows received at the headworks receive at least primary treatment and disinfection. Up to 77 mgd must receive secondary treatment. Flows greater than 77 mgd but less than 91 mgd must receive secondary treatment during the first hour of such flows. Flows greater than 77 mgd, received after the first hour of such flows, are diverted to the wet weather treatment facility and discharged through outfall 002A. The maximum daily flow discharged from outfall 002A is 123 mgd. For outfall 002A, CBOD and TSS is monitored and reported (no limit has been established at this time) based on a 24-hour composite sample (hourly grabs) when in use. On an average monthly basis, for storms less than or equal to the one-year six-hour storm, 35% BOD removal and 50% TSS removal is required. Fecal coliform and Total Residual Chlorine is monitored and reported (no limit has been established at this time) based on a grab sample taken at the same time.

Currently there are 65 CSO outfalls under the jurisdiction of the Narragansett Bay Commission, which result in 71 discharge events per year[.] NBC currently plans to spend one billion dollars on CSO control. The first phase of these improvements will go on line in 2008. Shouldn't the effects of CSO control of direct discharges to Narragansett

Bay be monitored prior to mandating additional treatment on the wet weather discharge at Upper Blackstone?

Response #F22: The water quality-based phosphorus limit of 0.1 mg/l was established to ensure that designated uses in the Blackstone River are achieved and maintained at all times. The limit was established under 7Q10 flow conditions, consistent with the requirements in the Massachusetts Surface Water Quality Standards, in order to ensure that the minimum criteria that are necessary to protect designated uses are met under worst case conditions and that water quality is better than the minimum criteria under higher flow conditions. These minimum criteria are only protective of designated uses if aquatic life are exposed to these levels infrequently and for short periods of time. We disagree that the phosphorus limit is not necessary during high flow events to ensure that water quality standards will be met. The UBWPAD facility discharges into the headwaters of the Blackstone River and is very large (peak hour flow of 160 MGD during wet weather) relative to the flow in the river. The discharge dominates the flow in the river under low flow conditions and during most storm events. In addition to the substantial increase in discharge flow during wet weather conditions, the background concentration of phosphorus is significantly elevated compared to dry weather conditions (see Response #C1 and *Blackstone River Watershed 2003 DWM Water Quality Monitoring Data*, May 2005 (MassDEP)). Wet weather monitoring conducted by MassDEP under its Smart Monitoring program at a water quality station (Middle River) just upstream of the UBWPAD discharge, at a time when the Worcester Combined Sewer Overflow Facility upstream was not discharging, resulted in total phosphorus concentrations ranging from 45 - 330 ug/l with an average of 132 ug/l (MassDEP Smart Monitoring data: 9/20/2000, 11/20/2003, 4/28/2004, 6/23/2004). The lack of dilution and the elevated background concentrations of phosphorus during wet weather events supports the applicability of the 0.1 mg/l total phosphorus limit under all flow conditions.

With regard to nitrogen, RIDEM's 2004 study documents that current total nitrogen loads to the Seekonk River are 24 times higher than the total nitrogen load to all of Narragansett Bay on a per unit area basis. If the concentration limitations recommended by the report were used to establish mass limits using the design flows of the waste water treatment facilities, the Seekonk River would receive nitrogen loads of approximately 10 times higher than the Bay-wide loads per unit area. With the limitations established as concentration limits (5.0 mg/l for UBWPAD), at current flows the Seekonk River would receive nitrogen loads of about 6.5 times higher than the Bay-wide load. Even at 6.5 times the Bay-wide loading, further reductions may be necessary and the monitoring program in place will allow for making this determination (*see* Response #E1). Based on the MERL tank experiments, a nitrogen loading of between 2 times and 4 times the Bay-wide loading may be necessary to achieve water quality standards. We have established UBWPAD's limit at 5.0 mg/l in light of uncertainties in the physical model. *See* Response #F18A. As indicated in the Fact Sheet and in Response #F6, EPA believes that the limit cannot be any less stringent than 5.0 mg/l under all flow conditions and ensure that water quality standards will be met. Concentration based total nitrogen limits have also been established in permits for many other municipal treatment facilities in Massachusetts and Rhode Island that discharge to Narragansett Bay in order to achieve a nitrogen loading of 6.5 times the Bay-wide loading.

Total loading to Narragansett Bay greatly exceeds that water body's capacity to assimilate nitrogen. All discharges of nitrogen from the UBWPAD, those occurring during dry and wet weather, are contributing to substantial water quality impairments in the Bay. It is essential, therefore, that the Permit limit these discharges. There are uncertainties in the physical model for the Bay, and it is not yet feasible to precisely identify limits for all dischargers that may ultimately be necessary for standards to be met at all times. The Region has concluded, however, that a nitrogen limit at least at stringent as 5.0 mg/l for the UBWPAD is necessary to prevent further degradation of the Bay. In accordance with the Clean Water Act's mandate, the Region has included that limit in the UBWPAD's permit.

Rhode Island has a strategy for addressing wet weather impacts from point source dischargers that will achieve a substantial amount of reduction in the frequency and volume of overflows. CSO remediation for the NBC facilities includes extensive tunnel storage and maximization of the amount of flows receiving full treatment. Discharges not receiving full treatment will be very infrequent. In contrast, UBWPAD has no significant storage capability and the frequency and volume of wastewater not receiving full treatment will be much greater than NBC.

Additional upgrades evaluated for achieving the new nutrient limits at the UBWPAD facility should carefully consider the amount of storm water in the system (infiltration/inflow in separate sewers as well as remaining CSO contributions to the plant). Controlling the excessive amount of rainwater and groundwater in the system will not only reduce the size of the facilities necessary to comply with the permit limits but will also reduce operation and maintenance cost, in particular chemical and energy cost.

Comment #F23: Footnote 3 on page 5 of 19 (pertaining to CBOD5, TSS, ammonia, total nitrogen, phosphorus, metals and whole effluent toxicity testing) indicates, “For each day that there is a discharge from outfall 001A, 24-hour composite samples will consist of hourly grab samples taken from outfall 001A for the duration of the discharge.” An automatic sampler exists at this outfall and should be allowed for use in obtaining a composite sample from outfall 001A for the duration of the event.

Footnote 5 on page 5 of 19 (pertaining to fecal coliform, total residual chlorine and dissolved oxygen) indicates, “For each day that there is a discharge from outfall 001A, a grab sample will be taken from outfall 001A within the first hour of the discharge, and every three hours thereafter for the duration of the discharge, and combined proportional to flow with a grab sample taken concurrently from outfall 001” Fecal coliform, MC and DO need not be a blended sample – each discharge will monitored independently and meet the requirements of the permit. In addition, grab samples every three hours for the duration of the discharge from outfall 001A is excessive, inconsistent with other permits in the watershed and would require “round-the-clock” staffing of trained laboratory personnel during and after a discharge event. The District has established dosing rates during a storm event which is flow paced and has shown to achieve the required fecal coliform kill. The SCADA system tracks chemical dosing which will confirm adequate

chemical dosing during the event. If there is a need for supplemental coliform monitoring, use of the "Coliert" method should provide the efficacy of disinfection without the need to staff with trained lab personnel "round-the-clock."

Response #F23: Footnote #3 in the draft permit allows for use of a composite sampler for outfall 001A.

Maintaining adequate chlorine dosing to achieve bacteria limits, and then ensuring adequate dosing of dechlorination chemicals to ensure that toxicity based TRC limits are not exceeded, is a difficult task during dry flow conditions due to changing flows rates and chemical constituents, and is made even more difficult during high flow events. A once per day grab sample, in particular during high flow events, is inadequate for ensuring compliance with the permit limits. It is reasonable and appropriate to require more frequent sampling during high flow events. However, we do not believe that these concerns are as significant for dissolved oxygen. Consequently, the final permit has reduced the frequency of dissolved oxygen monitoring to once per day.

The permit limits for dissolved oxygen, TRC and fecal coliform apply to the combined discharge. It is, therefore, appropriate for the permit to require compliance sampling results for the combined discharge. However, we agree it is sufficient for the permittee to monitor for these permit limits at each outfall separately provided that effluent limits are met at each separate outfall. The final permit reflects this change.

Comment #F24: Footnote 13 on page 7 of 19 requires whole effluent toxicity testing on discharge 001A two times per year. This requirement is also excessive and inconsistent with other permitted wet weather discharges. Also, since this is an intermittent discharge chronic testing is illogical. Typically chronic tests are renewed with discrete samples beginning on days 0, 3 and 5 (as outlined in Attachment A of the permit). It may not be possible to acquire the required samples from outfall 001A on subsequent days after the test is started (since we cannot predict that weather) or it may not be possible to obtain sufficient volume of effluent for chronic tests which are renewed daily. If a single grab sample is collected for chronic testing, it would be used throughout the 7-day period (exceeding the sample hold time of 72 hours). It is suggested that chronic testing on outfall 001A be stricken from the permit.

Response #F24: Facilities subject to high flow events can experience a significant reduction in removal efficiencies for toxic parameters. The Brockton, MA permit is an example of a facility receiving very high flows and experiencing significant toxicity during high flow events. The Brockton permit also requires additional toxicity testing during high flow events. It is necessary to ensure that a facility designed to receive very high peak flows does not result in a toxic discharge during these peak flow periods. However, we concur that acute testing under high flow conditions is more appropriate than chronic testing and have removed the requirement for chronic testing from the permit.

Comment #F25: The draft permit requires year-round disinfection to achieve the fecal coliform limits. In the past, as has been common in Massachusetts, disinfection has been limited to the seasons when people might swim, and the District does disinfect in the swimming season (April 1 through October 31). The Fact Sheet states that the new requirement is based on Rhode Island Water Quality Requirements, however, the Rhode Island requirements are designed to protect bathing waters from bacterial contamination and Rhode Island's Department of Health stops testing bathing beaches in September for bacterial contamination. Lastly, there are no designated bathing beaches on the Blackstone River in Rhode Island. Therefore, we question the need for year-round disinfection of outfalls 001 and 001A since it serves to protect a use that doesn't exist. This requirement will increase chemical use of sodium hypochlorite and sodium bisulfite by about 50%, resulting in commensurate increase in cost and truck traffic associated with the chemical deliveries.

It is also important to understand the fate and transport of fecal coliform bacteria discharged from the Upper Blackstone WWTF to the Rhode Island border. Depending on flow in the river, the travel time from the Upper Blackstone WWTF to the Rhode Island border is estimated to range from about 22 hours to 36 hours. Assuming a decay coefficient of between 1.0 to 1.5/day, and a one day travel time, the concentration of fecal coliform at the border is expected to be only 20 to 35% of that discharged from the plant. Finally, dilution of the Upper Blackstone WWTF discharge in the Blackstone River at the Rhode Island border [ranges] from 13:1 to 23:1. Assuming the most conservative decay coefficient of 1.0/day, a one day travel time, and a 13:1 dilution, Rhode Island water quality requirements could be met at the border if fecal coliform discharged from the Upper Blackstone facility was 7500 MPN/100 ml.

It is our understanding that RIDEM is doing a TMDL for bacteria on the Blackstone River. The results of that TMDL should be reviewed to determine, how much, if any, reduction in fecal coliform is necessary at the Upper Blackstone facility in the winter months.

Response #F25: Rhode Island water quality criteria for fecal coliform bacteria apply year round, and RIDEM implements this requirement by establishing year round bacteria limits in Rhode Island permits. We do concur that bacteria die off during the travel time to the state line should be considered since the criteria apply at the state line The applicable (EPA-approved) Rhode Island water quality criteria for fecal coliform bacteria are a geometric mean value not to exceed 200 MPN/100 ml and that 20% of values are not to exceed 500 MPN/100 ml. We do not believe that we can establish limits that account for dilution because of the multitude of other sources of bacteria in the river that effectively eliminates the dilution benefit of higher flows. For example, as part of the Blackstone River Initiative, wet weather sampling[14] that was conducted during three fall storm events, (September 1992, November 1992, and October 1993) each showed event mean fecal coliform concentrations exceeding the MA and RI water quality criteria

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[14] EPA-New England"Blackstone River Initiative", May 2001, pp.7-16 to 7-18.

(geometric mean of 200 cfu/100 ml) at all river stations from Northbridge to the state line in Blackstone, Massachusetts, for all three storm events, with the exception of one station where the criteria was exceeded for two of the three storm events**.** During the September and October sampling events, the Massachusetts POTWs would have been disinfecting, indicating significant wet weather sources of bacteria. Data collected during the November storm, which was sampled during the period of November 2-5 of 1992, when the Massachusetts POTWs would not have been disinfecting, showed a mean fecal coliform concentration of 764 colonies/100 ml at the state line.

Accordingly, we have calculated bacteria limits based on die-off due to the travel time to the state border, assuming a first order die-off equation, as suggested in the comment. Assuming a decay rate of 1.0/day and a travel time of 1 day, both values within the range suggested in the comment, we have calculated that 35% of the bacteria discharged will be viable at the state border. We have therefore changed the cold weather bacteria limits to a monthly average of 571 organisms per 100 ml (200/0.35) and a daily maximum of 1429 organisms per 100 ml (500/0.35). We believe that these limits will ensure that the discharge does not cause or contribute to a violation of standards at the state line.

If an approved TMDL for bacteria indicates that an alternative effluent limit is appropriate, then the permit limit can be modified in a future permit action. *See also* Response #F49.

Comment #F26: During the public meeting held in advance of the public hearing on the permit, EPA offered the opinion that the project would cost significantly less than the amounts being discussed by the District, and that consequently the increase in household costs would be proportionately lower. According to senior EPA personnel the EPA based its costs on comparisons to the estimates of the cost to upgrade the Narragansett Bay Commission's Fields Point Plant, and by extrapolation of the installed costs of denitrifying filters installed for the Town of Wareham, MA. Written documentation of the former is not available; however email correspondence between the District and EPA provides insight into the extrapolation of the Wareham costs.

That documentation suggests that EPA estimated the costs of the Wareham filters at $550,000, plus an allowance of $55,000 for installation and $37,000 for startup and training. The specific source of these estimates is not clear. Also, it is not clear what year dollar values are used, although it is likely that they reflect prices from the 2001-2005 time frame, as that is when the plant was bid and constructed. The Agency used its cost estimate to scale up from the 1.6 mgd plant Wareham plant size to a 45 mgd plant size for the District. A review of this suggests the following:

> The way the EPA used the Wareham plant data is erroneous. Although the plant is rated at 1.6 mgd average day flow capacity, equalization basins have been installed ahead of the treatment system to dampen out peak system flows. The peak design flow is only 2.0 mgd, whereas normally this would have in the range of 3.5 to 4.5 mgd (peak factors of approximately 2:1 to 3:1).

It is not clear where the $550,000 cost for the filters came from. The overall cost of this project approached $20 million.

The fit-up estimate of $55,000 is significantly low, as this typically approaches the cost of the equipment itself.

There seems to be no allowance for any ancillary facilities and equipment necessary to house and support the operation of the filters. Nor does it appear to include any allowance for contractors overhead, bonding, profit or engineering.

There are no costs associated with installation of facilities for phosphorus removal, there are no costs associated with an expanded chlorine contact tank. This is necessary because the full 160 mgd must meet both the N and P limits contained in the permit, and thus split treatment of high flows is not possible.

Because of the equalization basins, it would be more appropriate to calculate a cost per mgd of peak capacity, and then multiply that by 160, the peak flow rate at which the District must meet the proposed permit limits. This factor alone suggests that EPA has underestimated its costs by about a factor of 4, as they appear to have used a 45 mgd design flow for estimating costs.

Costs should be adjusted to reflect the midpoint of construction.

Taken altogether, this suggests to us that EPA's cost estimates were significantly in error, and should be discounted. As a first order estimate of the costs of compliance, the District believes a value of approximately $150 million in present day costs, and greater in constructed dollar costs, are a more appropriate estimate of the costs of compliance with the nitrogen and phosphorus limits in this permit.

Response #F26: Through their water quality standards, states determine the level of protection needed for receiving waters. Where EPA (or other permitting authorities) conclude there is a reasonable potential that a discharge will cause or contribute to a violation of the standards, EPA then must set an effluent limit necessary to ensure the standards are met. *See* 40 CFR §122.44(d)(1)(i). Costs are not considered at this point in the process of establishing water quality-based effluent limits. Once these limits are established and set forth in a final permit, however, the regulations include a mechanism to allow relief from meeting the limits where they are demonstrated to be unaffordable. *See* Response #F1.

EPA held an informal, public meeting in advance of the public hearing in light of the substantial public interest in this permit issuance. At that time, we made available the staff working on the permit to answer questions about this permit and the permitting process in general. While not relevant to setting water quality-based limits, we fully appreciate that the cost of treatment is a critical concern for ratepayers, public officials and others in the UBWPAD service area. At the public meeting, we offered estimates of costs of nutrient treatment based on estimates of other facilities' planning efforts (e.g., NBC Fields Point).

UBWPAD has offered estimates in oral and written comments ranging from $100 to $200 million to construct upgrades necessary to meet the new nutrient limits. EPA cannot evaluate the accuracy of nor agree with these figures as we do not know the basis for these estimates. We (and UBWPAD) do not yet know the most cost-effective treatment options for the UBWPAD facility. In addition, we do not yet know how and over what time period cost of treatment would be funded. As stated elsewhere, EPA intends to work with UBPWAD and its consultants to discuss cost issues in the context of scheduling.

Comment #F27: The schedule for whole effluent toxicity testing presented on page 7 of the permit is too restrictive, requiring that the test be conducted during the second week of January, April, July and October. The previous permit required only that one test be conducted each quarter with no definition on when during each quarter the test would be conducted. It is helpful when there is more flexibility in scheduling tests in any quarter to coordinate with the workload of the few labs in the nation that perform these tests, as well as the Upper Blackstone staffing and vacation schedules. It is suggested that more flexibility be offered in the scheduling of these tests.

Response #F27: Identifying the time when quarterly samples are taken is necessary to ensure that samples are representative and not selectively conducted only at times when the treatment performance is at its best. This is now a standard requirement in EPA Region 1's permits and has not proven to be a significant burden for either labs or other dischargers.

Comment #F28: Page 1 of 19 of the permit states, "The City of Worcester, the Towns of Millbury, Auburn, Holden, West Boylston and Rutland, and the Cherry Valley Sewer District are co-permittees for Part D and E. Only municipalities specifically listed as co-permittees are authorized to discharge waste water into the UBWPAD facility."

The Fact Sheet, page 1, defines Co-Permittees as follows: The municipalities of Worcester, Millbury, Auburn, Holden, West Boylston, Rutland and the Cherry Valley Sewer District are co-permittees for specific activities required by the permits as set forth in Section IV.H of this Fact Sheet and Section I.D and I.E of the Draft Permit.

Section I of the Fact Sheet states, "The facility serves Worcester and portions of Auburn, West Boylston, Holden, Rutland, Oxford and Millbury."

Section IV.H, last paragraph, states, "Because Worcester, Millbury, Auburn, Holden, West Boylston, Rutland and the Cherry Valley Sewer District each own and operate collections systems that discharge to UBWPAD's treatment plant, these entities have been included as co-permittees for the specific permit requirements discussed in the paragraph above."

Refer to Attachment A regarding the legal issues associated with the Co-Permittee, however, note the inconsistencies in permit needs regarding the municipalities that discharge to the Upper Blackstone Water Pollution Abatement District. A portion of

Sutton is conveyed through the Millbury collection system. The District also serves portions of Shrewsbury (Goodard Park) and Paxton (Anna Maria) via connections to the sewer system of Worcester and Oxford (Thayer Pond) via a connection to the Auburn system.

Also, please clarify that the language on Page 1 of the permit does not exclude the District from accepting septage and sludge from other communities.

Part D states, "The permittee and co-permittees are authorized to discharge only in accordance with the terms and conditions of this permit [and] only from the outfall(s) listed in Part I A.1." This is contrary to page 1 of 19 which indicates that the co-permittees discharge to the UBWPAD facility and District discharges from the outfall(s).

Response #F28: EPA derived the list of co-permittees set forth in the Draft Permit from information provided by UBWPAD in its re-application; specifically, in Response to Question A4 on Form 2A, UBWPAD indicated that its treatment facility serves the following municipalities: Auburn, Cherry Valley Sewer District, Holden, Millbury, Rutland, West Boylston and Worcester. Page 1 of the Draft Permit, the top of page 1 of the Fact Sheet, and page 19 of the Fact Sheet list co-permittees consistent with the information provided on the re-application. Section I of the Fact Sheet should have included Cherry Valley Sewer District and not Oxford. Notwithstanding the information provided in the permit application, EPA notes that UBWPAD's Facilities Plan does indicate that certain other municipal systems contribute wastewater to UBWPAD. The portions of Sutton, Shrewsbury, Oxford and Paxton that are sewered to the UBWPAD, or will be sewered to the UBWPAD during the life of this permit, are very small; accordingly, EPA will not include these three permittees as "co-permittees" in this permit. EPA may, however, include them as "co-permittees" in a future permit reissuance or a separate permit action. In addition, in the Final Permit, EPA has amended the language on Page 1 of the permit to make clear that these communities are not prohibited from discharging to UBWPAD.

The language on Page 1 of the permit refers to wastewater flows and not to septage and sludge deliveries.

The language in Part D of the permit is general permit language that applies to the permittee as well as the co-permittees. The language indicates that the only outfalls authorized for wastewater discharges are those listed on page 1 of the permit. We have clarified Section D of the final permit to make it clear that the term discharge in this context refers to discharges to waters of the United States.

Comment #F29: In order to achieve the proposed permit limits of 5 mg/L total nitrogen and 0.1 mg/L total phosphorus, significant modifications and additions to the current facility under construction would have to be implemented at a capital cost of $150,000,000 in today's dollars. The increase in operation and maintenance costs to achieve the limits is expected to approach $3,700,000 per year. The required treatment processes to achieve these limits is not sustainable, especially given that the benefits in the receiving waters realized from achieving these limits is suspect.

The current design, under construction, employs enhanced biological nutrient removal (EBNR) for phosphorus removal, nitrification and denitrification. However, there are limitations to the level of treatment that can be achieved using these biological processes. For total nitrogen, a limit of 8 mg/L can be consistently achieved without supplemental chemical addition (methanol) with a properly designed system. The system under construction is designed to treat an average daily flow of 45 mgd, maximum daily flow of 80 mgd and will be able to achieve 8 mg/L total nitrogen even though this was not included in the current permit. The system under optimal conditions (related to influent flow, influent load, and temperature) will likely produce an effluent less than 8 mg/L. It should be noted that the District chose to move forward with a system that has the ability to nitrify and denitrify because this system, although slightly more capitally intensive, reduces power, since less oxygen is required, and reduces chemical consumption (sodium hydroxide) since alkalinity [is] returned to the system. For phosphorus, the EBNR system, will achieve the current permit limit of 0.75 mg/L and will likely be able to produce an effluent quality in the range of 0.6 to 0.7 mg/L. However, this is about the limit of effluent quality that can be achieved simply with EBNR. [Note that achieving nitrification, denitrification and EBNR concurrently is a delicate process since competing reactions can favor the removal of one nutrient over the other.] Phosphorus removal can be heightened with the addition of an iron based chemical coagulant. However, consistently achieving a total phosphorus limit <0.5 mg/L without the aid of final filtration is difficult, especially when the treatment facility serves a combined sewer system.

In order to achieve a total phosphorus limit of 0.1 mg/L (a limit which is currently required at less than 30 of the 17,000 publicly owned treatment works in the nation) and a total nitrogen limit of 5 mg/L for the entire flow reaching the treatment facility, additional aeration tankage would be required, and the tankage currently under construction would have to be modified to provide the volume necessary to implement the modified Bardenpho process. Storage and feed facilities to accommodate the addition of 800 gallons per day of methanol or a similar energy source, would be required for nitrogen removal. [Note, significant care must be taken in the design and operation of this chemical storage facility, since methanol is an explosive substance.] Use of such energy sources will produce additional carbon dioxide (a notorious greenhouse gas); and will reduce the amount of the alternative energy available for other purposes while consuming the parent agricultural material needed as a food supply.

Subsequent to final clarification, the entire flow would have to be pumped to an add-on filtration or high rate settling process to achieve the phosphorus limits. Multipoint chemical addition (likely ferric chloride) would be required at a rate of 8,500 gallons per day. The chemical addition will increase sludge production at the facility by 35%. The sludge generated by the District is currently thickened, dewatered and incinerated on-site in multiple hearth furnaces. The chemical sludge produced in order to achieve the proposed phosphorus limit will be more difficult to dewater and incinerate. It is likely that the dewatered sludge will have a lower percent solids and it will be more inert due to the high fraction of chemicals in the sludge. Additional energy required to dewater and incinerate the sludge is expected to be significant. Lastly, additional ash will be

produced, again due to the inert chemical addition, which will more readily consume the finite ash landfill capacity on the District's property. The electrical energy required to achieve these limits is expected to be on the order of 3,000,000 kW-hr/yr, nearly 20% above current usage, resulting in a commensurate increase in green-house gas emissions.

Before expending this much energy, consuming significant amounts of chemicals and generating significantly more sludge to be processed and disposed of, the benefits of achieving these limits should be known and the indirect impacts of achieving these limits quantified.

Response #F29: Please see Responses #F8 and #F52 relative to sustainability. See also Responses #A9 and #F1 relative to cost and technological considerations in establishment of water-quality based effluent limitations. See also Response #F6 relative the need for and benefits of the limits.

Comment #F30: Paragraph F.2.c specifies the maximum daily concentration of metals in the sludge fed to the incinerators. Limits for chromium and nickel should be revised to $1x10^6$ mg/kg since no concentration can exceed $1x10^6$ mg/kg.

We are unsure of the source of the stated metal control efficiencies. The metal control efficiencies used to calculate the maximum concentration of metals in the sludge are comparable but not the same as those recently obtained in the stack emissions test for cadmium, chromium and nickel, and should be revised to reflect most recent testing. Understand that even with the revised control efficiencies, easily achievable sludge metal concentrations result and there is no material change in the results.

Paragraph F.3.b,c,e, F.5.f and F.7.1: The moisture correction verbiage for carbon monoxide is incorrect. Moisture correction is not required.

Response #F30: The calculations for maximum daily concentration limits for chromium and nickel were done correctly, but as the commenter notes, result in concentration greater than physically possible. Limits of $1x10^6$ mg/kg have been included in the final permit.

The stated metal control efficiencies were taken from the permit application.

Federal regulations, 40 CFR 503.40(c), provides as follows: "The management practice in 40 CFR 503.45(a) . . . do not apply if the following conditions are met: (1) the exit gas from a sewage sludge incinerator stack is monitored continuously for carbon monoxide. (2) The monthly average concentration of carbon monoxide in the exit gas from a sewage sludge incinerator stack, corrected for zero percent moisture and to seven percent oxygen does not exceed 100 parts per million on a volumetric basis . . . ".

However, since UBWPAD's carbon monoxide monitoring system automatically corrects for moisture, the final permit language has been modified accordingly.

Comment #F31: Footnote No. 1. Since all influent flow to the facility is measured through the Parshall Flume at the influent end of the facility, this meter will be used to determine total flow to the facility.

Response #F31: The comment is noted for the record. Please note that the permit requires that outfall 001A discharge flows must also be reported.

Comment #F32: Ammonia nitrogen standards are listed in pounds per day and in milligrams per liter. Which limit prevails?

Response #F32: Both limits are required to be met.

Comment #F33: The draft permit requires the use of a continuous TRC analyzer for reporting monthly average and daily maximum discharges. The previous permit allowed daily grab samples for monitoring TRC. There seems to be inconsistency with the permit table and associated footnotes 7 and 8. The table establishes limits of 12 ug/L and 21 ug/L based on the daily grab and indicates "report" of continuous monitor. The footnotes, however, imply that [the] continuous monitor will be used for reporting purposes and daily grab simply used for calibration. The reliability of the TRC monitors for reporting is questionable based on experience which has shown that monitors foul easily, lose calibration quickly and are insufficiently sensitive to monitor required TRC limits. To our knowledge there are no continuous monitors capable of reliably measuring down to 12 Mg/L. The District has already tried three different probes on their TRC analyzers with limited success. Does the EPA have experience with any reliable TRC monitors? We would contend that the daily grab sample be the sample that is monitored for compliance, while the continuous recorder is presented for informational purposes only.

Response #F33: The permit requires that the grab sample be used for compliance and that the continuous meter be used for reporting-only. In light of fluctuations of flow and chlorine demand at the facility, grab samples may not be sufficient to determine if the discharge is in consistent compliance with TRC limits. For this reason, we have supplemented the grab samples with a requirement that TRC be measured continuously. We do not believe, however, that there is sufficient experience with TRC analyzers to require continuous monitoring to be used for compliance purposes at this time. Accordingly, continuous monitoring is report-only and will be presented for informational purposes. In addition, we note that the reporting level for TRC is 20 ug/l. With regard to experience with specific TRC analyzers, EPA has been working with a number of other wastewater treatment facilities and as we gain additional information, we will share this information with all the facilities including UBWPAD.

As described above, the grab sample results are to be used to calculate compliance. Each day, at least one grab sample result shall be used to calibrate the continuous meter. This sample does not have to be taken in addition to the minimum number of samples required by the permit, but if it is, the result must be included in the data set used for compliance reporting of monthly average and daily maximum values. *See also* Response #D5.

Comment #F34: Footnote 9 indicates, "The permittee shall operate the treatment facility to reduce the discharge of total nitrogen during the months of November – April to the maximum extent possible." What is the basis for N reduction in the cold weather months? How is the District to show conformance to this standard? Should the facility be operated to reduce nitrogen in the colder months at the expense of phosphorus reduction?

Response #F34: The winter optimization requirement is included to minimize the potential that higher nitrogen loads might accumulate in the system and contribute to a further elevation of the nitrogen concentrations in the growing season. (*see* also RIDEM Response to Comments, page 26). The permit requires UBWPAD to use all available equipment, except carbon source addition and operate in a manner that allows for denitrification. As detailed in Response #A13 above, EPA has not established an effluent limit for the winter period. The facility is expected to operate in a manner that allows for denitrification during the November through April period while meeting all other permit requirements including the winter phosphorus limit. *See* Response #A13.

Comment #F35: On a combined sewer system, where the influent is often very dilute, it can be difficult to attain 85% removal of CBOD and TSS, even though the effluent limits are met. This requirement is a remnant of the old secondary treatment standards and should be stricken from the permit.

Response #F35: We concur and have modified the final permit to require that the permittee's treatment facility shall maintain a minimum of 85 percent removal of both total suspended solids and biochemical oxygen demand during dry weather. Dry weather is defined as any calendar day on which there is less than 0.1 inch of rainfall and no snow melt. The percent removal shall be calculated as a monthly average using the influent and effluent BOD and TSS values collected during dry weather days.

Comment #F36: In order to properly operate a waste water treatment facility, operators need to perform routine process monitoring and control. This draconian requirement [set forth at Part I.A.1.f of the draft permit] will ultimately discourage operators from performing this monitoring for fear that the results will be used to penalize the District.

Response #F36: The referenced requirement provides that: "The result of sampling for any parameter above its required frequency must also be reported." The requirement is not intended to be punitive. Rather, it is merely a re-statement of requirements applicable to all permits found at 40 CFR Part 122.41(l)(4)(ii) and included in Part II of the permit. This requirement is a condition of the expired permit. Facilities are required to be in

compliance with limits at all times and not just when they are conducting compliance sampling. The condition remains in the final permit but has been clarified that it applies to effluent data collected and analyzed using EPA approved methods in Part 136.

The permittee should review the requirements in the expired permit, and if it finds that it has failed to report such data in the past, it should provide the missing data to EPA and MassDEP as soon as possible.

Comment #F37: Part I.D, This section is not clear on whom is responsible for notification of overflows the permittee or the co-permittee.

Response #F37: The co-permittees are responsible for reporting overflows from sewer systems under their jurisdiction. We have further clarified this requirement in the final permit.

Comment #F38: The Permit requires the I/I Control Plan must be submitted within six months of the effective date of the permit. This does not provide the permittee or co-permittees enough time to prepare the required plan. The time should be extended.

Response #F38: In light of the requirements of the 1999 permit (modified December 2001), we believe that six months is adequate time to complete the required plan. Among other requirements, the previous permit required UBWPAD to work with the member communities to develop and implement strategies to eliminate excessive infiltration/inflow. Accordingly, UBWPAD and the co-permittees should have already developed much of the basis for the required plan. The UBWPAD is subject to extreme high flows that are in large part due to the very high level of infiltration/inflow in the member community sewer systems. *See also* Response #A4 and #F8.

Comment #F39: As noted in the Fact Sheet, MassDEP has submitted revised site-specific water quality criteria for copper. We are in support of the site specific criteria and would welcome its adoption in the final permit.

Response #F39: *See* Response #D1 above.

Comment #F40: The attached figure depicts an estimate of sewered population in Eastern Massachusetts and Rhode Island. As presented, a number of communities lining the Bay are less than 50% sewered. The identification of all non-point sources of nitrogen in Narragansett Bay has not been well established and thus the basis for the nitrogen limit for Upper Blackstone is questioned. Non-point sources, such as groundwater (from septic systems), combined sewer overflows (CSOs), atmospheric deposition, and sediment flux all contribute to the nitrogen load in Narragansett Bay and is not well understood. Until a better understanding of all loads to the Bay is provided (especially those in such close proximity to the Bay) it is illogical to spend significant funds to further reduce the nitrogen load originating at the Upper Blackstone facility miles away.

Response #F40: The March 3, 2004 report, *Governor's Narragansett Bay and Watershed Planning Commission, Nutrient and Bacteria Pollution Panel, Initial Report,* cited on page 11 of the Fact Sheet, identifies various reports analyzing nitrogen loads to Narragansett Bay. The reports indicate a general consensus that point sources are the dominant source of nitrogen to Narragansett Bay (60 – 70% of the total load). These evaluations of the relative significance of sources did include septic systems, CSOs and atmospheric deposition. Point sources represent the majority of the load to Narragansett Bay. Thus it is necessary and appropriate to limit point sources in order to achieve water quality standards. Further, non-point sources are not as amenable to controls as point sources, making point source reductions all the more critical. While efforts to reduce non-point sources of nitrogen are important and will have beneficial effects, even a high level of non-point source nitrogen reduction would not preclude the need for significant point source reductions.

Site specific factors affecting the response to nitrogen loadings in Narragansett Bay (as opposed to the results of the MERL tank experiments) are clearly recognized and discussed in the Fact Sheet. The differences between the MERL tank experiments and conditions in Narragansett Bay are the primary reason why even lower limits for total nitrogen are not being established at this time. *See* Response #F18A.

Comment #F41: Clarifications to Fact Sheet

Description of Treatment Facility

1st para, 3rd line, delete, "and chemical addition facilities for total phosphorus removal." There are no chemical addition facilities currently and none are planned in the current upgrade.

1st para, 7th line, delete, "stored in a septage holding facility and then introduced" and replace with "directly discharged." The District does not have septage holding tanks.

2nd para., 2nd line, delete "two" and replace with "four." The current waste water treatment facility upgrade consists of four phases, the first two of which are essentially as described, a third phase which will soon be under design, will focus on sludge management improvements needed to sustain the facilities constructed in Phase I and II, and a fourth phase to accommodate future development in the service area.

2nd para., 3rd line, after "and" insert "improvements to multiple hearth furnaces and associated."

2nd para., delete last sentence and replace with "Phase I was completed in 2006 and Phase II is scheduled to be completed by August 5, 2009."

3rd para., 3rd line, delete "with minimal treatment."

3rd para., 4th line, after "a peak hour flow of" insert, "up to."

3rd para., insert at the end of the paragraph, “The upgraded facilities were designed to meet the permit limits established in the September 30 1999 (modified on December 19, 2001) with the blended effluents from outfalls 001 and 001A.”

4th para. Refer to comments above regarding Discharge at Outfall 001A.

Description of the Receiving Waters

The Rhode Island waters are clearly designated with a partial use restriction — waters likely to be impacted by combined sewer overflows. Why isn't the Blackstone River in Massachusetts so designated?

Limits Derivation

Page 8, 2nd para., under “Phosphorus” states, “The expired permit has a monthly average limit of 750 ug/1 from April 1 to October 31. Effluent data from DMRs for April thru October during 2004 thru 2006 ranged from 900 to 2,400 ug/l total phosphorus.” This implies that the District has been in constant violation of its current permit which is not the case. Interim permit limits were negotiated in good faith with the regulators in late 2001, understanding, at that time, that the phosphorus limits included in the September 30 1999 (modified on December 19, 2001) would not be achieved until August 2009. The interim permit only required that the District “report” phosphorus, no limits on phosphorus were included. The District has operated in compliance with the Consent Order and the interim permit.

Sludge

Page 19, 2nd para., delete second paragraph in its entirety and replace with the following, "UBWPAD owns and operates two multiple hearth incinerators equipped with flue gas recirculation. The incinerators have the following air pollution control devices: a venturi scrubber which removes particulate matter and volatile metals; an impingement tray scrubber which removes acid gases and additional metals; a wet electrostatic precipitator which removes fine particulates and metals; and regenerative thermal oxidizers which converts volatile organic compounds to carbon dioxide. The District generates approximately 8836 dry metric tons of sewage sludge annually and receives approximately 2260 dry metric tones annually from off-site facilities.

Response #F41: The Fact Sheet is a document that accompanies the draft permit and is not subsequently modified with issuance of a final permit. The requested clarifications relative to the description of the treatment facility are noted for the record.

The Massachusetts Water Quality Standards do identify the Blackstone River as a CSO-impacted water, but it does not have a CSO designation because such designation requires a use attainability analysis that shows that elimination of CSOs is infeasible. A demonstration of infeasibility has not been made and no Use Attainability Analysis has been submitted to EPA. It remains to be seen how frequently the CSO facility will be discharging and whether the UBWPAD facility will be able to comply with water quality-based permit limits while accepting large volumes of combined sewer flows.

The effluent phosphorus data cited in the Fact Sheet indicates that the facility is not yet meeting the final limits in the expired permit. The facility has satisfied the interim requirements related to phosphorus included in the enforcement order.

The sludge clarifications are noted for the record.

Comments raised in Attachment B (Legal and Policy Issues/Comments) prepared by Bowditch & Dewey, in consultation with Barnes & Thornburg, LLP are addressed below.

Comment #F42: The District's central objection to the Draft Permit concerns the underlying scientific criteria, data and methods used to interpret narrative water quality standards and develop waste load allocations resulting in the proposed imposition of unrealistic and unreasonable numeric limits, particularly those limits pertaining to nitrogen and phosphorus. The Draft Permit's limits are not supported by reliable, probative and substantial evidence and are not in accordance with law and EPA's own policies. Several conditions of the Draft Permit are based upon clearly erroneous findings of fact and errors of law and implicate significant policy considerations. The data relied upon by EPA in determining certain nutrient limits is outdated and does not account for recent and ongoing upgrades and permit adjustments to municipalities discharging to the Blackstone River. Equally troubling is that EPA has acted on outdated information with full knowledge of the fact that updated information with respect to the water quality of the Blackstone River is currently being developed and should be available later this year.

Response #F42: The basis and methodology for development of the nutrient limits is detailed in the Fact Sheet. More specific comments raised by counsel to UBWPAD regarding the nutrient limits are addressed below. With regard to consideration of upgrades currently being undertaken by UBWPAD, *see* Responses #F7 and #F9. With regard to consideration of upgrades necessary to be undertaken by other facilities relative to establishment of the nitrogen limit, *see* Response #47(b)(iii). With regard to phosphorus, EPA established the limit based on the near field impacts of this pollutant and in order to meet Massachusetts water quality standards before other dischargers to the Blackstone River. *See* Responses #F9 and #F48. With reference to the modeling being undertaken by UBWPAD, EPA does not believe it is appropriate to delay permit issuance pending completion of this work. *See* Responses #F7 and #F43.

Comment #F43: On May 18, 2007, the District submitted a request for an extension of the public comment period to December 31, 2007 to allow sufficient time to complete an improved, more robust water quality model of the Blackstone River watershed and generate model results which are critical to making an informed decision and developing scientifically defensible permit limits for nitrogen and phosphorus. On May 23, 2007, the EPA denied this request, noting that the District's request does not include any discussion as to how, or even if, its model could be used to establish point source permit limits that "'will ensure attainment of water quality standards in the Blackstone River and in Narragansett Bay." See Appendix. Tab B-1. Under the Clean Water Act ("CWA") that

burden of proof is on EPA [not the District], and EPA has not done this. Pursuant to 40 C.F.R. §122.44(d)(1), a water quality-based permit requirement is justified only if it is determined that the discharge will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard. Since EPA has not made any showing that the proposed limits in the Draft Permit are needed to prevent violations of, or that they will lead to attainment of, Rhode Island water quality, there is no legal basis for those limits.

Response #F43: EPA's May 23rd correspondence does not state or suggest that UBWPAD has the obligation or authority to determine whether its discharge of nitrogen and phosphorus "will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard" pursuant to 40 C.F.R. §122.44(d)(1). Similarly, the Region appreciates it is not UBWPAD's regulatory responsibility to conduct a TMDL. In our May 23rd letter, the Region simply explained that, based on the information provided regarding the modeling efforts and the documented extent of impairments to receiving waters, delay in permit issuance pending completion of the model is not warranted. The fate and transport of nutrients is very difficult to simulate in a dynamic system such as the Blackstone River. It is far from certain that the model can be calibrated and verified for low-flow, 7Q10 conditions or be a useful tool to evaluate the impact of the UBWPAD discharge on water quality, particularly in the marine waters in Rhode Island. This is necessary in order for EPA to use the model results to establish water quality-based effluent limits. Additional challenges in this regard were discussed in previous responses. *See* Response # F7 relative to nitrogen.

Understandably, UBWPAD does not suggest that the results of the model will be akin to an approvable TMDL with final point source allocations, nor would we expect the UBWPAD to undertake such an effort. Again, if the results of the effort yields information indicating that any final effluent limit is more or less stringent than necessary to attain water quality standards, a permit modification can be pursued. *See* 40 CFR §122.62.

The comment also appears to confuse the "reasonable potential" analysis with the establishment of effluent limits. An NPDES permit must limit any pollutant or pollutant parameter (conventional, non-conventional, toxic and whole effluent toxicity) that is or may be discharged at a level that causes or has a "reasonable potential" to cause or contribute to an excursion above any water quality criterion. Where EPA makes such a determination, it then proceeds to establish an appropriate effluent limit.
The comment asserts generally that EPA has failed to demonstrate that the discharge from UBWPAD causes or has the reasonable potential to cause or contribute to an excursion above state water quality standards for phosphorus and nitrogen and that the limits are necessary. The basis for these determinations is set forth in the Fact Sheet and the comment offers no specific facts or arguments to rebut the explanation in the Fact Sheet. *See also* Responses #F44, #F47(a)(1) and #F48 below.

Comment #F44: The District is concerned that EPA is moving too quickly on implementing nutrient limits more stringent than those required by state law, and more

stringent than those that will soon be achieved by the District in 2009, based on political considerations, insufficient or incorrect information, speculation and questionable scientific footing, which could cost the Blackstone River communities hundreds of millions of dollars without reaping discernable water quality benefits. Without explanation, EPA Region I seems to be rejecting the recommendation by EPA's national experts [the Science Advisory Board] that prior to installing expensive treatment technology, a comprehensive study of the watershed should be conducted to determine the need for and the effectiveness of other controls including, among others, non-point source controls, removing contaminated sediments, and dam removal modification.[15]

We disagree with the apparent approach of the Agency in allocating responsibility for waste load removal mainly to point source dischargers without a commensurate effort aimed at the other significant sources [e.g., non-point sources, contaminated sediments originating from past discontinued practices, the presence of dams]. In addition, the District questions whether certain segments of the Blackstone River (particularly the reach to which the District discharges) were properly listed under Section 303(d)(1)(A) of the CWA, rather than some other more appropriate section, such as Section 303(d)(3). The imposition of the Draft Permit's conditions to which the District objects exceeds the Agency's authority under the CWA, lacks sufficient support in the administrative record, is otherwise substantively and procedurally deficient, and based on an inappropriate exercise of discretion.

By imposing another state's water quality standards or legislative mandate [RI Gen. Laws §46-12-2(f); requiring that nitrogen discharges be reduced by 50% by December 31, 2008] on the District's facility, without the CWA-required demonstration that the District's discharge is causing or contributing to a violation of those out-of-state standards, is contrary to law. Among other things, it deprives the District and its ratepayers of their procedural due process rights to an adequate, meaningful opportunity to be informed of, and to participate in, the Rhode Island rulemaking process for the narrative standards upon which the total nitrogen limits are purportedly based. EPA's attempts to impose its own interpretation of state water quality standards, and its failure to respect and address the Massachusetts Department of Environmental Protection's ("DEP") objections and concerns regarding EPA's proposed nitrogen and phosphorus limits and conditions, violate constitutional federalism principles.

EPA has failed to consider or to adequately explain how the proposed nutrient limits which will cause the District to spend funds approaching $200 million [with no guarantee or scientific evidence to demonstrate that it will work] meets the requirements of the DEP regulations which require that the treatment be the best practical.

While costs are generally not given much weight in considering compliance with permit conditions where, as here, the costs are "wholly disproportionate" to the benefits [if any]

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[15] See EPA Draft Science Advisory Board (SAB) Report: Evaluation of the Blackstone River Initiative, prepared by the Ecological Processes and Effects Committee, EPA-SAB-EPEC-98-XX, June 25, 1998; and An SAB Report: Evaluation of the Blackstone River Initiative, EPA-SAB-EPEC-98-0 11, September 1998.

sought, the conditions should be deemed arbitrary and capricious.[16] The proposed permit limit changes of concern, here, constitute an unfunded mandate.

Response #F44: With regard to cost considerations in the establishment of water quality based effluent limits, *see* Responses #A9 and #F1. The commenter's reliance on *BASF Wyandotte Corp. v. Costle*, 598 F.2d 637, 656 (1st Cir. 1979), *cert. denied*, 444 U.S. 1096, 100 S. Ct. 1063, 62 L. Ed. 2d 784 (1980) for support that costs are to be considered in ***establishment*** of a water quality based-effluent limit (such as the nitrogen limit in this matter) is misplaced. *BASF Wyandotte* involves a challenge to EPA's development of technology-based effluent limitations guidelines for the pesticide industry pursuant to 33 U.S.C. §1311(b)(1)(A) and §1314(b)(1). For industrial sources, Sections 1314(b)(1)(A) and (B) direct EPA to establish national effluent limitation guidelines representing the level of treatment attainable through application of the best practicable control technology currently available for specific categories of industrial facilities and taking into account, among other things, the cost of the technology in relation to the effluent reduction benefits to be achieved. These guidelines are inapplicable to POTWs (such as UBWPAD), which are required, pursuant to Section 301(b)(1)(b), to meet limits based on secondary treatment, which is defined at 40 CFR Part 133. Moreover, in issuance of a NPDES permit, EPA is required to consider not only applicable technology-based limits, but also water quality-based requirements where necessary to comply with applicable water quality standards. 40 CFR §122.44(d)(1)(i). Cost considerations or technological feasibility are not permissible factors in setting water quality based effluent limits. *See United States Steel Corp. v. Train*, 556 F. 2d 822, 838 (7th Cir. 1977). *See also In re City of Moscow*, 10 E.A.D. 135, 168 (EAB 2001); *In re New England Plating Co.*, 9 E.A.D. 726, 738 (EAB, 2001). As noted above, UBWPAD can conduct an analysis of affordability issues for the purposes of determining whether a designated use cannot be obtained or for obtaining a variance. *See* Response #F2.

This permit issuance does not contravene recommendations of the SAB. As a preliminary matter, EPA did not use the 1997 Dissolved Oxygen model developed as part of the Blackstone River Initiative as the basis for the phosphorus or nitrogen limits in the current permit. As is explained in Response #F5, EPA established the Blackstone River Initiative (BRI) in 1991 to promote interstate assessment and cleanup of the Blackstone River. The BRI had a budget of approximately two million dollars and included an intensive environmental sampling and assessment program to describe interstate water quality, biology and toxicity in the river system under both dry and wet weather conditions, and to develop a wasteload allocation model and a toxics model to predict impacts of contaminant loadings to the system. It is one of several sources of data documenting the severe eutrophication in the Blackstone River and the significance of the nitrogen loadings to Narragansett Bay from the Blackstone River. The University of Rhode Island, MassDEP, and RIDEM all participated. At the request of the Region, the

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[16] *See BASF Wyandotte Corp. v. Costle*, 598 F.2d 637, 656 (1st Cir. 1979), *cert. denied*, 444 U.S. 1096, 100 S. Ct. 1063, 62 L. Ed. 2d 784 (1980).

SAB reviewed the results of the BRI. In addition, the BRI participants submitted a response to the comments and recommendations raised by the SAB.[17]

Nowhere in its review did the SAB indicate that the Region should suspend issuance of NPDES permits pending completion of comprehensive studies of the watershed including non-point source controls, removal of contaminated sediments and dam removal. The SAB's recommendations for further study reflect an attempt to foster Regional adoption of integrated watershed management assessment approaches. More specifically, the SAB recommended that the Region undertake a second phase effort that would include: incorporation of the ecological risk assessment framework, limited additional monitoring, inclusion of biological information and the use of additional existing models for watershed-level analysis. We disagree that this permit issuance should await such TMDL-like efforts. *See also* Responses #E3 and #F6 for a discussion that the permit should not await completion of TMDLs or the modeling being conducted by UBWPAD. Where EPA determines that a discharge of a pollutant causes or contributes to an excursion above any State water quality standard, including State narrative criteria for water quality, EPA must include an effluent limitation in the permit for that pollutant.

In establishing the nitrogen limit in this permit, EPA adhered to the requirements of the CWA and the Agency's regulations. Section 301(b)(1)(C) of the CWA requires NPDES permits contain effluent limits more stringent than technology-based limits where more stringent limits are necessary to comply with, among other things, any applicable state or federal water quality standards. EPA's regulation at 40 CFR §122.4(d) prohibits the issuance of an NPDES permit unless its conditions can "ensure compliance with the applicable water quality requirements of all affected States." In the context of this permit issuance, both Massachusetts and Rhode Island are "affected states." Section 401(a)(2) of the CWA and EPA's regulations at 40 CFR 122.44(d)(4) also require EPA to condition NPDES permits in a manner that will ensure compliance with the applicable water quality standards of a "downstream affected state,' in this case Rhode Island. The statute directs EPA to consider the views of the downstream state concerning whether a discharge would result in violations of the state's water quality standards. If, as in this matter, EPA agrees that a discharge would cause or contribute to such violations, EPA must condition the permit to ensure compliance with the water quality standards.

As is detailed in the Fact Sheet and this Response to Comments, the total nitrogen limit in this permit is necessary to ensure compliance with Rhode Island's water quality standards. Excessive loadings of nutrients stimulate the growth of aquatic plants and algae in downstream water bodies. The abundance of aquatic plants and algae deplete dissolved oxygen levels and impair the physical habitat of these water bodies.

Phosphorus is the primary nutrient of concern in fresh waters (such as the Blackstone River) and nitrogen is the primary nutrient of concern in salt waters (such as the Seekonk and Providence Rivers). Narragansett Bay is an important New England fishery and

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[17] *See* Letter dated February 4, 1999 from John P. DeVillars, Regional Administrator to Drs. Joan M. Daisey and Dr. Mark A. Harwell.

recreational resource. The designated uses of the Seekonk and Providence Rivers include primary and secondary contact recreational activities and fish and wildlife habitat. The upper sections of Narragansett Bay (including the Providence and Seekonk rivers), are no longer able to support a healthy aquatic community. At times, dissolved oxygen levels decline dramatically and significant fish kills are becoming regular occurrences. Only a small fraction of the historic eelgrass habitat remains.

Numerous scientific studies conducted over the last 15 – 20 years have documented that excessive discharges of nitrogen are causing the impairment and wastewater discharges are the dominant source of nitrogen. *See also Nutrient and Bacteria Pollution Panel, Initial Report*, Governor's Narragansett Bay and Watershed Planning Commission, March 2, 2004 at page 3 (summarizing studies). The UBWPAD – with a permitted design flow of 56 MGD – is one of the largest sources of nitrogen to Narragansett Bay. The loadings data utilized in DEM's 2004 study indicate that UBWPAD represented approximately 64% of the nitrogen load discharged to the Blackstone River from municipal wastewater treatment facilities for the period of time considered in the study. In addition, the Blackstone River discharges into the relatively poorly flushed areas at the head of the Upper Bay, which has exacerbated the impact of nutrients. Based on review of these various reports and studies of impairments in the Upper Bay and sources and loadings of nutrients, EPA concluded that discharges of nitrogen from the UBWPAD facility are causing or have the reasonable potential to cause or contribute to violations of Rhode Island's water quality standards.

EPA appropriately based the nitrogen limits on the requirements of Rhode Island's currently approved water quality standards. Rhode Island, like the vast majority of states, has not yet developed and EPA has not approved numeric total nitrogen criteria or numeric response variable criteria. Nor has Rhode Island developed site specific numeric criteria for total nitrogen or response variables for Narragansett Bay. Until then, EPA must base effluent limits on the criteria in the currently approved water quality standards, including applicable narrative criteria. *See* 33 U.S.C. §1311(b)(1)(C); 40 CFR 122.44(d)(1)(requiring limits on pollutants that have "a reasonable potential to cause or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.)" (emphasis added). Applicable criteria from Rhode Island Water Quality Standards are as follows:

"At a minimum, all waters shall be free of pollutants in concentrations or combinations or from anthropogenic activities subject to these regulations 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...." Rule 8.D.(1).

> The dissolved oxygen shall be "not less than 5 mg/l at any place or time, except as naturally occurs. Normal seasonal and diurnal variations which result in *insitu* concentrations above 5.0 mg/l not associated with cultural eutrophication will be maintained in accordance with the Antidegradation Implementation Policy." Table 2, Rule 8.D.(3)1.
>
> There shall be no nutrients "in such concentration that would impair any usages specifically assigned to said Class, or cause undesirable or nuisance aquatic species associated with cultural eutrophication." Nutrients "shall not exceed site-specific limits if deemed necessary by the Director to prevent or minimize accelerated or cultural eutrophication. Total phosphorus, nitrates and ammonia may be assigned site-specific permit limits based on reasonable Best Available Technologies." Table 2, Rule 8.D.(3)10; see also Rule 8.D.(1)(d).

Additional relevant regulations include Rule 9.A. and B., which prohibit discharges of pollutants which alone or in combination will likely result in violation of any water quality criterion or interfere with one or more existing or designated uses, and prohibit discharges that will further degrade waters which are already below the applicable water quality standards.

In interpretation and application of these criteria, EPA considered, among other things, the physical model conducted by RIDEM assessing the impacts of total nitrogen on non-attainment of water quality standards in the Seekonk and Providence Rivers. EPA also considered loadings from the facility and the amount of nitrogen anticipated to be delivered from the point of discharge to the mouth of the Blackstone River. Further, EPA considered that the discharge flows to the area of the Upper Bay where the most impairments have been measured. *See also* Response #F6.

EPA did not rely on or apply the Rhode Island legislation at R.I. Gen. Laws § 46-12-2. This provision directs the state Department of Environmental Management to: " implement measures to achieve an overall goal of reducing nitrogen loadings from waste water treatment facilities by fifty percent (50%) by December 31, 2008…." Rather, EPA relied on Rhode Island's Water Quality Standards, consistent with 40 CFR §122.44(d), to impose nitrogen limits necessary to ensure attainment of Rhode Island's water quality standards. Moreover, RIDEM's 2004 study suggests that even more stringent limits (perhaps to the limit of technology) may be needed in future permit reissuances.[18]

The constitutional issues raised by UBWPAD in its comment do not need to be reached and, in any event, are not appropriately raised in this administrative permitting proceeding. More specific constitutional challenges are addressed below.

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[18] While EPA recognizes its independent obligation to establish protective permit limits, it is fully appropriate for EPA to consider the technical reports generated by RDIEM in the development of nitrogen limits for this permit. As noted above, the CWA expressly directs EPA to consider the views of a downstream state concerning whether a discharge would result in violations of the state's water quality requirements.

With regard to the comment that EPA should further evaluate non-point and other sources of nutrients before proceeding with permits for point sources, please see Responses #A8 and #C1.

With regard to its comment that Massachusetts incorrectly listed certain reaches of the Blackstone River on its 303(d) List of Impaired Waters, EPA has several responses. First, the comments provides no specific information that would call the listing into question. Second, the permit proceeding is not the appropriate forum for challenging the state's listing or EPA's approval of it. The permittee could have raised this issue during the listing process. Third, irrespective of a state's current 303(d) list, EPA is obligated to impose a water quality-based effluent limit for a pollutant if there is a reasonable potential that the discharge will cause or contribute to a violation of water quality standards. *See* 33 U.S.C. §1311(b)(1)(C) and 40 CFR §122.44(d)(5).

With reference to the comment that the new permit limits constitute unfunded mandates, *see* Response #B2.

Comment #F45: For several reasons (explained below), the co-permittees should be deleted from the proposed permit. The District challenges the proposed expansion of its NPDES permit to include co-permittees comprised of satellite sanitary sewer collection systems not owned or operated by the District or of any entity whose wastewater, septage or sludge the District accepts. The Agency's unwarranted expansion of its authority fails to consider the numerous and varied legal relationships and state municipal powers governing intercommunity collection systems, and is not in accordance with law. EPA's attempt to regulate entities discharging wastewater to the District's treatment facility usurps and undermines state and municipal authority. As the District has previously informed EPA (e.g., during the 1999 Permit renewal process), the District does not have the authority to legally bind co-permittees in the manner proposed by EPA.

None of the affected municipalities participated in or signed the Permit application, nor did they intend to be permit applicants. In addition, EPA did not make any provision in the Draft Permit for the targeted co-permittees to become signatories (thereby binding them to the terms of the permit). Before EPA can add any co-permittees to the permit, it will need to resolve these legal issues with the State and the respective municipalities involved.

The Draft Permit imposes legal and administrative burdens on the District for management of member sewers through the co-permittee process that are not allowed in the District's enabling legislation and that the District has no authority to accept.

The District does not own or operate the wastewater collection systems which discharge to its facility. The operation and maintenance of such systems is adequately regulated by the Commonwealth pursuant to 314 CMR 12.00. We understand that under NPDES permit issued to the Massachusetts Water Resources Authority ("MWRA") (permit no. MA0103284), co-permittee status is driven by ownership of infrastructure (e.g., pipes, treatment facility). We further understand that MWRA member communities are not

included as co-permittees [with very few exceptions] and that, for portions of the regional sewer system operated by member communities, reporting of sanitary sewer overflows are governed by the reporting and basic operation and maintenance requirements contained in the DEP regulations at 314 CMR 12.00. That practice should be followed here.

The Draft Permit's language purporting to limit which entities may discharge to the District conflicts with and undermines the District's authority under its enabling statute [Chapter 752 of the Acts of 1968, as amended] which authorizes the District to determine which entities may become members of the District and/or discharge to the District's regional treatment facilities. Since it is questionable whether such federal action is a valid exercise of Congress' constitutionally delegated powers, under the Tenth Amendment of the U.S. Constitution, the State enabling statute should be given precedence.

As explained below, the Draft Permit purports to regulate satellite wastewater collection systems as co-permittees under a proposed (not final) Sanitary Sewer Overflow (SSO) Rule regardless of whether or not these systems result in overflows that reach waters of the United States. This raises serious questions about whether the Agency has subject matter jurisdiction under the Clean Water Act [over discharges that do not reach, nor are they likely to reach, waters of the United States]. The Second Circuit recently ruled, in the *Waterkeeper Alliance* case (also known as the CAFO decision) that unless there is an actual discharge of a pollutant to navigable waters, there is no point source discharge, no statutory violation of the CWA, no requirement to comply with EPA regulations for point source discharges, and no duty to seek or obtain an NPDES permit in the first instance. *See Waterkeeper Alliance et al. v. EPA*, 399 F.3d 486 (2nd Cir. 2005). The Court stressed that: "The CWA gives the EPA jurisdiction to regulate and control only actual discharges - not potential discharges, and certainly not point sources themselves." (Emphasis in original).

The primary function of collection systems is to convey wastewater to the District's regional plant for treatment, but not to provide treatment. Under the current regulatory definition of POTW, neither CSOs nor SSOs may be deemed part of the POTW because they do not convey wastewater to the POTW, but instead result in a discharge prior to the POTW. The D.C. Circuit ruled in the *Montgomery Environmental Coalition v. Costle* case, 649 F.2d. 568 (D.C. ' Cir. 1980), that CSOs are not part of the “treatment works” under the 1979 or the 1980 definition, and consequently they are not subject to the “secondary treatment” standards applicable to POTWs. Since this decision, neither EPA nor the courts have formally determined that SSOs must be treated differently from CSOs.

The proposed addition of the satellite collection systems as co-permittees violates and/or circumvents the rulemaking procedural requirements. Any attempt to implement a proposed rule or materially change or rewrite a regulation through policy deprives the District and the impacted ratepayers of their fundamental rights to public notice, review and comment on such important matters.

While a proposed SSO regulation was signed by EPA Administrator Browner in 2001, the Administration withdrew the proposal before it was published, and the actual regulatory proposal still appears to be far in the future. Had the proposed SSO Rule been promulgated, it would have applied NPDES permit conditions to satellite systems in one of two ways: the NPDES permitting authority would have been given the discretion to give a collection system permit to either the satellite collection system owner/operator or the regional publicly owned treatment works (POTW) that accepts its flow.

The Association of Metropolitan Sewerage Agencies ("AMSA") has submitted substantial comments on the proposed SSO Ru1e opposing the discretion the Ru1e would have given to NPDES permitting authorities to decide which entity receives a collection system permit, stating that "the only appropriate permittee is the satellite collection system owner/operator entity." See AMSA letter to EPA Administrator Christine Todd Whitman, dated June 8, 2001. As EPA is aware, the draft rule's CMOM (capacity, management, operation and maintenance), reporting, public notification and recordkeeping provisions wou1d be burdensome to all potential permittees regardless of the size.

The Draft Permit states, on page 1 of 19, that "[o]nly municipalities specifically listed as co-permittees are authorized to discharge wastewater into the UBWPAD facility." The Draft Permit's proposed list does not include all dischargers to the District. For example; Sutton, Oxford, Paxton, and Shrewsbury discharge to the District's facility through their respective collection systems. The Draft Permit and its Fact Sheet are unclear as to whether its co-permittee language precludes the District from continuing to accept sludge and septage per its authority under the state enabling act. The Draft Permit language should not alter or diminish in any way the District's current authority under its enabling statute including, without limitation, its authority to accept wastewater, sludge or septage from member municipalities or otherwise.

Response #F45: In its comment above, UBWPAD objects to imposition of any requirements through the permit on the operation and maintenance of the "satellite" municipal collection systems that discharge waste to UBWPAD. UBWPAD does not challenge EPA's general authority to regulate appropriate operation and maintenance of collection systems. Rather, UBWPAD comments that EPA cannot impose such requirements on the satellite systems through this permit as they are separate legal entities from the owner/operator of the treatment facilities and outfalls.

Section 212(2)(A) of the CWA defines "treatment works" to include "any devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature… including … intercepting sewers, outfall sewers, sewage collection systems…." EPA regulations define the term "publicly owned treatment works" similarly at 40 CFR 122.2 and 403.1. As UBWPAD is well aware, historically, the Region has issued an NPDES permit only to the legal entity owning and operating the wastewater treatment plant, which is only a portion of the "treatment works" serving the communities for whom the UBWPAD provides wastewater treatment. The Region has now chosen to provide a more comprehensive approach to permitting

these facilities to ensure proper operation and compliance of the entire treatment works, not a portion of it.

The requirements in the permit imposed on satellite systems are set forth in the Draft Permit in Part I.D. ("Unauthorized Discharges") and Part I.E. ("Operation and Maintenance of the Sewer System"). Those provisions are as follows:

Part D provides that the permit only authorizes discharges through two specific outfalls. Part D also states that discharges through sanitary sewer overflows are not authorized and requires that UBWPAD and co-permittees report to EPA and Mass DEP any such overflows.

Part E of the Draft sets forth requirements related to operation and maintenance of the sewer system. Part E provides that operation and maintenance shall be in compliance with the General Requirements of Part II. The General Requirements of Part II, in turn, are standard conditions included in all NPDES permits. They track certain required conditions set forth in EPA's regulations such as duty to comply [40 CFR 122.41(a)], permit actions (40 CFR 122.41(f)] and duty to provide information [40 CFR 122.41(h)]; and a reopener clause [40 CFR 122.44(c) and 122.44(d)(vi)(C)(4)]. The standard conditions also include a recitation of EPA regulations related to confidentiality of information, and provisions regarding the impact of the permit on other local, State or Federal requirements. Part E also sets forth particular requirements regarding operation and maintenance of satellite collection systems in the respective municipal POTWs, including:

- provision of adequate staff to carry out the operation, maintenance, repair and testing functions required to ensure compliance with the terms and conditions of the permit;
- maintenance of an ongoing preventative maintenance program to prevent overflows and bypasses caused by malfunctions or failure of the sewer system infrastructure, including an inspection; and
- development and implementation of a plan to control infiltration and inflow (I/I) to the separate sewer system, including annual reporting of activities taken to minimize I/I; and
- provision of an alternate power source to operate the treatment works.

<u>Proper operation and maintenance at 40 CFR 122.41(e)</u>. This standard permit condition requires proper operation and maintenance of permitted wastewater systems and related facilities to achieve compliance with permit conditions; and

<u>Duty to mitigate at 40 CFR 122.41(d)</u>. This standard condition requires the permittee to take all reasonable steps to minimize or prevent any discharge in violation of the permit that has a reasonable likelihood of adversely affecting human health or the environment.

EPA's regulations include a duty to provide information at 40 CFR 122.41(h). This standard condition requires the permittee to provide any information which EPA may

request to determine, among other things, compliance with the permit. In addition, the regulation requires the permittee to provide copies of records required to be kept by the permit.

Based on these provisions in the statute and regulation, EPA clearly has authority to require appropriate operation and maintenance of collection systems necessary to achieve compliance with an NPDES permit. Since the District does not own or operate some of the collection systems that discharge to the treatment works, it is appropriate to apply these conditions to the owners/operators as co-permitees. The requirements set forth in Parts D and E give more specific direction to the satellite systems as to what is expected related to operation and maintenance, duty to mitigate and reporting.

Under *Montgomery Environmental Coalition v. Costle*, 649 F.2d. 568 (D.C. Cir. 1980), combined flows that exceed the design capacity of a combined system and are intentionally diverted away from a treatment works are not subject to secondary treatment requirements but rather are subject to the technology requirements applicable to non-POTWs. *Montgomery* does not address which NPDES permit conditions may be applicable to collection systems attached to treatment plants, nor does it address the circumstance of unpermitted discharges such as SSOs. This case simply is not relevant to the co-permittee issue raised by the comment.

The *Waterkeeper Alliance* case, 399 F3.3d 486, also does not restrict EPA's ability to impose conditions on the operation and maintenance of the collection systems owned and operated by the satellite systems. *Waterkeeper Alliance* involved review of challenges to regulations setting forth NPDES and effluent limitation guidelines and standards for Concentrated Animal Feeding Operations (CAFOs). The Second Circuit vacated that portion of the regulation that required CAFOs to apply for NPDES permits or otherwise demonstrate that they have no potential to discharge. The Court reasoned that effluent limitations can only be applied to point sources that actually discharge, not that simply have the potential to discharge. *Id*. at 505. In this matter, wastewater from the treatment works (including the collection system) is discharged through the outfalls at UBWPAD's treatment plant. Therefore, the treatment works (including the collection system) is subject to permitting. EPA has determined that operators of the collection system portion of the POTW must comply with the operation and maintenance requirements in the draft permit to ensure that compliance with the permit and the goals of the Clean Water Act are achieved.

EPA does not agree that the co-permittees each need to sign the permit application. The permit application requirements are designed to facilitate the permitting process and to aid the permitting authority by ensuring submittal of relevant information. In this case, UBWPAD submitted the permit application, including requisite information about satellite systems. As detailed above, EPA is authorized to regulate the entire POTW (including the treatment plant and collection systems). That UBWPAD and its member communities have decided to maintain separate ownership of the treatment plant and collection system does not require the EPA to solicit separate signatures from each of the satellite systems. Nor does it require that EPA issue separate permits to UBWPAD and

the satellite systems. Further, EPA provided a copy of the Fact Sheet and Draft Permit to each of the satellite systems included as "co-permittees" in the Final Permit. Each was invited to attend the public hearing and to submit oral and/or written comments on the Draft Permit.

UBWPAD also comments that it does not have authority to legally bind the satellite systems and that the requirements will impose additional "legal and administrative burdens" on UBWPAD. Through this permit, EPA has made each municipality responsible for implementation of the requirements of Parts D and E applicable to the portion of the collection system and/or treatment plant that it owns or operates. For instance, each municipality would be responsible to report to EPA any SSO that occurred from its collection system. Each municipality would be separately responsible for developing and implementing a plan to control I/I and reporting on the progress of its respective plan. EPA recognizes that this approach is a change from the expired permit, which required UBWPAD to serve in the role of facilitating a work group of its member communities to develop and implement strategies to eliminate excessive I/I. The expired permit also included a provision indicating that EPA and MassDEP might seek to add the member communities as co-permittees directly regulated under the permit if adequate progress was not made. That time has come: I/I flows to the UBWPAD continue to be very high – at 15 million gallons per day (*see* NPDES permit application at page 7) -- and more aggressive action is necessary to abate excessive I/I. The shift in approach to having EPA directly oversee the satellites as co-permittees should reduce any "legal and administrative burdens" on UBWPAD. While EPA believes that the language in the Draft Permit makes clear that each co-permittee is responsible for implementation of the operation and maintenance and reporting requirements of Parts D and E related to its respective system, the Final Permit includes an additional sentence to that effect.

The language of one requirement in Part E related to I/I control does require UBWPAD to take measures to control discharges from the satellite communities. That provision states: "The permittee shall require, through appropriate agreement, that all member communities control discharges to the permittee's POTW sufficiently to ensure that high flows do not cause or contribute to a violation of the permittee's effluent limitation or cause overflows from the permittee's collection system." UBWPAD's enabling legislation appears sufficiently broad to meet this provision. In particular, the legislation indicates that the purpose of establishing UBWPAD is to treat sewage from the local communities, not I/I such as groundwater or rainwater. *See* Chapter 752 of Act of 1968 at Sections 6 and 16. The legislation also gives the District authority to prevent the discharge into the sewers of substances which may damage or impair the sewerage collection and sewerage treatment system or interfere with its maintenance or operation. *Id*. at Section 7. In any event, the intent of the permit provision cited above is to ensure that high flows do not cause or contribute to violations of effluent limitations or cause unauthorized bypasses at the treatment plant. To address UBWPAD's concern, EPA has modified the language in the Final Permit to indicate that both the permittee and co-permittees are responsible to ensure that high flows do not cause such violations**.**

UBWPAD also notes that the Draft Permit does not include all satellite dischargers. UBWPAD specifically notes that EPA failed to include Sutton, Oxford, Paxton and Shrewsbury. EPA derived the initial list of discharges from information provided by UBWPAD in its re-application; specifically, in Response to Question A4 on Form 2A, UBPWAD indicated that the UBWPAD facility serves the following municipalities: Auburn, Cherry Valley Sewer District, Holden, Millbury, and Rutland. EPA notes that UBWPAD's Facilities Plan, however, does indicate that the municipal systems of Sutton, Oxford, Paxton and Shrewsbury also contribute wastewater to UBWPAD. As the contributions from these municipal systems are relatively smaller than the other satellite systems, EPA will not include these four municipalities as "co-permittees" in this permit. EPA may, however, include them as "co-permittees" in the future. In addition, in the Final Permit, EPA has amended the language on Page 1 of the permit to make clear that these communities are not prohibited from discharging to UBWPAD.

UBWPAD comments that the co-permittee language in the Draft Permit is unclear as to whether it precludes the District from continuing to accept sludge and septage per its authority under the state enabling act. The language in the Draft Permit referenced by UBWPAD only addresses discharges of wastewater. *See* Draft Permit at 1 (indicating that only co-permittees "are authorized to discharge wastewater into the UBWPAD facility"). To address UBWPAD's concern, EPA has clarified this intent in the final permit.

Comment #F46: Compliance Schedule. The Draft Permit Fact Sheet contains EPA's admission that the District will not be able to comply immediately with the proposed nutrient limits and states that EPA will work with the District to develop a schedule for the planning, design and construction of facilities necessary to meet these limits and that takes into account currently ongoing facility upgrades. EPA should include that schedule in the District's final permit. The Massachusetts permitting regulations control the issuance of permits in that state and these regulations allow compliance schedules and do not specify any term limits for such schedules.

In addition, the Fact Sheet states that the Draft Permit would supersede the permit issued on September 30, 1999. As the Agency knows, the District appealed certain conditions of the 1999 permit. After extensive negotiations with EPA, and in consideration of various accommodations by the parties (including the District's withdrawal of its appeal), a settlement agreement was executed and the permit was modified on December 19,2001 (the "2001 Permit"). The settlement agreement, and the administrative consent order issued there under in 2002 (the "Consent Order"), gave the District an 8-year compliance schedule, until August, 2009, to complete treatment plant upgrades and meet many of the 2001 Permit limits, including a phosphorus limit of 0.75 mg/l. Public notice of this compliance schedule and the interim permit limits effective during the permit was provided in the 2001 Permit's fact sheet or statement of basis.

Significant upgrades are currently underway at the District at costs of over $180 million, which will further limit the discharge of pollutants to the Blackstone River including nitrogen and phosphorus. In 2009, the new facilities will achieve a better than required

reduction in phosphorus for half of the year under the existing permit and provide nitrogen removal approaching the 40-50% nitrogen summer nitrogen reduction sought by the Rhode Island Governor's Special Committee without a new standard. In light of this significant progress, an appropriate adaptive management plan would consist of allowing the significant upgrades in Worcester to occur, address all local sources to the impaired waters in Rhode Island, and monitor the results of these actions prior to requiring additional severely restrictive and costly upgrades in Massachusetts.

The Draft Permit's provisions, particularly the new nutrient limits, conflict with the existing, enforceable compliance schedule established under the settlement agreement and Consent Order signed by the EPA. The settlement agreement and Consent Order were more than merely agreements between the NPDES permitting authorities and the District; they are administrative determinations entitled to substantial deference. One such determination was that a phosphorus limit of 0.75 mg/l would lead to attainment of the Massachusetts water quality standards, yet no new information has been provided to conclude otherwise. Like any written instrument affecting the rights and obligations of a party, a settlement agreement and consent order must be given effect according to its terms. The District has, in good faith, complied with the terms of these agreements including the compliance schedule. It expects that the Agency will, likewise, abide by its commitments under these agreements.

If additional measures are required in the permit beyond those specified in the amended 2001 Permit and settlement agreement, or if a more stringent water quality-based effluent limitation is included in the permit, the District is entitled to a compliance schedule under Massachusetts law. State regulations provide for compliance schedules as follows:
A permit may, when appropriate, specify a schedule leading to compliance with the Massachusetts and Federal Clean Water Acts and regulations. The purpose of a schedule of compliance generally is to afford a permittee adequate time to comply with one or more permit requirements or limitations that are based on new, newly interpreted or revised water quality standards that became effective after both issuance of the initial permit for a discharge and July 1, 1977. The Department may include a schedule of compliance in a permit at the time of the permit reissuance or modification where the permittee either cannot comply with such permit requirements or limitations, or where there is insufficient information available to determine whether the permittee can comply with such permit requirements and limitations. A schedule of compliance shall require compliance at the earliest practicable time, as determined by the Department. A schedule of compliance shall include dates for specified tasks or activities leading to compliance and may include interim effluent limitations, as the Department deems appropriate. 314 CMR 4.03(1)(b).

Although the District does not agree that a more stringent limit is authorized or appropriate, EPA acknowledged in the Draft Permit fact sheet that the District likely will not be able to comply with such a limit. Accordingly, a compliance schedule should be included in the permit for any more stringent water quality-based effluent limit. The state compliance schedule provision is consistent with federal regulations, which allow

compliance schedules that require compliance "as soon as possible." 40 CFR §122.47(a)(1).

The District requests that long-term compliance schedules, if necessary, be included in the permit itself, rather than in an administrative order or other agreement. There is no time limit on such compliance schedules under federal or state law. In other situations, EPA has authorized compliance schedules that extend beyond the term of the permit, and that extend for more than five years. For example, federal regulations concerning Great Lakes dischargers provide that compliance schedules may extend beyond the term of the permit. 40 CFR Part 132, Appendix F, Procedure 9. In addition, California provides long-term compliance schedules that can extend for several permit terms, consistent with the requirements of any TMDL. See, e.g., Basin Plan Amendment (Los Angeles Regional Water Quality Control Board, May 14, 2003). EPA approved those provisions on February 10, 2004. See Water Quality Standards: Examples of Alternatives to Changing Long-term Designated Uses to Achieve Water Quality Goals (EPA, March 2005) at p. 6. Therefore, a long-term compliance schedule---so long as it requires compliance "at the earliest practicable time" or "as soon as possible"-- may be included within the permit itself, consistent with both federal and state regulations.

Response #F46: EPA has determined not to include a compliance schedule in the Permit. Compliance schedules to meet water quality based effluent limits may be included in permits only when the state's water quality standards clearly authorize such schedules and where the limits are established to meet a water quality standard that is newly adopted, revised or interpreted after July 1, 1977. As noted in the Fact Sheet supporting the Draft Permit, EPA recognizes that UBWPAD will not be able to comply immediately with the water quality based effluent limits proposed for total nitrogen and phosphorus.

In this case, the limits on total nitrogen are based solely on ensuring compliance with the Rhode Island Water Quality Standards. Rhode Island's standards, in turn, do not include provisions allowing for schedules in permits. While Massachusetts standards do allow schedules in permits, the decision of whether to include a compliance schedule is discretionary and may only be granted "when appropriate." *See* 314 CMR 4.03(1). Thus, even if only Massachusetts standards were applicable, they do not mandate that a schedule be included in the permit itself. In this matter, there are many overlapping issues related to the planning, design and construction of facilities to meet the limits for phosphorus and nitrogen. In light of these overlapping issues and the fact that Rhode Island standards do not include provisions allowing schedules in the permit itself, EPA intends to issue a reasonable compliance schedule to meet both the phosphorus and nitrogen limits in a separate administrative order rather than in the permit itself. *See also* Response #E2.

The Settlement Agreement and Compliance Order issued in 2002 do not in any way restrict EPA's ability to issue a permit with more stringent limits or to issue a schedule to meet the new permit limits in a new administrative order. Recognizing that UBWPAD would not be able to immediately meet the limits in the expired permit, the 2002

Administrative Order included a schedule for treatment upgrades to meet those limits. The 2002 Administrative Order was issued pursuant to EPA's enforcement authorities and, as such, represents the Agency's enforcement response to UBWPAD's violations and anticipated ongoing violations of the permit limits in the expired permit. Nothing in the 2002 Order or Settlement Agreement alters the requirement of the CWA that EPA re-issue the permit and, where necessary, change effluent limits to ensure attainment of water quality standards. It is EPA's intent to issue a new administrative order with a reasonable schedule to meet the effluent limits in the new permit. In addition, we will likely incorporate remaining milestones under the old order into the new schedule.

Comment #F47: Nutrients. As a matter of law, policy and fairness, the Draft Permit's proposed nutrient limit changes should be stricken from the Permit and deferred or postponed until Total Maximum Daily Loads ("TMDLs") are developed. Such postponement is consistent with the DEP's May 9, 2007 comments regarding TMDLs for nutrients. The Draft Permit Fact Sheet fails to address the DEP's concerns about the uncertainties and inadequacies of the scientific knowledge used to develop the total nitrogen limits and about establishing effluent limits for nitrogen and phosphorus without the benefit of scientific guidance provided by TMDLs and the water quality goals they establish. DEP's comments, which were previously documented in the administrative record of the RIDEM permits and certain Massachusetts NPDES permits (e.g., Attleboro and North Attleboro), continue to go unanswered. Given the DEP's well-documented concerns and the fact that the District's capital improvements and upgrades slated for completion in 2009 will significantly reduce nutrient levels, it is proper to defer these newly proposed limits pending revision of the relevant water quality standards and TMDL development.

In addition, any proposed seasonal limits for nutrients should be based on temperature and flow in the River, and such limits should not start until the month of June. Some Rhode Island-issued permits recognize this relationship and, accordingly, have used June as the starting month for its seasonal nutrient limits. The Draft Permit acknowledges that nutrient limits are dependent on the temperature by selecting various months that are assumed to be representative of the spectrum of receiving water temperatures that are experienced in the Blackstone River.

Response #F47: NPDES permits must include effluent limits sufficient to meet water quality standards of all affected states; this requirement is not dependent on the existence of a TMDL. *See* 40 CFR §§122.4(d) and 122.44(d). *See also* Response #A3. The commenter does not indicate which specific comments raised by MassDEP have been unaddressed. Response to specific comments raised by MassDEP in this permit issuance are addressed above. *See* Responses #E1 - #E3.

Regarding the basis for the seasonal periods, *see* Response #F20. In addition, please note that these seasonal time frames correspond to those in RIDEM's permit to Woonsocket.

Comment #F47(a): Total Nitrogen (TN). For several reasons (explained below), the Draft Permit's total nitrogen limits should be stricken and the determination of such limits should be deferred to the future completion of a TMDL. The DEP has declined to impose

the total nitrogen limit contained in the Draft Permit, nor does it support this limit. The interstate nature of this predicament raises several legal and policy issues, which are discussed more fully below.

This problem is exacerbated by the absence of TMDL calculations as well as other reliable data supporting the nitrogen limit proposed by Rhode Island and/or EPA here. The Draft Permit's total nitrogen limit rests upon an approach that the Clean Water Act attempted to avoid, that Massachusetts regulators contest, and that science cannot justify. This raises additional factual, legal and policy issues under the Act.

The problem of nitrogen should be addressed at a watershed level by completion of a TMDL. The identification of all sources and their relative importance has not been well established in the RIDEM documents, which are the basis for the proposed permit limits. Major omissions include nitrogen loads from local contributing non-point sources such as groundwater (i.e. septic system) and 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. Without a complete, consistent, and logically progressed evaluation of the sources and their contributions, financially expensive solutions are being proposed for implementation in both Rhode Island and Massachusetts without confidence that the projected benefits will be obtained once construction is completed and the solutions are implemented. See DEP letter to RIDEM, dated February 11, 2004, commenting on RIDEM Permits and Documents in Support of Permit Limits (Appendix, Tab B-2); see, also, MA DEP Review Comments (February 8, 2005) RIDEM Discharge Permits and Modification to Permits (Attached to Technical Comments).

Response #F47(a): EPA is responsible for development and issuance of NPDES permits in Massachusetts as the Commonwealth has not received authorization from EPA to administer the federal NPDES program. Although EPA administers the NPDES program, Massachusetts maintains independent water pollution control permitting authority under state law. *See* Mass. Gen. Laws Ann. Ch. 21, §43. EPA and the Commonwealth have often issued their respective permits in the same document. In this matter, the final permit is issued only by EPA pursuant to its authority under the CWA. Regardless of whether EPA and MA DEP issue their respective permits in the same or in different documents, the nitrogen limit in this permit is based upon an application of the requirements of the federal CWA and is necessary to meet Rhode Island's water quality standards, but not Massachusetts water quality standards.

Excessive nutrients, generally nitrogen in marine water and phosphorus in fresh water, can contribute to eutrophication. At the point of discharge from the facility, the receiving water is a fresh water river – the Blackstone River. The Blackstone River is an interstate water which has its headwaters in Worcester, Massachusetts and flows through several communities in Massachusetts before entering Rhode Island. The Blackstone then flows to the headwaters of the Seekonk River, which is a marine water.

Section 401(a)(2) of the CWA and 40 CFR § 122.44(d)(4) require EPA to condition NPDES permits in a manner that will ensure compliance with the applicable water quality standards of a "downstream affected state," in this case Rhode Island. The statute directs EPA to consider the views of the downstream state concerning whether a discharge would result in violations of the state's water quality standards. If EPA agrees that a discharge would cause or contribute to such violations, EPA must condition the permit to ensure compliance with the water quality standards.

A TMDL is not required for EPA to establish water quality-based limits. *See* Responses #A3 and #E3.

With regard to the comment that EPA must evaluate other sources of nutrients before proceeding with nutrient limits in this permit, *see* Response #F40.

Comment #F47(a)(1): The TN limit is fatally flawed because it is based on criteria that are not scientifically defensible. In EPA's recommended water quality criteria for nutrients [published in January 2001 (66 FR 1671)], EPA states "wherever possible, develop nutrient criteria that fully reflect localized conditions and protect specific designated uses." The criteria used to develop the TN 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. This was not done. See Guidance on Developing Nutrient Criteria for Protecting Designated Uses of Water Bodies, Benjamin R. Parkhurst, Ph.D., et al., prepared for Federal Water Quality Coalition, Fredric Andes, Barnes & Thornburg LLP (Appendix, Tab B-3).

Response: #47(a)(1): It is unclear if the commenter is challenging Rhode Island's narrative water quality criteria for nutrients or the approach used by EPA to develop the specific nitrogen effluent limit in this permit. Water quality criteria are one of three parts of state water quality standards. (The other two components include one or more "designated uses" and an antidegradation provision.) Rhode Island, like most states, has not yet developed statewide numeric total nitrogen criteria or numeric response variable criteria, nor has Rhode Island developed site specific numeric criteria for total nitrogen or response variables for Narragansett Bay. Until then, EPA must base effluent limits on its interpretation of the narrative criteria in the currently approved water quality standards. Water quality-based effluent limits imposed through NPDES permits must ensure that all components of water quality standards are achieved, including narrative criteria. *See* 33 U.S.C. §1311(b)(1)(C); 40 CFR 122.44(d)(1)(requiring limits on pollutants that have "a reasonable potential to cause or contribute to an excursion above any State water quality standard, **including State narrative criteria for water quality.**") (emphasis added).

The commenter refers to a study prepared on behalf of the Federal Water Quality Coalition (which is described on its website as "a group of industrial facilities,

municipalities, agricultural parties and trade associations whose goal to ensure that water quality programs under the Clean Water Act are focused, flexible and founded on sound science"). Counsel for the permittee in this matter also represents the Coalition and serves as its Coordinator. The study reviews and recommends approaches that can be taken by state and tribal authorities in the development of numeric water quality criteria for nutrients, and may be of interest to Rhode Island as it pursues development of such criteria. In the meantime, EPA's charge is to establish effluent limits that ensure that all components of Rhode Island's existing water quality standards are met – including designated uses, criteria and antidegradation.

When calculating a numeric permit limit to achieve a narrative criterion, EPA's regulations at 40 C.F.R. §§ 122.44(d)(1)(vi)(A), (B) authorize the agency to base its permitting decision on a wide range of relevant material, including EPA technical guidance, state laws and policies applicable to the narrative water quality criterion, and site-specific studies. In establishing the nitrogen limit in this permit, EPA considered the more than 15 years of water quality data, studies and reports evaluating nitrogen levels and response variables in Narragansett Bay. EPA also considered the results of a physical model operated by the Marine Ecosystems Research Laboratory (MERL) at the University of Rhode Island. This enrichment gradient experiment included a study of the impact of different loadings of nutrients on DO and chlorophyll a. (See *Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers*, RI DEM, December 2004). Both the MERL tank experiments and the data from the Providence/Seekonk River system indicate a clear correlation between nitrogen loadings, chlorophyll a levels, and dissolved oxygen impairment. Low dissolved oxygen levels, as well as supersaturated dissolved oxygen levels, are an indicator of cultural eutrophication. The MERL tank experiments showed a clear correlation between nitrogen loading rates and dissolved oxygen variability. In addition, sampling in the Providence/Seekonk River system documents both extremely low and extremely high dissolved oxygen levels.

A stronger indicator of cultural eutrophication is phytoplankton chlorophyll a levels. The RIDEM data from 1995-96 indicates that average photoplankton chlorophyll a levels in the Seekonk River ranged from 14 ug/l to 28 ug/l with the highest levels in the upper reaches of the river and the lowest levels in the lower reaches of the river. The chlorophyll a levels in the Seekonk River correlate with total nitrogen levels as well as dissolved inorganic nitrogen levels. Again, this response is consistent with the MERL tank experiments that showed a correlation between nitrogen loading rates and chlorophyll a levels. Peak chlorophyll a levels in the Providence/Seekonk River system exceeded 200 ug/l. Coastal areas without high nutrient loads could be expected to have chlorophyll a levels in the 1 to 3 ug/l range (Nutrient Criteria Technical Guidance Manual – Estuarine and Coastal Marine Waters, USEPA, October 2001).

EPA recognizes that the MERL tank experiments cannot completely simulate the response of chlorophyll a and dissolved oxygen to nitrogen loadings in a complex, natural setting such as the Upper Narragansett Bay. In this regard, use of a physical model introduces some uncertainty in determining the precise level of nitrogen controls which

may ultimately be needed in the River. Both the MERL Tank experiments and the data from the River system, however, indicate a clear correlation between nitrogen loadings, chlorophyll a levels and dissolved oxygen impairment. Accordingly, the MERL tank experiments are an appropriate tool for evaluating the relationship between nitrogen loadings and cultural eutrophication indicators. While the uncertainties in the model and the receiving water response to reduced nutrient loading may ultimately mean that additional nitrogen reductions are needed beyond those required by this final permit, it is EPA's judgment that based on the available evidence, water quality standards cannot be met with a less stringent nitrogen limit than 5.0 mg/l. *See* Response #F18A for additional detail on establishment of the nitrogen limit.

Comment #F47(a)(2): Current multiple plant upgrades already under construction by the District and other WWTFs are expected to significantly reduce the TN loading to the Upper Bay. Requiring additional treatment to meet a 5 mg/l TN limit will result in extremely high construction and operating costs to acquire additional, non-renewable resources such as chemicals and electricity without any reasonable confidence that it will attain the designated uses. In addition, the use of substantial amounts of non-renewable resources is not consistent with the EPA's sustainable development policies. See discussion of Sustainability, below.

Response #F47(a)(2): *See* Responses #F6, #F7, and #F8, and Response #F53 below.

Comment #F47(a)(3)(i)-(iii): TMDL considerations.
(i) The results of the 1981-84 MERL laboratory tank studies are not an acceptable substitute for a TMDL to establish TN effluent limits. RIDEM should complete the federally-required TMDL before EPA imposes the proposed TN permit modification.[19]
(ii) Without a TMDL, the current approach lacks (a) clear, scientific justification, (b) a definite schedule or endpoint, and (c) a clear assessment to determine the need for future tighter restrictions.[20]
(iii) TN loading to Narragansett Bay is a regional, interstate issue that needs a comprehensive plan [as was implemented in Long Island Sound], which plan cannot be developed without a working TMDL.

Response #F47(a)(3)(i)-(iii): When reiussing an NPDES permit, EPA is not allowed under the CWA to delay imposition of water quality based-limits pending completion of a TMDL. *See* Responses #E3 and #F12. Further, as discussed above, nutrient TMDLs are very complex and can take many years to develop with no guarantee that the effort will be successful. *See* Responses #E3 and #F12. We also note that the Long Island Sound TMDL is undergoing a major revision to address certain deficiencies. *See* Framework for Reassessing a Total Maximum Daily Load Analysis to Achieve Water Quality Standards for Dissolved Oxygen Deficiencies in the Long Island Sound TMDL

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[19] See February 7. 2005 letter from Narragansett Bay Commission (NBC) to RIDEM commenting on proposed N limits (Attached to Technical Comments).
[20] See Footnote [immediately preceding].

(June 1, 2007). With regard to the Upper Narragansett Bay, for the past decade or more RIDEM expended significant resources in an attempt to simulate the estuary through the use of mathematical models and had concluded that the system was too complicated to simulate with available mathematical models. *See* Response #E3. In its decision to move forward now with a nitrogen limit, EPA also considered the existing severe nitrogen-driven cultural eutrophication in the receiving waters and the tendency for nitrogen to not only exacerbate existing water quality impairments but to persist in the environment in a way that contributes to future water quality problems. In light of these factors, delay in establishing permit limits is inappropriate.

In the absence of a validated dynamic model or TMDL, EPA has relied on the best information reasonably available to it, which is also precisely the type of information contemplated by 40 CFR §122.44(d)(vi). The agency considered more than 15 years of water quality data, studies and reports evaluating nitrogen levels and response variables in Narragansett Bay. These materials included EPA's *Nutrient Criteria Technical Guidance Manual: Estuarine and Coastal Marine Waters* (EPA, October 2001) and a variety of site-specific reports undertaken by Rhode Island to address nitrogen loading and control the effects of cultural eutrophication in the receiving waters. *See, e.g., Evaluation of Nitrogen Targets and WWTF Load Reductions for the Providence and Seekonk Rivers* (December 2004); *Plan for Managing Nutrient Loadings to Rhode Island Waters* (RI-DEM, February 1, 2005); *Nutrient and Bacteria Pollution Panel – Initial Report* (Governor's Narragansett Bay and Watershed Planning Commission, March 3, 2004); and *Massachusetts Estuaries Project – Site-Specific Nitrogen Thresholds for Southeastern Massachusetts Embayments: Critical Indicators*, July 21, 2003 as revised). In addition, EPA relied on the results of the MERL model, which was designed to predict the relationship between nitrogen loading and several trophic response variables in the Narragansett Bay system. In establishing the nitrogen limit in this permit, and evaluating the MERL model, EPA also considered actual measurements of nitrogen loadings from point source discharges, including a 1995-96 study by RIDEM Water Resources. *See* Response #F18A relative to EPA's establishment of the nitrogen limit and use of the MERL model.

That the MERL tank experiments were a physical rather than mathematical model and could not completely simulate the complex natural setting of Narragansett Bay does not undermine the relevance and validity of the model to the nitrogen limits here. This view of physical models is consistent with EPA guidance, which states:

> There are many other examples of empirical models used to relate environmental forcing functions to ecological responses, especially nutrient load/concentration and response relationships. Much of the professional aquatic ecological literature reports on use of empirical models (e.g., Chapters 2 and 3). Empirical models have their limitations, but when judiciously applied, they offer a highly useful tool to water quality managers.

Nutrient Criteria, Technical Guidance Manual; Estuarine and Coastal Marine Waters,

EPA-822-B-01-003 (October 2001) at 9-2. Further, the MERL model was peer-reviewed and published in a scientific journal, thereby withstanding the scrutiny of representatives of the scientific community. EPA itself cited the MERL experiment with approval in national nutrient technical guidance. *Id*. at 2-11 and 2-16 ("Three case studies provide some of the strongest evidence available that water quality managers should focus on N for criteria development and environmental control (see NRC 2000 for details). One study involves work in large mesocosms by the University of Rhode Island (Marine Ecosystem Research Laboratory–MERL) on the shore of Narragansett Bay. Experiments showed that P addition was not stimulatory, but N or N+P caused large increases in the rate of net primary production and phytoplankton standing crops (Oviatt et al. 1995).").

The commenter's proposed course — to await completion of a dynamic model or a TMDL while pollutant loadings continue unabated — is unreasonable and contrary to policy objectives of the CWA to make reasonable further progress toward eliminating pollution to the Nation's waters.

Comment #F47(a)(3)(iv): The District shares the concern of the Narragansett Bay Commission (NBC) about the unanticipated effects that could result from a dramatic TN reduction from WWTFs on the Upper Bay.[21]

Response #F47(a)(3)(iv): During permitting proceedings administered by RIDEM, NBC offered a comment expressing concern that dramatic nitrogen reductions in the Bay could have detrimental impacts on secondary productivity such as fisheries and shell fishing. We concur with RIDEM's response which, among other things, noted that in light of the highly degraded condition of the Providence and Seekonk Rivers (including DO levels that have dropped to levels that are lethal to aquatic life), the aquatic life benefits of the nutrient reduction are expected to far exceed potential negative impacts to secondary productivity. Certainly, there will be improved secondary productivity in those areas that regularly experience lethal levels of oxygen depletion. A study of the Boston Harbor before and after moving the outfall from the Deer Island wastewater treatment facility, for instance, looked at the catch per unit effort for winter flounder (a relative measure of their abundance). Catch per unit effort increased after the outfall was moved. Nester et al. (2007), *2006 Annual Fish and Shellfish Report*, Boston, MWRA. Report ENQUAD 2007-06. 200p.

Comment #F47(a)(3)(v): Total N loading to Narragansett Bay has been essentially level in the past 3 decades, based on evaluations by Dr. Scott Nixon of URI/GSO. [22] Such findings underscore the need for a TMDL to determine the appropriate relationship and

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[21] See Footnote [immediately preceding].

[22] 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.

relative importance of nutrient loading and climatic conditions to producing hypoxic conditions.

Response #F47(a)(3)(v): Questions have been raised relative to the limitations of the data used to draw this conclusion (*see, e.g.,* RIDEM Response to Comments at page 17). Moreover, studies and reports have documented that water quality has been severely degraded for at least 15 years. Regardless of whether loadings have been consistent over time, the nitrogen loadings are excessive and must be reduced.

Comment #F47 (a)(3)(vi): 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 [sic], as well as to the influence of residence time on community structure and ecological interactions [sic] are still poorly understood, and an improved understanding of the factors that determine the sensitivity of estuaries to nutrients may eventually lead to better management of coastal nutrient pollution.[23]

Response #F47(a)(3)(vi): Additional research is not needed to substantiate the total nitrogen limit in the final permit. As detailed repeatedly throughout this Response to Comments, the CWA does not allow EPA to postpone development of water quality-based effluent limits pending completion of a TMDL. *See* Responses #E3 and #F12. Further, as previously explained, EPA has determined that a seasonal reduction of nitrogen to no more than 5.0 mg/l at the UBPWAD facility is required in order to achieve water quality standards. *See* Responses #F17, #F18A, #F22, #F44, #F47(a)(1), #F47(a)(3)(i)-(iii).

We agree that physical conditions such as stratification, temperature, tidal stage, wind induced mixing and re-aeration do have an effect on dissolved oxygen levels. Indeed, as part of RIDEM's modeling efforts, water quality data (11 sampling events during 1995 and 1996) were collected under a variety of conditions in order to reflect the dynamic physical conditions of the system. Additional evaluations of site specific factors might be informative in determining whether further reductions of nitrogen are necessary in future permit issuances. Monitoring conducted after completion of the upgrades required by this permit and RIDEM's permits will incorporate consideration of appropriate site specific factors relative to the response of nitrogen loadings to Narragansett Bay.

Comment #F47(b): Interstate/Transboundary pollution considerations.

Comment #F47(b)(i): The Draft Permit seeks to apply a Rhode Island legislative mandate [RI Gen. Laws §46-12-2(f); requiring that nitrogen discharges be reduced by 50% by December 31, 2008] to Massachusetts dischargers. That mandate does not

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[23] 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.

constitute a state water quality standard that has been promulgated and then approved by EPA. As such, it is not part of Rhode Island's water quality standards under Federal law, and there is no legal basis, under the "Alaska Rule" (40 CFR 131.21) to apply it in NPDES permits.

Response #F47(b)(i): EPA did not apply RI Gen. Laws §46-12-2(f) in establishing the effluent limit for nitrogen. *See* Response #F44.

Comment #F47(b)(ii): In order to subject a point source to permit requirements based on another state's water quality standards, EPA must demonstrate that the point source's discharge is causing or contributing to a violation of those out-of-state standards.[24] As discussed elsewhere in these comments, EPA has not made any showing that the proposed limits in the Draft Permit are needed to prevent violations of Rhode Island water quality standards. The burden is on EPA to show how the proposed limits will lead to attainment of the Rhode Island standards, and EPA has not done this. Therefore, there is no legal basis for those limits.

Response #F47(b)(ii): The discussion of the nitrogen limit in the Fact Sheet (pages 8-14) details the basis for EPA's finding that discharges of nitrogen from UBWPAD's facility are causing or have the reasonable potential to cause violations of Rhode Island's Water Quality Standards. Related and more specific comments and objections from UBWPAD are addressed elsewhere. *See, e.g.,* Response #F6 and #47(a)(1).

There is no need to reach UBWPAD's comment that, absent having determined "reasonable potential," consideration of Rhode Island's water quality standards violates Section 510 of the CWA and the Tenth Amendment of the Constitution. As is detailed above, EPA has satisfied this regulatory threshold. In any event, UBWPAD does not explain how the permit limits in any way restrict Massachusetts' sovereignty or rights over waters in the Commonwealth in contravention of Section 510 of the CWA. In establishing the permit limits in this matter, EPA adhered to the requirements of the CWA and its implementing regulations. These requirements mandate that EPA set effluent limits that ensure compliance with the applicable water quality requirements of all affected states, including downstream affected states. 33 U.S.C. §1341(a)(2); 40 CFR §122.44(d)(4).

Further, to the extent that UBWPAD is challenging the constitutionality of the CWA and/or its implementing regulations, such a challenge is not appropriately raised in these administrative permitting proceedings. *See, e.g., In re: City of Marlborough,*

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[24] Related legal concerns of the District include whether the imposition of Rhode Island requirements on Massachusetts point source discharges, without the CWA-required demonstration that the point source's discharge is causing or contributing to a (1) violation of those out-of-state standards/requirements: violates Section 510 of the Clean Water Act, 33 U.S.C. § 1370, which prohibits construing any provision of the statute as impairing "any right or jurisdiction of the States with respect to waters (including boundary waters) of such states"; and/or (2) violates the Tenth Amendment of the United States Constitution or invades Massachusetts' sovereignty and, thus, is unconstitutional.

Massachusetts, NPDES Appeal No. 04-1 at n. 19 (EAB March 11, 2005); *In re: City of Port St. Joe and Florida Coast Paper Co.*, 7 EAD 275 at n.58 (July 30, 1997). In any event, UBWPAD does not substantiate any such claim. The Tenth Amendment does not itself limit the power of the federal government, but simply confirms that such power is limited to that provided in the Constitution. *New York v. United States*, 505 U.S. 144, 156-57 (1992). The Clean Water Act is a valid exercise of the Commerce Clause power delegated to the United States by the Constitution. *United States v. Riverside Bayview Homes, Inc., et al.*, 474 U.S. 121, 133 (1985).

Comment #F47(b)(iii): Dischargers in Rhode Island, which are much closer to the Bay than is the District's facility, have received TN limits as high as 8 or 10 mg/l and, in some cases, no limit at all. If attenuation is considered (as it must be), an equivalent limit for the District, based on alleged impacts to the Bay, would be much higher than those limits. Yet, without justification, EPA has applied a limit of 5mg/l to the District. In light of RIDEM's actions concerning its own dischargers, EPA's interpretation of the Rhode Island narrative water quality standards is erroneous.

Requiring that Massachusetts plants meet more stringent limits than Rhode Island plants, without a technical justification based on protection of water quality, violates the Commerce Clause of the Constitution to the extent that Rhode Island is attempting to employ the Clean Water Act to secure an unfair economic advantage or benefits for Rhode Island [e.g., by unfairly shifting a disproportionate share of the responsibility and expense of reducing/treating the TN load that may not be necessary or economically feasible].

Response #F47(b)(iii): The predominant sources of the nitrogen loading in the Providence and Seekonk Rivers are municipal wastewater treatment facilities in Rhode Island and Massachusetts. *See* Response #F6. In administration of the NPDES program, Rhode Island (who administers the NPDES program in that state) and EPA (who administers the program in Massachusetts) have prioritized the most significant point sources of nitrogen to the system. In developing nitrogen limits for these facilities, both Rhode Island and EPA have considered the relative nitrogen loading and location of the discharge of each facility.

The 2004 RIDEM study includes evaluation of various combinations of nitrogen reduction from the significant point sources of nitrogen to the system. These include seven Rhode Island and three Massachusetts wastewater treatment facilities. The Rhode Island facilities include: Woonsocket, NBC Fields Point, NBC Bucklin Point, East Providence, Cranston, Warwick and West Warwick. The Massachusetts facilities include UBWPAD, Attleboro and North Attleborough. (See *Evaluation of Nitrogen Targets and WWTF Load Reductions of the Providence and Seekonk Rivers*, DEM, December 2004). RI DEM has established final nitrogen limits of 5.0 mg/l for Rhode Island facilities with relatively larger design flows that also discharge into areas of the river system experiencing the most significant impairment – NBC Fields Point (65 MGD) and NBC Bucklin Point (31 MGD). RIDEM also issued a nitrogen limit of 5.0 mg/l to Woonsocket; although Woonsocket has a permitted design flow of 16 MGD, it

discharges to the area of the Bay where the greatest impairments have been measured. [25] Rhode Island also has issued permits with a nitrogen limit of 8.0 mg/l for four other facilities – East Providence, Cranston, Warwick and West Warwick. These facilities have relatively smaller permitted design flow (and corresponding nitrogen load) – ranging from 8 MGD to 20 MGD – and they discharge further downstream in the Providence River. In Massachusetts, EPA has issued final permits with total nitrogen limits of 8.0 mg/l to Attleboro and North Attleborough. While these two facilities discharge to a freshwater river that flows to areas of the Upper Bay where the greatest impairments have been measured, they also have much smaller permitted flows and corresponding nitrogen loadings than UBWPAD. Attleboro has a design flow of 9 MGD and North Attleborough has a design flow of 5 MGD. There are several smaller facilities in both Rhode Island and Massachusetts and Rhode Island that discharge to freshwater rivers that flow to the Upper Bay. The CWA requires that Rhode Island and EPA assess whether these discharges require water quality based effluent limits, including any limits for nitrogen, in subsequent permit reissuances.

As Massachusetts facilities are not being treated more stringently than Rhode Island facilities, there is no need to reach the commenter's contention that Rhode Island has violated the Commerce Clause of the United States Constitution. Further, to the extent that UBWPAD is challenging the constitutionality of the CWA and/or its implementing regulations, such a challenge is not appropriately raised in these administrative permitting proceedings. *See, e.g., In re: City of Marlborough, Massachusetts*, NPDES Appeal No.04-12 at n.19 (EAB March 11, 2005); *In re: City of Port St. Joe and Florida Coast Paper Co.*, 7 EAD 275 at n.58 (July 30, 1997). In any event, a Commerce Clause claim alleging that one State is attempting to secure an economic advantage over another State should be directed at the allegedly offending State, not the federal government. *See, e.g., City of Philadelphia v. New Jersey*, 437 U.S. 617 (1978). EPA, not Rhode Island, is the permitting authority in this matter.

Comment #F47(b)(iv): Due process violations. Massachusetts facilities, ratepayers, and taxpayers have not had an adequate opportunity to be informed of, and to participate in the Rhode Island rulemaking process for the out-of-state, narrative water quality standards upon which the total nitrogen limits are based. This deprives the District, other Massachusetts POTWs, and their impacted ratepayers of their fundamental rights to public notice, review and comment on such important matters, thus depriving them of due process under the federal and state constitutions.

Response #F47(b)(iv): Section 401(a)(2) of the CWA and 40 CFR § 122.44(d)(4) require EPA to condition NPDES permits in a manner that will ensure compliance with the applicable water quality standards (including narrative criteria) of a "downstream affected state," in this case Rhode Island. To the extent the comment challenges the constitutionality of this statutory and regulatory framework, it is not appropriately raised

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[25] In resolution of an appeal of this permit, Woonsocket recently entered into a Consent Agreement that the facility will meet a nitrogen limit of 3.0 mg/l. *See* Consent Agreement, In re: AAD No. 05-004/WRA dated June 27, 2008.

as part of these administrative permitting proceedings. *See, e.g., In re: City of Marlborough, Massachusetts*, NPDES Appeal No. 04-12 at n.19 (EAB March 11, 2005); *In re: City of Port St. Joe and Florida Coast Paper Co.*, 7 EAD 275 at n.58 (July 30, 1997).

In any event, the procedures governing this permit issuance satisfy any due process concerns. UBWPAD, co-permittees and members of the public have had the opportunity to participate in these permitting proceedings through the notice and comment process. As part of that process, EPA has received written comments from numerous organizations, public entities and individuals, including substantial comments from UBWPAD, its technical consultants and attorneys. EPA also held a public hearing at which 23 persons provided comment on the draft permit. Accordingly, UBWPAD has had full opportunity to comment on EPA's interpretation and application of the relevant Rhode Island water quality standards.

Moreover, in its comment above, UBWPAD simply raises broad due process concerns without articulating any specific concerns with Rhode Island's narrative nutrient criteria. Indeed, it is difficult to imagine what possible concerns with the criteria UBWPAD could forward. The CWA requires States to adopt water quality criteria sufficient to protect designated and existing uses of each water body. *See* 33 U.S.C. §§1313(a)-(c). *See also* 40 CFR §131.11(a). These criteria may be numeric or narrative. Rhode Island has adopted (and EPA has approved) the following narrative criteria applicable to the nitrogen limit:

> "At a minimum, all waters shall be free of pollutants in concentrations or combinations or from anthropogenic activities subject to these regulations 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...." Rule 8.D.(1).
>
> There shall be no nutrients "in such concentration that would impair any usages specifically assigned to said Class, or cause undesirable or nuisance aquatic species associated with cultural eutrophication." Table 2, Rule 8.D.(3)10; see also Rule 8.D.(1)(d).

Additional relevant regulations include Rule 9.A. and B., which prohibit discharges of pollutants which alone or in combination will likely result in violation of any water quality criterion or interfere with one or more existing or designated uses, and prohibit discharges that will further degrade waters which are already below the applicable water quality standards.

In short, Rhode Island's criteria prohibit discharges of nutrients that would impair or interfere with uses. Nowhere in its comments does UBWPAD challenge that these criteria are somehow flawed, do not appropriately protect uses or otherwise contravene the requirements of Section 303(a)-(c) of the CWA. Nor does UBWPAD offer what possible commentary or concerns it would have raised during the development of such narrative criteria by Rhode Island. The more specific objections UBWPAD has raised elsewhere in its comments relate to EPA's application of these criteria in establishment of the nitrogen effluent limit. And, as is detailed above, UBWPAD and other interested persons have had full opportunity through this permitting proceeding to comment on the Region's interpretation of and application of Rhode Island's narrative criteria.

Comment #F48: Phosphorus. For several reasons (explained below), the Draft Permit's phosphorus limits should be stricken and the determination of such limits should be deferred/postponed to the future completion of a TMDL. The limit set in the existing Permit should remain in effect.

There is no adequate technical and legal basis for imposing the reduced phosphorus limits proposed in the Draft Permit. The new phosphorus limits are based on outdated and irrelevant assessments. The manner in which the modified limits were developed is too simplistic, and does not reflect real world conditions. EPA has erroneously concluded that compliance with the proposed limits will have an affect 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, EPA, without any assessment of the beneficial effect of these upgrades and adjustments for phosphorus, issued a Draft Permit to the District containing phosphorus limits that are significantly more stringent than the limits in its 2001 Permit. As discussed in CDM's technical comments, the phosphorus levels that allegedly led to the water quality conditions described in the Draft 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.

The United States Geological Survey (USGS) and the District have undertaken development of hydrologic and water quality models suggested by the EPA's Science Advisory Board and the Watershed Action Plan.[26] The USGS is undertaking the hydrologic simulation model in concert with the Rhode Island Water Resources Boards,

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[26] *See* EPA-SAB-EPEC-98-001, Evaluation of the Blackstone River Initiative, p. 2; and 2004 Blackstone River Watershed Five-Year Action Plan.

and with the cooperation and sponsorship of the District. The District is undertaking the development of the HSPF water quality model (building on the HSPF quantity model developed by USGS), including additional wet and dry weather sampling, the installation of continuous recording analytical devices and the integration of the extensive volunteer data sets into the program. Significant outputs from the USGS and District models are expected in November/December 2007. Until the release of this modeling information and the associated understanding it should provide with respect to the affect of the various plant upgrades and permit adjustments on the water quality of the Blackstone River, there remains an inadequate and unreliable factual basis for imposing stricter phosphorus limits.

In the absence of a TMDL, EPA appears to rely solely on a purely mechanical application of national guidance that is outdated [namely, the 1986 Quality Criteria of Water, otherwise known as the Gold Book] and has no relation to site specific facts or the environmental impacts of the District's wastewater discharge. The existing limit, which was based on a water quality model previously embraced by the Region, should not be replaced with an unproven, speculative method [the Gold Book] that would necessitate a multi-million dollar renovation.

In addition, EPA considered an incorrect interpretation of the current Massachusetts Surface Water Quality Standards ("WQS") when it set the Draft Permit's phosphorus limit. Consequently, any reliance on the misinterpreted WQS is erroneous as a matter of law.

The Draft Permit Fact Sheet (pg. 3, footnote 1) states that the 1996 version of the Massachusetts WQS is applicable to this Draft Permit as the DEP's January 2007 revisions are not yet approved by EPA. The applicable Massachusetts WQS do not contain a numerical criteria for total phosphorus; instead, a narrative criterion at 314 CMR 4.05(5)(c) provides that nutrients "[s]hall not exceed the site specific limits necessary to control accelerated or cultural eutrophication."

In the Draft Permit's Fact Sheet (pg. 8), EPA asserts that the Commonwealth's WQS, at 314 CMR 4.04, require the imposition of "highest and best practical treatment" for phosphorus for <u>all discharges,</u> not just discharges to lakes and ponds as justification for the increase. This strained interpretation completely ignores the plain meaning of the language in the applicable WQS which states, in relevant part:

> (5) Control of Eutrophication. From and after the date 314 CMR 4.00 become effective there shall be no new or increased point source discharge of nutrients, primarily phosphorus and nitrogen, **directly to lakes and pond.** There shall be no new or increased point source discharge to **tributaries of lakes or ponds** that would encourage cultural Eutrophication or the growth of weeds or algae in these lakes or ponds. *Any existing point source discharge containing nutrients in concentrations which encourage eutrophication or growth of weeds or algae shall be provided with the highest and best practical treatment to remove such*

> *nutrients.* Activities which result in the non-point source discharge of nutrients **to lakes and ponds** shall be provided with all reasonable best management practices for non-point source control. 314CMR 4.04(5) (emphasis added).

The applicable [1996] Massachusetts regulations relied upon by EPA do not apply to the District given that they are clearly intended to control eutrophication in lakes and ponds and their tributaries, and there is no language to suggest that it was intended to apply to rivers and streams – other than tributaries to lakes and ponds. Critically, the District does not discharge to a lake, pond or tributary to the same.

The DEP has acknowledged that the 1996 regulatory language only applies to lakes, ponds and their tributaries by publishing, in January 2007, new proposed water quality standards, which are not yet adopted and approved by EPA, and which insert new language that states the "resulting provision is *expanded* to ensure that all surface waters, not just lakes and ponds, are protected from excessive nutrients. See DEP, *Summary of Proposed Revisions to 314 CMR 4.00 Water Quality Standards,* Appendix, Tab B-4].

The few publicly-operated POTWs across the country that have been required to meet phosphorus limits of 0.1 mg/l or lower [less than 0.18 percent of the 17,000 POTWs in the nation] are mainly facilities that discharge to lakes or ponds.

Regardless of which version [1996 or 2007] of the Massachusetts Water Quality Standards (314 CMR 4.00) is applied here, the District's technical experts have shown the 0.75 mg/l phosphorus limit to be appropriate and adequate. The existing QUAL2E model has indicated that at extreme low flow conditions (as compared to seasonal average values) with the existing phosphorus limit of 0.75 mg/l and with 25 percent reduction in sediment phosphorus flux, that chlorophyll a levels would be reduced substantially from 66 ug/l to 22 ug/l. The increased seasonal average flow [seasonal chlorophyll a was directly used in the Charles River as a measure of cultural eutrophication] would undoubtedly have mitigated algal growth further (e.g., dilution and reduced residence time) resulting in even lower chlorophyll a levels.

Response #F48: In the expired permit, EPA established a phosphorus limit of 0.75 mg/l based on a waste load allocation for achieving minimum dissolved oxygen criteria [Blackstone River Watershed Dissolved Oxygen Waste Load Allocation for Massachusetts and Rhode Island (November 1997)]. That permit issuance made clear that the 0.75 mg/l total phosphorus limit was based on meeting dissolved oxygen criteria in the Blackstone River only and did not address eutrophication related impairments in either the Blackstone River or Narragansett Bay. EPA specifically cautioned that future permit limits might include more stringent phosphorus limits if warranted by eutrophication impacts. *See* Response #F5 for a description of the development of the limit in the expired permit and the Agency's increased awareness of nutrient-related impairments.

As outlined in the Fact Sheet and as described below, EPA has determined that the discharge of phosphorus allowed under the expired permit causes or has the reasonable potential to cause or contribute to excursions above Massachusetts' narrative water quality criteria for cultural eutrophication. The 0.75 mg/l limit does not ensure that eutrophication related criteria will be met in the Blackstone River. *See* Fact Sheet at pages 8-9 and Response #F9.

Under undisturbed natural conditions, phosphorus concentrations are very low in most aquatic ecosystems. Excessive nutrient levels can result in increases in algae and other primary producers, which may prevent streams from meeting their designated uses. Typically, elevated levels of nutrients such as phosphorus will cause excessive algal and/or plant growth. Phosphorous and other nutrients (*i.e.*, nitrogen) promote the growth of nuisance levels of algae, such as phytoplankton (free floating algae) and periphyton (attached algae), filamentous algae such as moss and pond scum, and rooted aquatic plants, referred to generally as macrophytes.

Noxious aquatic plant growth degrades aesthetic and recreational uses in a variety of ways. Unsightly algal growth is unappealing to swimmers and other stream users and reduces water clarity. Heavy growths of algae on rocks can make streambeds slippery and difficult or dangerous to walk on. Algae and macrophytes can interfere with angling by fouling fishing lures and equipment. Boat propellers and oars may also get tangled by aquatic vegetation. 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.

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.

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 stream bed. In addition to physically altering the benthic environment and aquatic habitat, organic materials in the sediments can become available for future uptake, further perpetuating and potentially intensifying the eutrophic cycle.

As a Class B water, the Blackstone River has been designated by Massachusetts as a 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. §§ 4.06 (Table 12) and 4.05(3)(b). Such waters must have consistently good aesthetic value and, where designated, must be suitable as a source of public water supply with appropriate

treatment, as well as for irrigation and other agricultural uses. *See* 314 C.M.R. § 4.05(3)(b). Class B waters must also be free of floating, suspended or settleable solids that are aesthetically objectionable or could impair uses. *Id*. at § 4.05(3)(b)(5). Changes to color or turbidity of the waters that are aesthetically objectionable or use-impairing are also prohibited. *Id*. at § 4.05(3)(b)(6).

Numeric criteria for Class B waters include limits on dissolved oxygen (not less than 5.0 mg/l) and pH (6.5-8.3 s.u. and not more than 0.5 units outside the background range). *Id*. at §§ 4.05(3)(b)(1) and (3). 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."), and nutrients. *See* 314 C.M.R. § 4.05(5)(a),(b) and (c). Pursuant to C.M.R. § 4.05(5)(c), Massachusetts water quality standards require that "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…" Massachusetts standards do not include a numeric criterion for total phosphorus.[27]

The Blackstone River is listed on the *Massachusetts Year 2004 Integrated List of Waters* (which incorporates the CWA § 303(d) list) as a water that is impaired (not meeting water quality standards) and requires one or more Total Maximum Daily Loads (TMDLs) to be prepared to reduce pollutant loadings into the River so that it can attain water quality standards. The Blackstone River is listed as impaired for unknown toxicity, priority organics, metals, ammonia, chlorine, nutrients, organic enrichment/low dissolved oxygen (DO), flow alterations and other habitat alterations, pathogens, suspended solids, turbidity, and objectionable deposits.

In the absence of a numeric criterion for phosphorus, EPA looks to 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)(B). EPA also relies on 40 C.F.R. § 122.44(d)(1)(vi)(A) when interpreting a state narrative criterion and deriving a limit that will achieve uses.

EPA explained in the Fact Sheet that it used a variety of Section 304(a) information and recommended criteria as ***guidance*** to interpret the States' narrative criterion for nutrients and not as substitutes for state water quality criteria. *See also* Response #F10. In addition to the 1986 Quality Criteria of Water ("Gold Book"), EPA also looked to

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[27] Massachusetts has established site-specific criteria for numerous lakes and ponds pursuant to TMDLs. The criteria range from 0.0051 mg/l to 0.0455mg/l (see 314 C.M.R. 4.06, Table 28).

Ambient Water Quality Criteria Recommendations: Information Supporting the Development of State and Tribal Nutrient Criteria and the *Nutrient Criteria Technical Guidance Manual*. In these guidance documents, EPA has set forth total ambient phosphorus concentrations that are sufficiently stringent to control cultural eutrophication and other adverse nutrient-related impacts.

The Region's use of the Gold Book and ecoregional criteria published under Section 304(a) to develop a numeric phosphorus limit sufficiently stringent to achieve the narrative nutrient criterion is expressly contemplated by applicable NPDES regulations. When deriving a numeric limit to implement a narrative water quality criterion, EPA is authorized to:

> Establish effluent limits on a case-by-case basis, using EPA's water quality criteria, published under Section 304(a) of the CWA, supplemented where necessary by other relevant information.

40 C.F.R. § 122.44(d)(1)(vi).

The guidance documents produced by EPA present protective in-stream phosphorus concentrations based on two different analytical approaches. An effects-based approach provides a threshold value above which adverse effects (*i.e.*, water quality impairments) are likely to occur. It applies empirical observations of a causal variable (*i.e.*, phosphorus) and a response variable (*i.e.*, chlorophyll *a*) associated with designated use impairments. Alternatively, reference-based values are statistically derived from a comparison within a population of rivers in the same eco-region class. They are a quantitative set of river characteristics (physical, chemical and biological) that represent conditions in waters in that ecoregion that are minimally impacted by human activities (*i.e.*, reference conditions), and thus by definition representative of water without cultural eutrophication. While reference conditions, which reflect minimally disturbed conditions, will meet the requirements necessary to support designated uses, they may also exceed the water quality necessary to support such requirements.

The Gold Book follows an effects-based approach. It sets forth maximum threshold concentrations that are designed to prevent or control adverse nutrient-related impacts from occurring. Specifically, the Gold Book recommends in-stream phosphorus concentrations of no greater than 0.05 mg/l in any stream entering a lake or reservoir, 0.1 mg/l for any stream not discharging directly to lakes or impoundments, and 0.025 mg/l within the lake or reservoir. A more recent technical guidance manual, the Nutrient Criteria Technical Guidance Manual: Rivers and Streams (EPA 2000) ("Nutrient Criteria Technical Guidance Manual"), cites to a range of ambient concentrations drawn from the peer-reviewed scientific literature that are sufficiently stringent to control periphyton and plankton (two types of aquatic plant growth commonly associated with eutrophication). This guidance indicates in-stream phosphorus concentrations between 0.01 mg/l and 0.09 mg/l will be sufficient to control periphyton growth and concentrations between 0.035 mg/l and 0.070 mg/l will be sufficient to control plankton (Table 1 shows the range of

literature values cited in the Nutrient Criteria Technical Manual, and Table 2 shows a range of phosphorus criteria established by various states).

While the various recommended values for phosphorus contained in the materials cited above – e.g., 24 ug/l (Ecoregional Nutrient Criteria) to 100 ug/l (Gold Book Criteria) – were not specifically developed by or for Massachusetts, these values do reflect a range of ambient phosphorus concentrations that are sufficiently low to prevent cultural eutrophication. The Region opted for an in-stream phosphorus target approximating the Gold Book value rather than the more stringent Ecoregional criterion. EPA opted for the effects-based approach in this permitting proceeding because it is often more directly associated with an impairment to a designated use (i.e., fishing, swimming). The effects-based approach provides a threshold value above which adverse effects (i.e., water quality impairments) are likely to occur. Reference-based values are statistically derived from a comparison within a population of rivers in the same eco-region class. Specifically, reference conditions presented are based on the 25th percentiles of all nutrient data, including a comparison of reference conditions for the aggregate ecoregion versus subecoregions. *See* Ecoregional Nutrient Criteria at vii. Thus, while reference conditions, which reflect minimally disturbed conditions, may meet the requirements necessary to support designated uses, they may also exceed the water quality necessary to support such uses.

Based on these materials, EPA determined that an ambient phosphorus concentration of 0.1 mg/l would be necessary to control the effects of cultural eutrophication and to ensure compliance with applicable nutrient criteria in Massachusetts. The expired permit has a monthly average limit of ***0.75 mg/l*** from April 1 to October 31. Effluent data from DMRs for the period January 2004 through December 2006 show a range of 0.9 to 2.4 mg/l of total phosphorus. There is no significant dilution in the receiving stream under 7Q10 conditions. (*See* Att. B to Fact Sheet). Further, UBWPAD is the dominant source of phosphorus loadings to the Blackstone River (*see* Response #F7). With reference to the commenter's suggestion that EPA failed to consider upgrades at other facilities in establishing the limit, the phosphorus limit is necessary to ensure compliance with Massachusetts' water quality standards downstream of the discharge and before other dischargers. *See also* Response #F9 for detail on the data set collected by MassDEP on August 28, 2003.

The phosphorus limit is intended to ensure compliance with and is based on interpretation of the Commonwealth's narrative criterion related to nutrients – not on the provisions in the standards related to "highest and best practicable treatment." The Commonwealth's 1996 water quality standards include a narrative criterion which provides that nutrients "shall not exceed the site specific limits necessary to control accelerated or cultural eutrophication." 314 CMR 4.05(5)(c). The antidegradation provisions of Massachusetts' 1996 standards also include a requirement that "any existing point source discharges containing nutrients in concentrations which encourage eutrophication or growth of weeds or algae shall be provided with the highest and best practicable treatment to remove such nutrients." 314 CMR 4.04.

Massachusetts revised its standards in 2007, and EPA approved changes to the narrative nutrient criteria by letter dated September 19, 2007. The 2007 standards include a narrative criterion for nutrients at 314 CMR 4.05(5)(c) which prohibits nutrients in amounts "in concentrations that would cause or contribute to impairment of existing or designated uses," and addresses the role of TMDLs and site specific criteria. In addition, it includes the nutrient-related provisions for existing point and non-point sources that had previously been in the antidegradation section of the water quality standards at 314 CMR 4.04(5). It specifies that existing point sources of nutrients in concentrations that would cause or contribute to cultural eutrophication shall be provided with "the most appropriate treatment," which can include certain specified levels of technology ("BAT" and "HBPT" for non-POTWs and POTWs, respectively), and non-point sources are to be provided with "cost effective and reasonable" BMPs. In a letter to EPA dated January 2, 2007, and as reflected in EPA's September 9, 2007 approval letter, these later provisions do not interpret, modify or supersede the general prohibition against nutrients at levels that would impair uses, but rather inform the regulated community of requirements that will generally be imposed where nutrients are a concern.

The 2007 standards apply to the final permit issuance in this matter. In any event, the applicable narrative criterion in both the 1996 and 2007 version remains the same: there is a general prohibition against nutrient levels that would impair uses. In the Fact Sheet, EPA referenced the "highest and best practicable treatment requirement" (included in the antidegradation provisions of MassDEP's 1996 standards) because in some other permitting decisions, MassDEP had interpreted the requirement to require an effluent limit of 0.2 mg/l for phosphorus; EPA wished to make clear that such a limit would not ensure compliance with the ***narrative*** criterion for nutrients in this matter.

With regard to QUAL2E, as explained in previous responses, in light of changes in the system (i.e., macrophyte growth immediately downstream of the discharge), the model was determined to be an insufficient tool for establishing a limit in the new permit that will ensure attainment of standards. *See* Response #F13. Additionally, the Charles River system is a very different from the Blackstone River in that the lower Charles is more similar to a lake. The in-stream phosphorus target established for the Charles River was 28 ug/l as opposed to 100 ug/l for the Blackstone River. *See* Response #F12.

Comment #F49: Year-Round Disinfection. Since the proposed year-round disinfection condition is based solely on the Rhode Island water quality standards, the same interstate legal and policy issues raised in the District's comments on the proposed nitrogen limits apply here as well. In addition, as discussed in the technical comments and below, and as a matter of law, policy and fairness, the District questions the need to disinfect year-round or at all.

Pursuant to 40 C.F.R. §122.44(d)(i), a water quality-based permit requirement is justified only if it is determined that the discharge will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard. Further, Massachusetts permits must ensure compliance with the applicable water quality requirements of all affected States. 40 C.F.R. §122.4(d). Rhode Island water quality

standards governing fecal coliform are designed to protect bathing waters from bacterial contamination. There is no evidence, however, that the District's discharge adversely affects water quality in Rhode Island during the non-swimming season. In fact, there are no designated bathing waters on the Blackstone River in Rhode Island. In the absence of evidence that the District's discharge has a reasonable potential to exceed Rhode Island water quality standards, the CWA does not authorize the imposition of water quality-based effluent limits based on those standards.

Further, even if reasonable potential were demonstrated, it is not appropriate to regulate the District's fecal coliform discharges through a year-round disinfection requirement. Rhode Island has adopted water quality standards governing fecal coliform and, in addition, has chosen to impose technology-based requirements in municipal permits that include year-round disinfection. Those technology-based requirements, however, are not water quality standards. As a result, EPA has no authority to impose such requirements on Massachusetts dischargers, even if water quality-based limitations are required to ensure compliance with the Rhode Island water quality standards. EPA has no authority to impose such a requirement on the District's discharge.

Response #F49: The Blackstone River in Rhode Island is designated by the Rhode Island Water Quality Standards as a Class B1 water from the MA/RI border to the Slaters Mill Dam at the confluence with the Seekonk River. Under Rhode Island's Water Quality Standards, Class B1 waters are designated for, among other things, "primary and secondary contact recreational activities."

For fresh waters that are designated for primary contact recreation, Rhode Island's Water Quality Standards specify that fecal coliform bacteria shall not exceed a geometric mean value of 200 MPN/100 ml and that no more than 20% of instream samples shall exceed 500 MPN/100ml. These bacteria criteria apply year round, including during non-bathing season. These are EPA-approved water quality standards (not technology requirements) and are applicable to Massachusetts dischargers to the extent such discharges affect Rhode Island waters.

EPA has determined that in the absence of year round fecal coliform limits, the District's discharge – the dominant point source on the Blackstone River – does have a reasonable potential to cause or contribute to a violation of Rhode Island's fecal coliform criteria. The basis for this determination is detailed in the Fact Sheet and in Response #F25 and includes analysis of water quality sampling.

Please note that we have modified the final limit to account for bacteria die off during the travel time from the point of discharge to the state line. *See* Response #F25.

Comment #F50: Sampling and Monitoring. The District objects to Part 1.A.I (f) of the Draft Permit (one sentence on page 8). This provision infers that the District is required to report the results of all testing regardless of whether or not the results are representative of the activity being monitored or don't conform to EPA test protocols. This provision conflicts or is inconsistent with Part II.C. (Monitoring Requirements; page

6 of 25) which requires that all monitoring results be conducted according to approved test protocols, unless other test procedures have been specified in the permit. The requirements of Part I.A.l (f) are analogous to requiring drivers of motor vehicles to report their speed every time they look at their speedometer. This provision is burdensome and should be stricken or clarified because it restricts operator flexibility and will increase paperwork, impacting plant performance by taking personnel away from other more important work.

Response # F50: The permittee should report all monitoring performed in accordance with EPA approved methods and monitoring requirements of the permit. *See* 40 CFR Part 122.41 (l)(4)(ii). *See also* Response #F36.

Comment #F51: Environmental Justice. In issuing the Draft Permit, EPA failed to account for disproportionate impacts on minority and low-income populations. The Agency is required to do so under Executive Order *12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations* (February 11, 1994). That Executive Order provides, in part, that the "EPA will . . . review the environmental effects of major Federal actions significantly affecting the quality of the human environment. For such actions, EPA reviewers will focus on the spatial distribution of human health, social and economic effects to ensure that the agency decision makers are aware of the extent to which those impacts fall disproportionately on covered communities." (Emphasis added). In addition, EPA's website notes that the "EPA's Environmental Justice mandate extends to all of the agency's work, including setting standards, permitting facilities, awarding grants, issuing licenses and regulations in reviewing proposed actions by Federal agencies." (Emphasis added).

As explained elsewhere in this set of comments, the estimated cost to meet the proposed limits for nutrients approaches $200 million. The cost for required facility upgrades would be borne by the users. Because the City of Worcester contributes approximately 90% of the flow to the District's POTW, the City's ratepayers are responsible for approximately 90% of the District's costs.

The current upgrade project has resulted in Worcester's sewer rates doubling in the last four years. Sewer rates will necessarily increase to complete the current upgrade project and carry out operation and maintenance activities. The burden of further capital investment and operation and maintenance costs required to meet the proposed permit limits would result in additional rate increases to rate payers.

The median household income in Massachusetts is $57,000.00. The median household income in Worcester, however, is $37,000.00. Because half of the households in Worcester make less than $37,000.00 per year, approximately 30% less than the Massachusetts median, the burden of paying additional sewer rates on Worcester's rate payers is extraordinary.

The Massachusetts Executive Office of Energy and Environmental Affairs ("EOEEA") has identified a significant portion of the City of Worcester as an Environmental Justice

("EJ") area. Specifically, Mass GIS has prepared maps showing approximately 45% of Worcester consists of EJ Populations. An EJ Population is identified as those segments of the population that EOEEA has determined to be most at risk of being unaware of, or unable to participate in, environmental decision-making or to gain access to state environmental resources. These are neighborhoods (based on US Census Bureau block groups) that meet one or more of the following criteria: (1) median annual household income is at or below 65% of the statewide median income for Massachusetts; or (2) 25% of the residents are minority; or (3) 25% of the residents are foreign born; or (4) 25% of the residents are lacking English language proficiency. (EOEEA Environmental Justice Policy dated October 9, 2002).

The Draft Permit would cause Worcester's EJ Population to bear a disproportionate share of the consequences of an EPA-issued permit. Worcester's EJ Population would bear this extraordinary cost. EPA has not recognized this impact or thought about ways to avoid it. Consequently, the requirements set by the Draft Permit are inconsistent with the EPA's Environmental Justice Policy. In addition, and contrary to the EPA's Environmental Justice Policy, the EPA has failed to allow for meaningful involvement of the EJ Population affected by the Draft Permit. The EPA New England's Environmental Justice Council's Environmental Justice Action Plan for fiscal years 2006 and 2007 (dated December 16, 2005), calls for the issuance of "environmentally significant [NPDES] permits, ensuring community input from potential EJ areas of concern is sought, where appropriate," (EJ Action Plan FY2006-FY2007, page 6 of 31). By failing to ensure community input from Worcester's EJ Population, EPA has ignored its own action plan. Before proceeding further with this permit, EPA needs to assess the social and economic effects on minority and low-income populations that will result from the requirements in the permit, and then review options, for avoiding or minimizing those impacts. That is called for by the Agency's own policies and by fundamental considerations of equity and fairness.

Response #F51: EPA is aware of the Environmental Justice populations in both Massachusetts and Rhode Island that are impacted by UBWPAD's discharge and this permit issuance. *See* Response #F2. A central tenet of Environmental Justice is ensuring that all people can enjoy the same level of water quality and environmental protection. EPA's Environmental Justice webpage (cited above by UBWPAD), explains that the goal of Environmental Justice "will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work." UBWPAD's facility discharges to the Blackstone River in Worcester. The flow travels downstream through Environmental Justice communities in the Worcester area and also in the area of Pawtucket. While we must be mindful of cost impacts to communities in the UBWPAD sewer area, we also have a responsibility to abate impacts to those downstream populations that are adversely impacted by the discharge. Excess levels of nutrients have resulted in impaired water quality and have interfered with such designated uses as swimming and fishing. The nutrient loading reductions in this permit represents a significant reduction and reflects an appropriate and reasonable determination of water quality-based limits necessary to achieve applicable water quality standards in

Massachusetts and Rhode Island. The nitrogen reductions required through this permit will have substantial environmental benefits, including significant reductions in algal growth and associated dissolved oxygen impairments that have severely impaired the marine fish community and recreational use of Narragansett Bay. The phosphorus reductions will also have substantial environmental benefits, including significant reductions in algal growth and associated odors that have severely impaired the aquatic community and recreational uses of the Blackstone River.

EPA cannot evaluate UBWPAD's unsubstantiated cost estimates – which have varied in oral and written comments from $100 to $200 million – because the basis for those estimates has not been provided. In addition, as noted above, UBWPAD can conduct an analysis of affordability issues for the purposes of determining whether a designated use cannot be obtained or for obtaining a variance. Should UBWPAD choose to pursue a demonstration that such relief is appropriate, the affordability analysis prepared for the required use attainability analysis (UAA) would include evaluation of the social and economic impacts on the communities in the UBWPAD service area, including the Environmental Justice communities. *See* Response #F2.

EPA further notes that in light of the substantial interest in this permit issuance throughout the Worcester area, EPA held a public hearing at a community college in Worcester and extended the public comment period.

Comment #F52: Sustainability. Any permit limits imposed by EPA should promote basic concepts of sustainability, and should be consistent with the Agency's own sustainability policies and efforts. The requirements of the Draft Permit do not achieve either of these goals.

EPA defines "sustainability" as "balancing a growing economy, protection for the environment, and social responsibility, so they together lead to an improved quality of life for ourselves and future generations." The Agency further states that "sustainability is the ability to achieve continuing economic prosperity while protecting the natural systems of the planet and providing a high quality of life for its people."[28] To this end, the Agency has published several policy-driven tools to help decision-makers evaluate risks to watersheds and other ecosystems. The Agency's sustainability policy is designed to promote sustainable watershed management through pollution prevention and other strategies, enforce federal clean water and safe drinking water laws, and support sustainable wastewater infrastructure.

Under EPA's policy for Sustainable Infrastructure for Water and Wastewater, EPA sets forth its commitment to promoting sustainable practices that will help to reduce the potential gap between funding needs and spending at the local and national level. The Sustainable Infrastructure Initiative reportedly guides EPA efforts in changing how the nation views, values, manages, and invests in its water and wastewater infrastructure.

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[28] See http://www.epa.gov/sustainabilitvlbasicinfo.htm#What.

Under this policy, EPA's "Watershed Approach" encourages the merger of watershed management principles into utility management, so that key decision makers consider watershed-based, cost-effective alternatives alongside the traditional treatment technology investments. For example EPA programs that are focused on wastewater utility management principles include:

Watershed Based NPDES Permitting. This approach, aimed at achieving new efficiencies and environmental results, provides a process for considering all stressors within a hydrologically defined drainage basin or other geographic area, rather than address individual pollutant sources on a discharge-by-discharge basis (EPA 833-B-03-004).[29] Managing for Excellence: Utility Management System Initiatives. As part of EPA's overall effort in collaboration with industry to ensure that the Nation's water and wastewater infrastructure is sustainable through more effective utility management, EPA's Office of Water recently profiled eight leading utilities to document and promote sustainable management approaches by utilities including the consideration of life-cycle costing and benefits to ensure decisions regarding projects and programs are evaluated over the lifetime of the project/program. EPA has documented that today's utilities are focusing on environmental performance that positions them as stewards of water and other natural resources with environmental management systems that include holistic water resources management, water conservation, solids and effluent reuse, materials recycling, and energy efficiency. Managing for Excellence: Analysis of Water and Wastewater Utility Management Systems, EPA-W-04-023 (August 2005).

In issuing the Draft Permit, EPA has not taken into account these policy considerations. For example, in order to achieve the proposed permit limits of 5 mg/l total nitrogen and 0.1 mg/l total phosphorus, significant modifications and additions to the current facility under construction would have to be implemented at a capital cost of $150,000,000 in today's dollars. The increase in operation and maintenance costs to achieve the limits is expected to approach $3,700,000 per year. Imposition of these costs on the ratepayers will have substantial social and economic effects. While those effects could be justified if there were significant environmental benefits, that is not the case here. The benefits to the receiving waters realized from achieving these limits are uncertain. In addition, as explained below, compliance with these limits would itself result in significant additional sludge production, chemicals use and energy consumption, with resulting increases in greenhouse gas emissions. Viewed from a sustainability perspective, then, the limits in the Draft Permit are not justified.

In order to achieve a total phosphorus limit of 0.1 mg/l [a limit which is currently required at less than 30 of the 17,000 publicly owned treatment works (POTWs) in the nation] and a total nitrogen limit of 5 mg/l for the entire flow reaching the treatment facility, additional aeration tankage would be required, and the tankage currently under construction would have to be modified to implement the modified Bardenpho process. Storage and feed facilities to accommodate the addition of 800 gallons per day of methanol or a similar energy source, would be required for nitrogen removal. (Note,

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[29] See http://www.eoa.gov/waterinfrastructure/watershedaooroaches.html

significant care must be taken in the design and operation of this chemical storage facility, since methanol is an explosive substance.) Use of such energy sources will produce additional carbon dioxide (a notorious greenhouse gas); and will reduce the amount of the alternative energy available for other purposes while consuming the parent agricultural material needed as a food supply.

Subsequent to final clarification, the entire flow would have to be pumped to an add-on filtration or high rate settling process to achieve the phosphorus limits. Multipoint chemical addition (likely ferric chloride) would be required at a rate of 8,500 gallons per day. The chemical addition will increase sludge production at the facility by an estimated 35%. The sludge generated by the District is currently thickened, dewatered and incinerated on-site in multiple hearth furnaces. The chemical sludge produced in order to achieve the proposed phosphorus limit will be more difficult to dewater and incinerate. It is likely that the dewatered sludge will have a lower percent solids and it will be more inert due to the high fraction of chemicals in the sludge. Additional energy required to dewater and incinerate the sludge is expected to be significant. Lastly, additional ash will be produced, again due to the inert chemical addition, which will more readily consume the finite ash landfill capacity on the District's property. The combined electrical energy required to achieve these nutrient limits is expected to be on the order of 3,000,000 kW-hr/yr, nearly 20% above current usage, resulting in a commensurate increase in greenhouse gas emissions.

Before requiring any facility to expend this much energy, consume significant amounts of chemicals and generate significantly more sludge to be processed and disposed of, EPA should determine that there are substantial water quality benefits that will result from achieving the proposed limits. In this situation, the opposite is the case: viewed as a whole, achieving these limits would have more detrimental environmental impact than any benefits realized in the receiving waters, EPA should reconsider the requirements in the Draft Permit.

Response #F52: Water infrastructure sustainability is an approach that UBWPAD should most assuredly embrace – not simply in evaluation of treatment to meet the new limits, but also across management and operations of the entire District. These considerations, however, are not part of the statutory and regulatory requirements for **setting** water quality-based effluent limitations. *See* Responses #A9 and #F8.

Through their water quality standards, states determine the level of protection needed for receiving waters. Where EPA (or other permitting authorities) conclude there is a reasonable potential that a discharge will cause or contribute to a violation of the standards, EPA then must set an effluent limit necessary to ensure the standards are met. *See* 40 CFR §122.44(d)(1)(i). Costs and technical considerations are not considered at this point in the process of establishing water quality-based effluent limits. Once these limits are established and set forth in a final permit, however, the regulations include a mechanism to allow relief from meeting the limits where they are demonstrated to be unaffordable. *See* Response #F1.

With regard to watershed permitting approaches and addressing other stressors to the receiving waters, efforts to reduce non-point sources and to address such issues as the impacts of dams will have beneficial effects. That being said, point sources are the dominant source of the nutrient load to the receiving waters and must be reduced in order to achieve water quality standards. *See* Response #B1, #C1 and #F40 relative to the need for point source controls notwithstanding significant reductions of other sources. In light of the severe existing nitrogen-driven cultural eutrophication in the receiving waters and the tendency for nitrogen to not only exascerbate existing water quality impairments but to persist in the environment in a way that contributes to future water quality problems, it is appropriate to move forward now with permit limits on UBWPAD and other point sources. *See also* Responses #F6, #F9, #F18A, #F48 and #F51 relative to need for and benefits from nutrient limits.

The Region is very supportive of UBWPAD's efforts to plan and design the most environmentally sustainable treatment processes necessary to meet the new effluent limits, as well as of any efforts to examine sustainability across all operations. The age of infrastructure, and the fact that UBWPAD has only recently undertaken significant upgrades to its facility, present both challenges and opportunities in this regard.

Two key components of our Regional Sustainable Infrastructure Initiative are optimized utility management and energy and water efficiency. A commitment to effective management and energy efficiency by utility leadership is the hallmark of a sustainable, environmentally progressive utility. These efforts should enhance sustainability and reduce the direct and indirect energy footprint no matter what level of treatment is employed.

With regard to utility management, EPA and six national water and wastewater associations are working collaboratively to identify the characteristics of sustainable utilities and to promote effective utility management. EPA and its partners formed a steering committee comprised of leading utility managers from around the country. The committee identified *Ten Attributes of Effectively Managed Utilities; Keys to Management Success* and was pivotal in the production of a primer for water and wastewater utilities titled *Effective Utility Management*, referenced in the comment above. These documents and additional tools and information can be found on EPA's website at http://www.epa.gov/waterinfrastructure/watereum.html. These tools seek to promote institutionalization of management systems and other innovative approaches that improve performance across utility operations at reduced cost. They do not, however, guide EPA's establishment of water quality-based effluent limits.

With reference to efficiency, water and energy efficiency are inextricably linked. By employing practices such as water conservation, leak detection, inflow/infiltration correction and the use of green infrastructure to capture and treat storm water, the amount of energy required to provide drinking water and collect and treat wastewater can be significantly diminished. Using a local example, through a leak detection grant program funded through the Drinking Water State Revolving Fund, the City of Holyoke eliminated the leakage of 127 million gallons per year of treated, potable water (and

North Attleboro 118 million gallons). Likewise, the Town of Cohasset recently employed a variety of green infrastructure technologies to the first 0.9 inches of rainfall keeping it out of traditional collection infrastructure.

Through an energy management plan that sets goals for energy efficiency and optimizes the use of renewable sources of energy, the impacts of conventional energy use can be mitigated. A holistic plan could consider equipment choices, HVAC, lighting, vehicle use, methane capture, energy generation from microturbines, wind or solar, and the purchase of energy from renewable sources. To address this issue, EPA New England has produced an energy management workbook to help utilities set measurable energy goals, manage energy issues and reduce consumption. *See also* Response #F8 relative to energy efficiency and opportunities for UBWPAD.

PART G.

Additional comments were received from: New England Plating Co., Inc., Town of Holden, City of Worcester (City Manager), Town of West Boylston, Worcester Regional Chamber of Commerce, City of Worcester (DPW), UBWPAD Board of Directors, Town of Leicester, Pepe & Hazard.

Comment #G1: Several expressed concerns about requiring an expenditure of substantial sums without clear evidence that water quality would improve. Rate payers would be affected without proper modeling (Town of Holden, City of Worcester (City Manager), Town of West Boylston, City of Worcester (DPW), UBWPAD Board of Directors, Town of Leicester).

Response #G1: *See* Responses #F1, #F2, #F4, #F5, #F6, #F9, #F17, #F18 and #F51.

Comment #G2: Several commented that the current upgrades are not considered and the upgrades should be allowed to be completed and results monitored before imposing new permit limits (New England Plating Co., Inc., Town of Holden, City of Worcester (City Manager), Town of West Boylston, City of Worcester (DPW), UBWPAD Board of Directors, Town of Leicester).

Response #G2: *See* Responses #F5, #F6, #F7, and #F9.

Comment #G3: A few commented that no affordability analysis or cost benefit analysis has been completed (Town of Holden, Town of West Boylston, City of Worcester (DPW)).

Response #G3: *See* responses #A9, #F1, #F2, and #F4.

Comment #G4: Several commented that the cost increase will hamper business growth and expansion, economic development, affordable housing and smart growth initiatives (New England Plating Co., Inc., Worcester Regional Chamber of Commerce, City of Worcester (DPW), UBWPAD Board of Directors).

Response #G4: As detailed in previous responses, cost is not an appropriate consideration in the process to establish water quality-based effluent limitations. EPA does, however, have a mechanism to evaluate whether relief is warranted from public entities seeking relief from meeting water quality standard requirements. *See* Response #F1. If UBWPAD seeks to undertake this demonstration, it involves evaluation of financial impacts to the public entity and current socioeconomic conditions of the community.

We know that Worcester has been a leader in encouraging smart growth redevelopment of the urban core, and do not intend to hamper those efforts. We recognize that the cost of wastewater treatment can be a burden for some businesses and residents, but clean water also is an economic asset to the communities in the UBWPAD service area. Boston is a good example of this; although it has been costly to clean up Boston Harbor, the waterfront has turned into an economic engine that is driving business growth and expansion.

Comment #G5: The City of Worcester (DPW) commented that the impact of nutrients is site specific and that dissolved oxygen in the Blackstone River is not low.

Response #G5: *See* Responses #F9, #F10, and #F13. Additionally, the Corps of Engineers data cited in Response #F13 indicated that dissolved oxygen concentrations below the UBWPAD discharge did not meet the water quality standards.

Comment #G6: The City of Worcester (DPW) commented that it is not clear what is causing cultural eutrophication in Narragansett Bay and that the 5.0 mg/l total nitrogen limit is not supported.

Response #G6: *See* Responses #F6 and #F18.

Comment #G7: The City of Worcester (DPW) commented that the need for year round TRC limits is not justified and that there are many other sources of bacteria.

Response #G7: Bacteria criteria are required to be met year round by RIDEM water quality standards, and RI requires its facilities to disinfect year round. We agree that there are many other sources of bacteria and therefore believe it is inappropriate to allow for dilution. However, we believe it is appropriate to base the fecal coliform limits on an assumed die off rate that will occur. *See* Response #F25.

Comment #G8: Several commented that we should wait for the new model and the MassDEP attenuation work (New England Plating Co., Inc., Town of Holden, City of Worcester (City Manager), Town of West Boylston, City of Worcester (DPW), UBWPAD Board of Directors).

Response #G8: *See* Responses #A2, #F5, #F7, and #F17.

Comment #G9: The City of Worcester (DPW) commented that the 7Q10 flow and the design flow do not occur at the same time and we should use minimum average daily plant flow.

Response #G9: Federal regulations, 40 C.F.R. §122.45(b), require that permit limits and conditions be based on the design flow. The 56 MGD flow is the design flow identified in the permit application and represents an annual average value. We note that flows will often be much higher than 56 MGD and at times may be as high as 180 MGD.

Comment #G10: A few commenters raised concerns with the legal and administrative burden of the UBWPAD relative to managing co-permittees and questioned whether the UBWPAD has the authority (Town of Holden, Town of West Boylston, UBWPAD Board of Directors).

Response #G10: *See* Responses #F3 and #F45.

Comment #G11: The UBWPAD Board of Directors commented that the river model previously used for the dissolved oxygen WLA is the only scientific basis for effluent limits today and the model resulted in limits that were needed to improve conditions and to benefit Narragansett Bay. Further, the UBWPAD will achieve a 40-50% summer reduction of total nitrogen by 2009.

Response G11: *See* Responses #F2, #F5, #F6, #F9, #F10, #F13, and #F18.

Comment #G12: New England Plating asked "how clean is clean" and that current water quality may be good enough. Does it make sense to regulate to non-detect levels such as is the case for cadmium?

Response #G12: The Clean Water Act requires states to adopt water quality standards that, at a minimum, provide for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water, through the establishment of designated uses and criteria to protect those uses. NPDES permits must ensure that discharges do not cause or contribute to violations of applicable state water quality standards. EPA does not have the authority to impose less protective limits except in the narrow circumstances where a variance is justified or the water quality standards are amended. As documented in the Fact Sheet, water quality in both the Blackstone River and Narragansett Bay does not meet state water quality standards and more pollutant reductions are needed.

The cadmium limit is based on the applicable Massachusetts water quality criteria value for protection of aquatic life. The limitation on how low cadmium can be detected is specific to measuring cadmium in waste water. As new analytical methods are developed and approved by EPA the ability to detect lower levels will enhance our ability to ensure that aquatic life are protected.

Comment #G13: Pepe and Hazard commented that there are 33 industrial users and not over 200 as referenced in the Fact Sheet.

Response #G13: There are more than 200 industrial users discharging to municipal sewer systems that send waste to the UBPWAD. Among these, there are 33 industrial users who meet the definition of Significant Industrial User at 40 CFR §403.3(v) and, therefore, must be regulated under the federal Industrial Pretreatment Program.

Comment #G14: Pepe and Hazard commented that since the permit prevents the introduction of pollutants from industrial sources that would pass through the POTW, the nutrients that now pass through the POTW must come from its domestic influent. The draft permit, however, is silent on requiring UBWPAD and the co-permittee communities to develop and implement programs which would reduce, let alone prevent, the introduction and pass through of domestic nutrients to the treatment works.

Response #G14: The federal pretreatment program addresses only non-domestic wastewater, and therefore the permit's requirement related to pass through and interference is appropriately applicable only to industrial users. *See* 40 C.F.R. Part 403.

The permit does not specifically require the permittee or co-permittees to pursue source reduction and EPA does not believe that this alternative alone would result in attainment of the effluent limitations. However, such reductions may be beneficial in decreasing capital cost and operation and maintenance costs of treatment, including reducing energy use, chemical use, and sludge production. We note that these appear to be priority issues for the UBWPAD and as such we expect that source reduction alternatives will be thoroughly evaluated. *See* Response #B1.

Comment #G15: Pepe and Hazard commented that it is inconceivable that waste water treatment facilities dominate the nitrogen load to Narragansett Bay since there are many other sources and no basis is cited for this conclusion. Part C (5) of the permit should include requirements for non-point source controls.

Response #G15: *See* Responses #B1 and #C1.

Comment #G16: Part C(5) currently requires UBWPAD to submit proposals for local law and other changes six months after the new permit is issued and in effect. The issuance of the new permit will trigger UBWPAD's extraordinary expenditure on treatment works improvements. Instead, the Draft Permit should be modified so that UBWPAD should have to comply with the amended requirements of Part C(5) *before* it goes forward with contracting for the capital improvements to treatment technology currently required by the Draft Permit. The Draft Permit should make provision for possible implementation of non-point source and domestic flow controls in lieu of the capital improvements if EPA finds that they would attain the desired reductions in nutrient loading. This would position the Draft Permit to be in better compliance with the objectives of 403.2, would achieve a superior environmental result, and may reduce the need for expensive, additional capital improvements and increase operation and maintenance costs at UBWPAD. These costs are presently proposed to be unfairly borne by the industrial users who do not create the problem discharges. In the case of domestic

flows, the enactment of prohibitions on certain nutrients as a method of pretreatment would be consistent with 40 CFR 403.5.

Pepe and Hazard commented that there is no public documentation of how fees are set and industrial facilities are not responsible for upgrades necessary to address nutrients.

Response #G16: Section C(5) of the permit requires the permitee, within six months of the effective date of the permit, to modify its pretreatment program in order to conform with all changes in the federal requirements related to the federal industrial pretreatment program. Ths provision has nothing to do with the revised nutrient limits established by the permit. Since industrial sources of nutrients are minor compared to domestic sources, implementation of the requirements in Section C(5) will have little, if any, effect on the capital improvements needed to meet the effluent limitations.

While non-point source controls would be beneficial, they are insufficient for meeting water quality standards. *See* Responses #B1, #C1 and #F40. Similarly, wastewater source reductions alone will not be sufficient to achieve the permit limits. *See* Response #B1.

EPA does not regulate how sewer use fees are established. Documentation of how fees are set should be requested from the UBWPAD and from the member communities.