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

[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

[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