RIDEM's Analysis failed to take into consideration several factors critical to the development of proper nitrogen limits and RIDEM failed to respond to comments raised by various parties with respect to these factors. EPA has also failed to respond to these comments.

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:

1. 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 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.

2. DEM fails to respond to the City of Woonsocket's comment that RIDEM has not taken all potential oxygen demanding sources into account in it 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 wastewater 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 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.

3. 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.

4. The City of Woonsocket commented that DEM erroneously attributed all the nitrogen discharged into Narragansett Bay via the Blackstone River to two wastewater 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.

5. Both the City of Woonsocket and the Massachusetts Department of Environmental Protection observed that RIDEM, in establishing 5 mg/l 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/l is the equivalent of a 5 mg/l 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.

Other Factors Undermine EPA's and RIDEM's Analysis

Circulation Patterns in Narragansett Bay do not support RIDEM's analysis. 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/l in the Upper Blackstone discharge are absolutely necessary to

restore the health of the Providence and Seekonk Rivers.

This Permit Should Take Into Consideration both Flow and Temperature in the Setting of Limits, As Has Been Done In Certain RI Permits

The proposed permit requires compliance with the nitrogen limit of 5 mg/l 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/l if the flow is below a certain level, or 8 mg/l 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.

RIDEM's Implementation of its Permit Limits Artfully Delays Attainment of a 5 mg/L Discharge for its Largest Dischargers, If Such a Level Will Ever Be Met

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/l permit limit. If the facilities cannot meet the 5 mg/l 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/l level, and then making allowances for further studies, planning and design, we might expect that compliance with the 5 mg/l 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/l 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/l 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/l 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.

C. Discharge 001A

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 wastewater 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 wastewater 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 thought 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 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 receives secondary treatment. Flows received in excess of the 46 mgd secondary treatment capacity receives 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 to the wastewater treatment facility headworks is reported. All flows received at the headworks receives 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?

Sampling and Monitoring

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, TRC 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".

Whole Effluent Toxicity Testing

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, see item 4 below.

D. Year Round Disinfection

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 ranging from 13:1 to 23:1. Assuming the most conservative decay coefficient 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.

E. Cost

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 suggest 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.

F. Whole Effluent Toxicity Testing

Schedule

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.

Wet Weather Discharge

The permit requires testing twice annually for both *Ceriodaphnia dubia* and *Pimephales promelas* (modified acute/chronic, two species). Typically only static acute testing is required on a wet weather discharge since it is an intermittent flow. 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.

G. Co-Permittees

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 wastewater into the UBWPAD facility."

The Fact Sheet, page 1, defines Co-Permittees as follows: The municipalities of Worcester, Millbury, Auburn, Holden, West Boyston, 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-permitteees 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 can 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).

H. Sustainability

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 denitrication. 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 in 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, denitrication 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.

I. Sludge Conditions

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.l: The moisture correction verbiage for carbon monoxide is incorrect. Moisture correction is not required.

J. Additional Comments

Flow

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.

Ammonia-Nitrogen

Standards are listed in pounds per day and in milligrams per liter. Which limit prevails?

Total Residual Chlorine

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 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