EXHIBIT G

RESPONSE TO COMMENTS

REISSUANCE OF NPDES PERMIT NO. NH0100595
TOWN OF JAFFREY WASTEWATER TREATMENT PLANT

RESPONSE TO COMMENTS – SEPTEMBER 21, 2009
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TOWN OF JAFFREY WASTEWATER TREATMENT PLANT
JAFFREY, NEW HAMPSHIRE

From April 5, 2007 through May 5, 2007 and from May 8, 2007 through May 21, 2007, the U.S. Environmental Protection Agency (EPA-New England) and the New Hampshire Department of Environmental Services, Water Division (NHDES-WD) solicited public comments on the draft National Pollutant Discharge Elimination System (NPDES) permit to be reissued to the Town of Jaffrey, NH.

EPA-New England and NHDES-WD received comments from the Town of Jaffrey and the Town of Peterborough dated May 21, 2007 and May 3, 2007, respectively. The following are joint responses on behalf of EPA-New England and NHDES-WD to those comments and descriptions of any changes made to the public-noticed permit as a result of those comments.[1]

A copy of the final permit may be obtained by writing or calling Dan Arsenault, United States Environmental Protection Agency, 1 Congress Street, Suite 1100 (CMP), Boston, Massachusetts 02114-2023; Telephone (617) 918-1562. Copies may also be obtained from the EPA Region 1 web site at http://www.epa.gov/region1/npdes/index.html.

COMMENTS FROM THE TOWN OF JAFFREY

COMMENTS NOT RELATED TO PHOSPHORUS

COMMENT NO. 1:

"As described on pages 9-10 of the Fact Sheet and Attachment C, we believe the dilution factor is not calculated properly. The 7Q10 at the Jaffrey discharge location using the Dingman factor is 3.82 cfs. That flow is based on drainage area characteristics of the drainage area at Jaffrey in relation to characteristics of the drainage area upstream of Peterborough and measured flows at Peterborough. The Town, DES and EPA all agree on the 7Q10 flow.

However, there is no justification for subtracting the effluent design flow from the 7Q10 in calculating the dilution factor. The statement that *"the 7Q10 just above the outfall is calculated by subtracting the plant design flow from the 7Q10 downstream of the outfall"* does not make sense. The 7Q10 just above the outfall, at the outfall and just below the outfall is 3.82 cfs.

[1] After EPA issues a final NPDES permit for a New Hampshire point source, the State interprets its water pollution control statute to authorize subsequent adoption of the federal permit as a state surface water discharge permit.

The correct dilution factor (DF) is 90% of (1.93 + 3.82)/1.93 = 2.68. This is a slight increase in the existing dilution factor, which is based on supporting documents for the NPDES permit renewal in 2001 using a 7Q10 of 3.33 cfs. While the draft permit increases the 7Q10 from 3.33 cfs to 3.82 cfs - - which is a benefit to Jaffrey - - the Town is simultaneously penalized by subtracting the design flow from the upstream 7Q10. Furthermore, the use of the design flow of 1.93 cfs builds into the equation even greater conservatism, since the Jaffrey Wastewater Treatment Plant (WWTP) effluent flow data demonstrates that the flow in the summer months is much less than in the winter. It is highly unlikely, therefore, that the plant will discharge at its design flow during summer, low flow river conditions. This very conservative approach is then compounded by use of the 10% margin of safety. It is also noteworthy that the water supply for the Town of Jaffrey is from two (2) gravel packed wells that supply on average 313,000 gallons per day or 0.48 cfs (2006 data). In addition, Millipore Corporation – the Town's largest industrial discharger – supplies most of their water needs from bedrock wells that account for about 75,000 gallons per day or 0.12 cfs.

There is no reasonable justification presented in the Fact Sheet for subtracting the Jaffrey WWTP design flow from the 7Q10. All limits determined using the correct dilution factor should be re-calculated with the results as follow:"

- Copper – average monthly 7.5 ug/l, maximum day 10.1 ug/l[1]
- Lead – average monthly 1.5 ug/l
- Silver – maximum day 0.9 ug/l
- Zinc – average monthly 99 ug/l
- Whole Effluent Toxicity: chronic limit 37.3%

[1] Although these copper limits are slightly higher that those in the current permit, EPA should find that these new limits should be excluded from the "anti-backsliding" rule. The slightly higher limits are the result of thorough analysis during the TMDL study and proper valuation of the dilution factor. 33 U.S.C. § 1342 (B)(i) and (C).

RESPONSE NO. 1:

As explained on page 9 of the Fact Sheet, the 7Q10 for the Contoocook River at the Jaffrey WWTF outfall was estimated by multiplying the Peterborough gage 7Q10 (8.11cfs) by the ratio of the Dingman 7Q10 at the Jaffrey WWTF to the Dingman 7Q10 at the Peterborough gage. This results in a 7Q10 at the Jaffrey WWTF outfall of 3.82 cfs.

As stated on page 9 of the Fact Sheet, the calculated 7Q10 was assumed to be just downstream of the Jaffrey WWTP. This assumption is consistent with the NHDES "Interim Final Policy on 7Q10 and Withdrawals for Fresh Water Surface Waters", dated June 24, 2002 (the "Policy"). As described in the Policy, "When the water source for the discharger is within the basin upstream of the discharger's location, the prorated 7Q10 is assumed to be located downstream of the discharge." Implicit in this assumption (with which EPA agrees) is that the wastewater treatment plant discharge replaces, rather than increases, the natural 7Q10. As described in the Policy, "As POTWs or industries increase

their design or permitted flow, respectively, the river flow upstream of the discharger will decrease as the upstream water usage by the discharger increases. However, the river flow just downstream of the discharge should remain constant as long as the water supply for the discharger is located in the basin above."

As described in the Policy, "For the NPDES Program, for the situation where the water source is in the basin (which is the vast majority of the cases) the dilution factors will be equal to the downstream 7Q10 divided by the discharger's flow all times 0.9." This calculation yields a dilution factor of 1.78, used to calculate the water quality-based limits in the draft permit:

(3.82 cfs/1.93 cfs) * 0.9 = 1.78

This calculation looks somewhat different than the one in the Fact Sheet because the fact sheet calculation goes through the extra step of subtracting the treatment plant flow to calculate the 7Q10 upstream of the discharge, but the result is the same:

((1.89 cfs + 1.93 cfs)/1.93 cfs) * 0.9 = 1.78

The equation presented by the commenter is incorrect since it assumes that the calculated 7Q10 does not include the treatment plant discharge and therefore accounts for the treatment plant flow twice.

The permit limits in the draft permit for total recoverable copper, lead, silver, zinc, and whole effluent toxicity remain unchanged.

COMMENT NO.2:

"The draft permit has been developed without reliance on an EPA-approved TMDL, even though DES, EPA, and the Town of Jaffrey have worked for many years on a TMDL study for the Upper Contoocook River that is essentially final. EPA approved the TMDL work plan prepared by DES on August 1, 2003 and has been involved in the implementation of the TMDL study over the last few years. DES issued the draft TMDL in May 2006, on which the Town provided substantive input in a report from HydroQual dated July 2006. DES subsequently revised the TMDL permit limits, and issued final TMDL permit limits on February 23, 2007. The Town of Jaffrey hired a consulting firm at its own expense to work with DES to finalize the TMDL. As indicated by additional comments from HydroQual, the Town still believes that certain limits in the DES final TMDL report are overly stringent, but those limits are still higher than those proposed by EPA in its draft permit.

The Town respectfully suggests that it is unreasonable to proceed with a final permit without the full benefit of the extensive work that went into the TMDL study. If there are flaws in the TMDL, then those flaws should be identified and addressed. The TMDL prepared by the DES with extensive input from the Town and the Town's consultants sets forth very (and sufficiently) protective limits that should be relied upon by EPA.

Ironically, while the Town has continued to assert its comments of February 12, 2007 that the final TMDL permit limits established by the DES are still overly conservative, the EPA draft permit ignores certain limits that DES has proposed. The proposed phosphorus limits, in particular, are substantially, more stringent than the TMDL calls for.

DES reaffirmed its final TMDL-derived permit limits, as indicated in the February 23, 2007 e-mail from Gregg Comstock to Randall Heglin. The NPDES permit limits should be no more stringent than DES's final TMDL limits."

RESPONSE NO.2:

The Town's assertion that a TMDL has been finalized for the upper Contoocook River is incorrect. While a draft TMDL was issued for public comment in May of 2006, a final version has not been submitted to EPA for approval. During the public comment period the DES received significant comments from both EPA and the Town of Jaffrey. As stated in EPA's comments on the draft TMDL, the model is not calibrated and verified for phytoplankton, periphyton, or daily maximum dissolved oxygen levels. Consequently, the model cannot be used to determine if the narrative eutrophication criteria is met, nor can it be used to determine the effect of aquatic plants on dissolved oxygen levels. The second concern is that the model does not include Powder Mill Pond, which is a eutrophic pond with significant dissolved oxygen impairments located just downstream of the study area. Biomass growth upstream of Powder Mill Pond can be flushed to the pond and accumulate in the sediments and contribute to the eutrophication and dissolved oxygen impairment. The third concern is the reliance of the TMDL on estimates of SOD improvements to determine if dissolved oxygen criteria will be met.

Neither the CWA nor EPA regulations require that a TMDL be completed before a water quality based limit may be included in a permit. Rather, water quality based effluent limitations in NPDES permits must be "consistent with the assumptions and requirements of any *available* [emphasis added] wasteload allocation." 40 C.F.R. § 122.44(d)(1)(vii)(B). Thus, an approved TMDL is not a precondition to the issuance of an NPDES permit for discharges to an impaired waterway. This interpretation is consistent with the preamble to 40 C.F.R. § 122.44(d)(1), which expressly outlines the relationship between subsections 122.44(d)(1)(vi) (*i.e.*, procedures for implementing narrative criteria), and (d)(1)(vii):

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

See 54 Fed. Reg. at 23,876. If a TMDL is eventually issued by NHDES and approved by EPA, the phosphorus effluent limitation in any subsequently issued NPDES permit must be consistent with the wasteload allocation assigned to the Jaffrey WWTP.

Given the significant issues with the TMDL raised during the public comment period, NHDES has indicated that the TMDL will not be submitted for final approval. Therefore, EPA has based the limits for phosphorus on the Contoocook River on the best information reasonable available to it at this time (*i.e.*, instream data collected by the NHDES, applicable narrative State water quality standards, Federal water quality criteria guidance, and other relevant information discussed in the Fact Sheet and in these Responses to Comments).

COMMENT NO.3:

"We appreciate that EPA has adjusted the draft permit limits for $CBOD_5$ and ammonia nitrogen at the Town's request. That adjustment increased the $CBOD_5$ limit but lowered the ammonia limit, so that the total oxygen demand remains the same. The Town now seeks a further modification to these limits, decreasing further the ammonia limit and increasing in a corresponding fashion the $CBOD_5$ limit. In his March 15, 2007 letter to Randall Heglin, Roger Janson indicated that further EPA "would be amenable to a small further increase to the $CBOD_5$ limit if requested, but would further reduce the ammonia limit to maintain the same ultimate oxygen demand." The draft NPDES permit sets a summer ammonia nitrogen limit of 5.3 mg/l and a winter limit of 30 mg/l. Ammonia limits in the draft permit are significantly higher than the limits negotiated between the DES and Jaffrey. Based on DES summer requirements (temp= 25 deg C and pH = 7, 7Q10 flow, Jaffrey WWTP design flow), and a winter requirements (low temperature, winter pH values, 7Q10 flows not adjusted for season, Jaffrey WWTP at design flow), the draft ammonia limits may exceed DES ammonia toxicity standards. In addition, TMDL modeling to date indicates that the draft ammonia winter limit and most likely the summer limit also will cause a dissolved oxygen standard violation.

Under an administrative order from EPA, we are proceeding with construction of an activated sludge treatment plant that will be capable of meeting a more stringent ammonia nitrogen limit in the summer. Thus, we ask that EPA lower the summer ammonia nitrogen limit to 2.5 mg/l and increase the corresponding $CBOD_5$ limit to 15 mg/l. The overall total oxygen demand will not be increased, and most likely will be reduced.

With respect to the total suspended solids (TSS) limit, we would ask that a limit of 15 mg/l be set rather than 7 mg/l. EPA's normal practice is to set TSS concentration limits equal to BOD limits[3]. However, if permits include both $CBOD_5$ (in lieu of BOD_5) and ammonia nitrogen limits, the corresponding TSS limit can be set 5 mg/l higher than the $CBOD_5$ limit. This would allow a summer TSS limit for Jaffrey of 15 mg/l. Because TSS is less of a concern in meeting water quality standards than BOD_5 or $CBOD_5$, the permitted TSS limit matches the BOD_5 limit.

Although the current permit sets a summer TSS limit of 7 mg/l, this limit has never been consistently achieved. The ability of the new treatment plant to consistently meet a TSS summer limit of 7 mg/l without the addition of an effluent filtration process is unlikely. The Town of Jaffrey and its advisors have worked with DES on the development of the TMDL and the resulting effluent limits for the past three years. The TSS limit contained in the DES's Final TMDL, is 15 mg/l. Additionally, this limit was discussed with EPA and DES in a March 8, 2007 conference call, along with the reasons for requesting the 15 mg/l limit[4]. Based on extensive water quality data and the modeling done as part of the TMDL since the issuance of the current permit in 2001, there is no indication of water quality standards exceedances at a 15 mg/l monthly average limit for TSS. Thus, EPA should reasonably find that a less stringent TSS standard may be included in the renewed permit for Jaffrey under 33 U.S.C. § 1342 (B)(i) and (C). To require additional costly treatment like effluent filtration to address a TSS limit that is not soundly based on water quality concerns is not supportable. (See the Town's October 17, 2006 letter with attachments to Harry Stewart at DES re: Jaffrey WWTP Upgrade – Affordability for a discussion of the substantial and widespread economic and social impacts associated with the new plant, including a filtration component).

[3] Our experience is that EPA and DES essentially always set a TSS limit at the same level as the BOD_5 limit. We are aware of no permit where this has not been done.

[4] This again raises an anti-backsliding issue. The analysis summarized in this section of our comments supports EPA's finding an exception to the anti-backsliding rule. 33 U.S.C. § 1342(B)(i) and (C)."

RESPONSE NO.3:

Refer to State of New Hampshire Section 401 Water Quality Certification conditions on page 31 of this document for $CBOD_5$, TSS, and ammonia limits contained in the final permit

COMMENT NO. 4:

"We question the justification and necessity of a specific limit for aluminum. Aluminum (Al) is a naturally occurring element. EPA indicates on page 12 of the Fact Sheet that the instream aluminum criteria was exceeded 68% of the time from 2001 through 2005. EPA accurately points to general DES water quality regulations on restoring water quality where pollutants are already present. However, EPA fails to address the specific DES standard for aluminum (and other toxic pollutants), with provides that the instream 0.75 and 0.087 mg/l standards shall apply "unless naturally occurring" (Env-Ws 1703.21(a and b)).

Given that there are no point source discharges upstream of the Jaffrey WWTP outfall and in the absence of any contrary data, the existing presence of aluminum must be presumed to be naturally occurring and due to the soil/rock composition in the drainage area. As such, the aquatic life communities in the Contoocook system have adapted to the ambient aluminum. The draft limit proposed for Jaffrey at the surface water quality standards

which are lower than ambient may cause stress to the aquatic life by reducing aluminum. A more appropriate limit is one that reflects existing effluent quality to the extent that the drinking water source and, hence the wastewater source contains the same aluminum concentrations as the Contoocook. Further, the data in the EPA Fact Sheet on page 12 show that the effluent has generally less aluminum than the river. Thus, the wastewater treatment already reduces ambient aluminum to bring the river closer to standards. There is insufficient reason to impose an aluminum limit in Jaffrey's permit and we would ask EPA require only monthly monitoring and reporting of aluminum in the effluent."

RESPONSE NO. 4:

While EPA understands that State of New Hampshire Surface Water Quality Regulations at Env-Ws 1703.21 do allow for exceedances of water quality criteria if naturally occurring, there is no information provided by the Town to verify that this is the case for aluminum concentrations in the Contoocook River above the treatment plant's outfall. EPA agrees with the Town that there are no known point sources above the Jaffrey WWTP; however, there is insufficient data to support the assertion that "the presence of aluminum must be presumed to be naturally-occurring and due to the soil/rock composition of the drainage area." It is unknown whether there are anthropogenic sources of aluminum to the river (abandoned landfills or junk yards, land clearing operations, etc.). In light of this uncertainty, removal of the limit would be inconsistent with EPA's obligations under the CWA to *ensure* compliance with water quality standards. Thus, in assessing the need for and establishing an aluminum limit in the permit, EPA relied upon aluminum criteria found in Table 1703.1 in the State of New Hampshire's Surface Water Quality Regulations – Chapter 1700.

As outlined in *Ambient Water Quality Criteria for Aluminum -1988* (EPA 440/5-86-008), aluminum has both acute and chronic toxicity effects on aquatic organisms. With respect to acute toxicity, brook trout had a 96-hr LC50 of 3,600 ug/l (Decker and Menendez, 1974) where as ceriodaphnids had acute toxicity values as low as 1,900 ug/l (McCauley et al, 1986). Chronic toxicity values for *Daphnia magna*, *Ceriodaphnia dubia*, and the fathead minnow were, 742.2, 1,908, and 3,288 ug/l, respectively. Diatoms, *Cyclotella meneghiniana*, and green algae, *Selenastrum capricornutum*, were affectd by concentrations of aluminum in the range of 400 to 900 ug/l.

Without the knowledge of the source of aluminum the permit must comply with Env-Ws 1703.01(b) which states, "All surface waters shall be restored to meet the water quality criteria for their designated classification including existing and designated uses, and to maintain the chemical, physical, and biological integrity of surface waters" and Env-Ws 1703.03(a) which states, "The presence of pollutants in the surface waters shall not justify further introduction of pollutants from point and/or nonpoint sources". Further, pursuant to 40 C.F.R. 122.44(d), a permit must contain effluent limits for all pollutants that cause or contribute, or have the reasonable *potential* to cause or contribute, to water quality standards violations and must include conditions as necessary to ensure compliance with applicable standards. Therefore, a limit for total recoverable aluminum shall remain in the permit.

In developing the total recoverable aluminum limit for the draft permit, five years of aluminum data were analyzed from 2001 through 2005. The data included sampling results from the treatment plant and from the Contoocook River upstream of the discharge. Analysis of this data showed that the chronic water quality criteria for aluminum was exceeded 68% of the time (68 out of 100 samples) in the Contoocook River upstream of the discharge. Because the Contoocook River exceeds the chronic water quality criteria for aluminum the majority of the time no further impairment can occur. Therefore, the permit must contain a limit for total recoverable aluminum of at least 0.087 mg/l, which is the chronic criteria for this metal

New Hampshire Water Quality Regulations found at Env-Ws 1705.01 state that not less than 10 percent of the assimilative capacity of the surface water shall be held in reserve to provide for future needs. Given this requirement, the draft permit contained a total recoverable aluminum limit of 0.078 mg/l (78 ug/l), which takes into account 10% assimilative capacity being held in reserve. Upon further review of this limit, EPA believes it is inappropriate to withhold 10 percent reserve capacity in instances where the permit is already at the chronic water quality criteria, because there is no assimilative capacity remaining. It is the goal of the NPDES program to ensure that discharges meet applicable water quality standards established under Section 303 of the Clean Water Act. A permit limit at New Hampshire's adopted chronic water quality criteria of 0.087 mg/l (87 ug/l) for total recoverable aluminum meets this goal. Therefore, the permit limit for total recoverable aluminum has been changed from 0.078 mg/l (78 ug/l) to 0.087 mg/l (87 ug/l). On September 11, 2009 EPA contacted NHDES for concurrence that a limit at the chronic criteria is appropriate for this particular case in light of this interpretation of the standards and the NHDES agreed that a permit limit of 0.087 mg/l is appropriate.

Jaffrey may wish to examine the watershed upstream of the outfall to determine whether the source of aluminum in the Contoocook River is anthropogenic or natural. However, the Town should coordinate with EPA and NHDES prior to initiating such a study. If the results of the study can verify that the source of aluminum is natural then the permit can be modified to include a limit for aluminum based upon background concentrations.

COMMENT NO. 5:

"Monitoring frequency for TSS is shown as $1/Week^3$ and the superscript should be 2 or $1/Week^2$."

RESPONSE NO. 5:

This change has been made to the permit.

COMMENT NO. 6:

"With respect to lead limits there is a discrepancy in the minimum level (ML) between the permit value, 0.5 ug/l and the Fact Sheet value of 5.0 ug/l, and Attachment A (Freshwater Chronic Toxicity Test Procedure and Protocol), 5 ug/l."

RESPONSE NO. 6:

The draft permit contains a monthly average limit for total recoverable lead of 1.0 ug/l. A requirement to report the daily maximum value is also contained in the permit. At the time of the previous permit issuance the lowest ML for total recoverable lead using methods approved in 40 C.F.R. Part 136 was 5.0 ug/l. Consequently, the basis for determining compliance/noncompliance was set at 5.0 ug/l. On March 12, 2007, 40 C.F.R. Part 136 was amended to include (among other items) inductively coupled plasma mass spectrometry (ICP/MS), the ML of which is 0.5 ug/l. Therefore the ML specified in the permit for total recoverable lead testing has been reduced to 0.5 ug/l. The chronic criteria for lead found in Table 1703.1 in the State of New Hampshire's Surface Water Quality Regulations – Chapter 1700 is 0.54 ug/l.

The ML referred to on page 10 of the Fact Sheet, 5.0 ug/l, refers to the ML from the previous permit (described above) that was used to determine compliance/noncompliance. The ML for current permit is 0.5 ug/l.

With respect to the toxicity testing, the Freshwater Chronic Toxicity Test Procedure and Protocol was updated in May 2007. Among the changes in the updated protocol is an ML for total recoverable lead of 0.5 ug/l. The previous protocol contained an ML for total recoverable lead of 5 ug/l. The final permit includes the updated edition of the Freshwater Chronic Toxicity Test Procedure and Protocol.

COMMENT NO. 7:

"Entries for lead in Attachment D, TR limit last 2 columns are reversed."

RESPONSE NO. 7:

This comment is correct. The values for the acute and chronic total recoverable lead limits in Attachment D have been reversed. The acute limit should be 24.9 ug/l and the chronic limit should be 1.0 ug/l. This comment has been noted in the administrative record. The permit is correct and contains a monthly average total recoverable lead limit of 1.0 ug/l and a monitoring and reporting requirement for the daily maximum.

COMMENT NO. 8:

"Monitoring frequency in the draft NPDES permit for Bis(2-Ethylhexyl) Phthalate indicates 2/month and the Fact Sheet indicates 1/month. The Fact Sheet should be corrected."

RESPONSE NO. 8:

This comment has been noted in the administrative record. The correct monitoring frequency is 2/month which is specified on pages 2 and 3 of the permit.

PHOSPHORUS RELATED COMMENTS

COMMENT NO. 1:

"The Town has designed a new treatment plant that will accomplish substantial phosphorus (P) reduction. While the Town may be able to meet the limit set for in DES's final TMDL limits (0.5 mg/l phosphorus summer, 1.0 mg/l winter), the need for phosphorus limits is not apparent. To the contrary, the data, modeling and analysis show affirmatively that a phosphorus limit is not needed to maintain water quality standards and meet the DES phytoplankton target. There is no basis for a summer phosphorus limit more stringent than DES's final TMDL limit of 0.5 mg/l. DES, the Town, and EPA have devoted considerable time, attention, and resources to developing a TMDL. While there remain differences of opinion among the three governments as to whether limits for phosphorus are truly needed, and what those limits should be, the Town has indicated a willingness to accept the summer phosphorus limit as set forth in DES's final TMDL limits. EPA can impose a further condition in the final permit that requires evaluation of the new WWTP operations, and effluent and receiving water monitoring. A well-designed and implemented monitoring program will provide EPA and DES and Jaffrey with additional information and analysis on phosphorus."

RESPONSE NO. 1:

The Town's assertion that a TMDL has been finalized for the upper Contoocook River is incorrect. While a draft TMDL was issued for public comment in May of 2006 a final version has not been submitted to EPA for approval. During the public comments the DES received significant comments from both EPA and the Town of Jaffrey. As stated in EPA's comments on the draft TMDL, the model is not calibrated and verified for phytoplankton, periphyton, or daily maximum dissolved oxygen levels. Consequently, the model cannot be used to determine if the narrative eutrophication criteria is met, nor can it be used to determine the effect of aquatic plant on dissolved oxygen levels. The second concern is that the model does not include Powder Mill Pond, which is a eutrophic pond with significant dissolved oxygen impairment located just downstream of the study area. Biomass growth upstream of Powder Mill Pond can be flushed to the pond and accumulate in the sediments and contribute to the eutrophication and dissolved oxygen impairment. The third concern is the reliance of the TMDL on estimates of SOD improvements to determine if dissolved oxygen criteria will be met.

While a monitoring program for the Contoocook River can be developed and implemented to provide EPA, NHDES, and Jaffrey with additional information and analysis on phosphorus, EPA is required to issue the permit with limits and conditions necessary to ensure compliance with State water quality standards at the time of permit reissuance.

Neither the CWA nor EPA regulations require that a TMDL be completed before a water quality based limit may be included in a permit. Rather, water quality based effluent limitation in NPDES permits must be "consistent with the assumptions and requirements of any *available* [emphasis added] wasteload allocation." 40 C.F.R. § 122.44(d)(1)(vii)(B). Thus, an approved TMDL is not a precondition to the issuance of an NPDES permit for discharges to an impaired waterway. The current administrative record supports the need for a total phosphorus limit of 0.16 mg/l to ensure compliance with applicable standards and the Region was therefore obligated to include it in the permit pursuant to 40 C.F.R. 122.44(d)(1) EPA has based the limits for phosphorus on Contoocook River instream data collected by the NHDES, applicable narrative State water quality standards, Federal water quality criteria guidance, and other relevant information discussed in the Fact Sheet.

COMMENT NO. 2:

"The Fact Sheet (page 17) states that the effects-based approach was selected because "it is more directly associated with impairment to designated uses. The effects-based approach provides a threshold value above-which adverse water quality effects (i.e.,) water quality impairments are likely to occur. It applies empirical observations of a causal variable (i.e. phosphorus) and a response variable (i.e. chlorophyll a) associated with designated use impairments." However, while stating that an effects-based approach is taken for the Contoocook, application of the Red Book/Gold Book 0.1 mg/l total phosphorus for the river is arbitrary and not defensible.

Available data and DES TMDL modeling results demonstrate that 0.1 mg/l total phosphorus as a stream standard and the corresponding draft Jaffrey 0.16 mg/l effluent limit (summer) are not "necessary to meet water quality standards" (FS, page 7). EPA's statement that there is "no realistic likelihood that water quality standards could be met with less stringent limits than those proposed in the draft permit" (FS, page 7) is contradicted by extensive site-specific data, modeling, and analysis done through the TMDL study. The TMDL analysis for the upper Contoocook River should be used to establish a phosphorus standard for the river that is protective of the uses that can be impaired by phosphorus in the river and downstream waters: aesthetics (too much phytoplankton, too much periphyton), dissolved oxygen impairments (caused by too much algae and/or too much periphyton) and impacts on downstream impoundments (algae and dissolved oxygen impairments from sediment sources of dead vegetation). See Appendix A for a discussion of EPA's inappropriate reliance on the so-called "Gold Book" and other guidance documents in suggesting that a particular instream phosphorus criterion applies to this permit."

RESPONSE NO. 2:

In the course of determining the trophic status of the receiving waters and deriving a protective phosphorus effluent limit that would meet the narrative phosphorus criterion, the Region looked to a variety of sources, including the Gold Book, the *Ambient Water Quality Criteria: Information Supporting the Development of State and Tribal Nutrient Criteria*

("Ecoregional Nutrient Criteria"), and the *Nutrient Criteria Guidance Manual: Rivers and Streams* (EPA 2000) ("Nutrient Criteria Technical Guidance Manual"). These constitute information published under CWA § 304(a). The Region also relied on peer-reviewed scientific literature pertaining to nutrient impacts on aquatic systems. The Region explained in the Fact Sheet that it used Section 304(a) information and recommended criteria as guidance to interpret the State's narrative criterion for nutrients and not as substitutes for State water quality criteria. The Region's use of the Gold Book and other relevant materials published under Section 304(a) to develop a numeric phosphorus limit sufficiently stringent to achieve the narrative nutrient criterion is consistent with applicable NPDES regulations. When deriving a numeric limit to implement a narrative water quality criterion, EPA is authorized to:

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

40 C.F.R. § 122.44(d)(1)(vi)(B). While the various recommended values for phosphorus contained in the material cited above (Ecoregional Nutrient Criteria of 0.01 mg/l to the Gold Book value of 0.1) were not specifically designed to meet New Hampshire's water quality standards in particular, these values do reflect a range of ambient phosphorus concentrations that are sufficiently low to prevent cultural eutrophication.[2]

EPA employed the Gold Book recommended concentration (0.1 mg/l) rather than the more stringent ecoregional criteria or the draft New England-wide value. The Gold Book value is based on effects as opposed to the ecoregional criterion, which was developed on the basis of reference conditions. EPA opted for the effects-based approach because it is often more directly associated with an impairment to a designated use (i.e. fishing, swimming). The effects-based approach provides a threshold value above which adverse effects (i.e. water quality impairments) are likely to occur. It applies empirical observations of a causal variable (i.e. phosphorus) and a response variable (i.e. chlorophyll a) associated with designated use impairments. Reference-based values are statistically derived from a comparison within a population of rivers in the same ecoregion class. Specifically, reference conditions presented are based on the 25th percentile of *all* nutrient data, including a comparison of reference conditions for the aggregate ecoregion versus subecoregions. *See* Ecoregional Nutrient Criteria at vii. They are a quantitative set of river characteristics (physical, chemical, and biological) that represent minimally impacted

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[2] For example, the Gold Book States:

> Algal growths impart undesirable tastes and odors to water, interfere with water treatment, become aesthetically unpleasant, and alter the chemistry of the water supply. They contribute to the phenomenon of cultural eutrophication.
>
> To prevent the development of biological nuisances and to control accelerated or cultural eutrophication, total phosphates as phosphorus (P) should not exceed 50 ug/l in any stream at the point where it enters any lake or reservoir, nor 25 ug/l within any lake or reservoir. A desired goal for the prevention of plant nuisances in stream or other flowing waters not discharging directly to lakes or impoundments is 100 ug/l total P.

conditions. Thus, while reference conditions, which reflect minimally disturbed conditions, may meet the requirements necessary to support designated uses, they may also *exceed* the water quality necessary to support such requirements.

The reliance upon a concentration of 0.1 mg/l is consistent with other total phosphorus recommendations from other effects-based studies outlined in EPA's *Nutrient Criteria Technical Guidance Manual – Rivers and Streams*. See Table 1. In order to prevent impairment risks the total phosphorus recommendations from these studies ranges from 10 to 90 ug/l (0.01 to 0.09 mg/l). Additionally, *A Literature Review for use in Nutrient Criteria Development for Freshwater Streams and Rivers in Virginia* by the Virginia Polytechnic Institute and State University – Virginia Water Resources Research Center (2006) presents examples of total phosphorus guidelines and criteria from various states in the U.S. See Table 2. The total phosphorus concentration of 0.1 mg/l which EPA has applied to Jaffrey's discharge to the Contoocook River is also consistent with total phosphorus criteria and guidelines developed in other states.

Refer to Response 1 above concerning reliance upon the NHDES TMDL to establish limits for this discharge.

For more detail, please see *In re City of Attleboro Department of Wastewater*, NPDES Appeal No. 08-08, slip op. at 47-75, 14 E.A.D. (EAB, September 15, 2009), which sets forth and upholds the Region's technical and legal justification for deriving phosphorus limits in NPDES permits.

Table 1

Nutrient (ug/l) and algal biomass criteria limits recommended to prevent nuisance conditions and water quality degradation in streams based either on nutrient-chlorophyll *a* relationships or preventing risks to stream impairment as indicated.

PERIPHYTON Maximum in mg/m^3

TN	TP	DIN	SRP	Chlorophyll *a*	Impairment Risk	Source
				100 – 200	nuisance growth	Welch et al. 1988, 1989
275 – 650	38 – 90			100 – 200	nuisance growth	Dodds et al. 1997
1500	75			200	eutrophy	Dodds et al. 1998
300	20			150	nuisance growth	Clark Fork River Tri-State Council, MT
	20				*Cladophora* nuisance growth	Chetelat et al. 1999
	10 – 20				*Cladophora* nuisance growth	Stevenson unpubl. data
		430	60		eutrophy	UK Environ. Agency 1988
		100[1]	10[1]	200	nuisance growth	Biggs 2000
		25	3	100	reduced invertebrate diversity	Nordin 1985
			15	100	nuisance growth	Quinn 1991
		1000	10[2]	~ 100	eutrophy	Sosiak pers. comm.

PLANKTON Mean in ug/l

TN	TP	DIN	SRP	Chlorophyll *a*	Impairment Risk	Source
300[3]	42			8	eutrophy	Van Nieuwenhuyse and Jones 1996
	70			15	chlorophyll action level	OAR 2000
250[3]	35			8	eutrophy	OECD 1992 (for lakes)

1 30-day biomass accrual time
2 Total Dissolved P
3 Based on Redfield ratio of 7.2N:1P (Smith et al. 1997)

Source: *Nutrient Criteria Technical Guidance Manual – Rivers and Streams*. EPA-822-B-00-002. U.S.EPA. July, 2000.

Table 2		
Examples of Numeric Criteria and Guidelines for Total Phosphorus in the U.S.		
State and Waters	**Phosphorus Criteria Values**	**Reference**
Arizona River Specific	Annual Mean 0.05 – 0.20 mg/l 90 Percentile: 0.10 – 0.33 mg/l Single Sample Maximum: 0.20 - 1.0 mg/l	AAC R18-11-109
Arkansas All Waters	Maximum limit: 0.100 mg/l (guideline)	2 AAC 2.509
Hawaii Inland Streams	Geometric Mean, not to exceed 0.05 mg/l – Wet Season (Nov.1 – Apr.30) 0.030 mg/l – Dry Season (May 1 – Oct. 31)	HAR 11-54-5.2
Illinois Streams at entrance to reservoir or lake with surface area of 8.1 hectares or more	Maximum limit: 0.05 mg/l	35 IAC 302.205
Nevada* River Specific	Mostly, average: 0.1 mg/l	NAC 445A
New Jersey Streams	Maximum limit: 0.1 mg/l, unless demonstrate TP is not a limiting nutrient and will not render the waters unsuitable for designated uses.	NJAC 7:9B-1.14(c)
New Mexico Perennial reaches of specific waters in Rio Grande, Pecos River, and San Juan River basins	Maximum limit (single sample): 0.1 mg/l	20 NMAC 6.4.109 20 NMAC 6.4.208 20 NMAC 6.4.404 20 NMAC 6.4.407
North Dakota Class I, IA, II and III streams	Maximum limit: 0.1 mg/l (interim guideline limit)	NDAC 33-16-02-09
Oregon Yamhill River and its tributaries	Monthly median: 0.070 mg/l as measured during summer low flow	OAR 340-041-0350
Utah Streams and rivers to protect aquatic life; 3B, 3C waters	Maximum limit: 0.05 mg/l (used as pollution indicator; when exceeded, further investigations are conducted)	UAC R317-2 (Table 2.14.2)
Vermont Upland streams (> 2,500 ft.)	Maximum limit: 0.010 mg/l at low median monthly flow	VWQS 3-01-B2
Washington Spokane River (river mile 34 – 58)	Average euphotic zone: 0.025 mg/l (during June 1 to October 1)	WAC 173-201A-130
* Different requirements may exist to maintain existing higher quality streams.		

Source: *A Literature Review for use in Nutrient Criteria Development for Freshwater Streams and Rivers in Virginia*. Virginia Polytechnic Institute and State University – Virginia Water Resources Research Center. 2006.

COMMENT NO. 3:

"DES considers a phytoplankton level of 15 ug/l of chlorophyll a as a numeric expression of its narrative nutrient standards for algae. Examination of the available upper Contoocook River data indicates that under existing conditions from Jaffrey, the upper Contoocook is not impaired for phytoplankton. Data collected in August 2004 and in summer 2005 show only one sample greater than the target of 15 ug/l. (16 ug/l Noone Pond, August 4, 2004). All other phytoplankton measurements are less than 7, with the majority less than 5 ug/l chlorophyll a. A sample from Noone Pond (small impoundment downstream of the Jaffrey discharge) September 14, 2005 during and extreme low flow period (flow at Peterborough, 6 cfs) was 4 ug/l. Again, even during extreme low flow, the river phytoplankton in Noone Pond was well below the DES target with existing phosphorus levels in the Jaffrey WWTP effluent.

The predictive model at 7Q10 flows with the Jaffrey discharge at existing conditions (effluent TP = 2.8 mg/l) also predicts phytoplankton chlorophyll at less than the target level of 15 ug/l. The modeling to date indicates that the phytoplankton growing in the river does not contribute to the river dissolved oxygen impairment. Modeling results show that the decrease in algae from lower phosphorus actually results in lower dissolved oxygen. Therefore, at the TP levels predicted downstream of the Jaffrey WWTP (greater than 0.1 mg/l), no impairment is predicted at that TP level. Thus, even for Jaffrey at existing effluent phosphorus levels, the data and analysis suggest that no limit at all is needed during the summer season. The 0.1 mg/l total phosphorus used in the draft Jaffrey permit limit development is not appropriate for the upper Contoocook and use of 0.1 mg/l as a stream standard to be met at 7Q10 is overly stringent."

RESPONSE NO. 3:

Refer to Response No. 1 above for issues EPA has raised concerning the modeling performed for the Contoocook River.

All states, including New Hampshire, are in the process of developing numeric nutrient criteria that, at a minimum, will protect all designated uses. NHDES has not yet adopted numeric nutrient criteria. EPA's recommended parameters are nitrogen, phosphorus, chlorophyll a, and some measure of water clarity. EPA believes that nutrient criteria, to be effective, should address both causal variables (N and P) and response variables (chl a and water clarity). If a state chooses to adopt criteria only for response variables, EPA recommends that a numeric translator also be adopted to provide a means of obtaining permit limits for phosphorus and/or nitrogen. EPA does not believe that a chlorophyll a criterion, by itself, is adequate to protect designated uses from the impacts of eutrophication in all waters of the State. Chlorophyll a may prove to be a useful assessment tool, but in order to protect designated uses, numeric values for phosphorus and nitrogen are critical for purposes of setting permit limits. At present, two New England states, Maine and Vermont have draft criteria for total phosphorus. Vermont's draft criteria for total phosphorus range from 10 to 62 ug/l, depending on the classification of the

receiving water. Maine's draft criteria for total phosphorus range from 15 to 40 ug/l and chlorophyll *a* draft criteria range from 2.3 to 8 ug/l, depending on the classification of the receiving water.

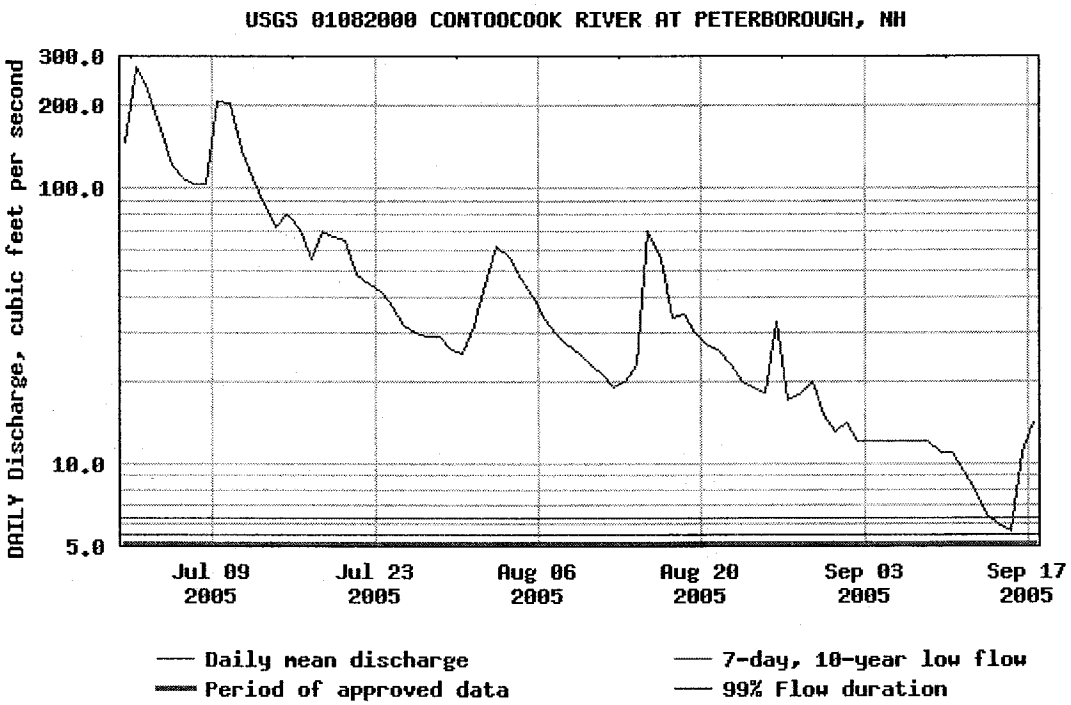
Water column chlorophyll *a* levels are an indicator of phytoplankton biomass, which would be expected to be higher in stream segments with low current velocity, long detention time, low turbidity/color, open canopy, greater depth, and greater depth to width ratio. *Nutrient Criteria Technical Guidance Manual*, Table 1, at 21. However, water column chlorophyll *a* is not adequate as the only indicator of eutrophication to document the full extent of nutrient related impacts in most rivers/streams, because stream segments with high current velocity, low turbidity/color, open canopy, shallow depth, minimal scouring, limited macroinvertebrate grazing, gravel or larger substrata, and smaller depth to width ratio would be expected to have a high periphyton biomass, which is not measured by water column chlorophyll *a*. As explained above, any criterion that is based on a response variable such as chlorophyll *a* must also include a mechanism for establishing limits on the causal variable (i.e. phosphorus) that will result in attainment of the criterion.

Since the Contoocook River is a shallow, clear, relatively fast moving stream a high chlorophyll a value would not be expected in situations where there is nutrient enrichment. Rather, in areas such as this it would be expected that either macrophytes and/or periphyton would dominate. In the case of the Contoocook, estimates of periphyton coverage of 67 – 100% have been noted at sampling stations below Jaffrey's discharge. According to *A Literature Review for use in Nutrient Criteria Development for Freshwater Streams and Rivers in Virginia* (Virginia Polytech 2006) filamentous algal coverage of the streambed by about 20% (Welch et al. 1988) and 30% (Biggs 2000b) has also been proposed at thresholds for identifying nuisance conditions.

With respect to Noone Pond, during the 2004 TMDL sampling program, chlorophyll *a* levels of 16.39 ug/l and 2.89 ug/l were recorded on August 4 and 11, respectively. As noted in the DES 2004 Contoocook River Data Report, on the second day of sampling (August 11) the flow at the Peterborough gage ranged from 10.68 cfs in the morning to 4.27 cfs at the end of the day with a low of 2.36 cfs at 2:00 pm. The drop in flow was the result of operations at the hydroelectric dam at Noon Falls (sample site 30 CTC). The relatively low chlorophyll *a* reading on August 11 can be attributable to the operations of the hydroelectric dam that released a large amount of water, and chlorophyll *a*, stored in Noone Pond.

Also noted in the comment were chlorophyll *a* levels in Noone Pond at 4.34 and 4.69 ug/l in two samples taken on September 14, 2005. Additionally, two samples taken on August 9, 2005 showed chlorophyll *a* levels of 4.55 and 3.65 ug/l. While the comment points out that the relatively low chlorophyll a levels recorded on September 14 were taken at extreme low flow (6 cfs), the comment did not take into account the flow history from the previous months. As can be seen below from the flow history from the Peterborough USGS Flow Gage, the flows in July and August were well above the 7Q10 flow. During July, flows for half the month were well above 100 cfs and for the second half of the month were generally greater than 50 cfs. In August the flows were generally greater than 20 cfs. For

September, flows for the first week or so remained at about 13 cfs and then started to decrease with a low of 6 cfs on September 14. Given the high flows in the two months preceding the September 14 sampling event in addition to the operation of the hydroelectric dam at the outlet at Noone Pond, it is likely that the residence time in Noone Pond was not sufficient to result in high chlorophyll *a* levels.



Source: USGS

It should be noted that DES does not consider a chlorophyll *a* level of 15 ug/l of chlorophyll *a* as a numeric expression of its narrative nutrient standards for algae. Rather, NHDES has been using a chlorophyll *a* value of 15 ug/l as a threshold for 303(d) listing determinations related to nutrient impacts to a single designated use, primary contact recreation. It is not used by the Department to address nutrient related impacts on other designated uses, such as aquatic life. *See* Consolidated Assessment and Listing Methodology at 3-33. The chlorophyll *a* value of 15 ug/l has not been adopted by NHDES as a water quality criterion and has not been approved by EPA.

Additionally, while a total phosphorus criteria has not been adopted by NHDES, *Interpreting VRAP Water Quality Monitoring Parameters – Chemical Parameters* (NHDES 2007) states the total phosphorus concentrations of greater than 0.05 mg/l are excessive and is a potential nuisance concentration.

COMMENT NO. 4:

"During the winter season, furthermore, aquatic plant growth is limited by factors other than nutrients. Low temperatures, low light, generally higher flows, and periodic ice cover

limit growth. Given New Hampshire winter temperatures, phytoplankton, periphyton, and rooted aquatic plants are not being produced during the winter season. This lack of growth will be independent of phosphorus concentrations in the waters. Therefore, there is no use impairment associated with Jaffrey phosphorus. Similarly, die off of aquatic vegetation during the fall season is independent of phosphorus levels during the winter and is a natural occurrence. The measured phytoplankton and the qualitative assessment of periphyton during the summer season as stated above is very low, well within DES target levels. The summer phosphorus, as indicated by the TMDL modeling, does not produce excessive biomass. Reduction of Jaffrey summer phosphorus does not significantly reduce instream phytoplankton. Therefore, there is relatively little biomass from the upper Contoocook to be settled into the bottom sediments of the upper Contoocook or to settle out downstream of the Peterborough WWTP in Powder Mill Pond.

EPA acknowledges that the "vast majority of the phosphorus discharged is in the dissolved form and the dissolved phosphorus will pass through the system during the winter period." (FS Page 17). We agree with the Fact Sheet assessment regarding high dissolved phosphorus form in the Jaffrey effluent and that phosphorus will flow through the system during the winter season. For that reason and the fact that plant growth does not occur (for reasons other than nutrient limitation) a phosphorus effluent limit at Jaffrey is not necessary to protect water quality and water uses during the winter."

RESPONSE NO. 4:

Refer to Response No. 1 above for issues EPA has raised concerning the modeling performed for the Contoocook River.

EPA imposition of a winter limit is reasonable given the nature of nutrient-driven impacts on aquatic systems. Several general points are important to bear in mind. First, "[i]n flowing systems, nutrients may be rapidly transported downstream and the effects of nutrient inputs may be uncoupled from the nutrient source, [which] complicate[es] source control." *See* Nutrient Technical Guidance Manual at 3. Second, eutrophic conditions are often exacerbated around impoundments and in other slow moving reaches of rivers, where detention times increase relative to free flowing segments of rivers and streams. *Id.* at 32. Third, once the cycle of eutrophication begins, it can be difficult to reverse. This is because "nutrients can be re-introduced into a waterbody from the sediment, or by microbial transformation, potentially resulting in a long recovery period even after pollutant sources have been reduced." *Id.* at 3. Therefore, one key function of a nutrient limit is preventive, because phosphorus has the ability to persist and accumulate in the water column and sediments. A second key objective is to protect downstream receiving waters "regardless of [their proximity] in linear distance." *See* Gold Book at 241; Nutrient Technical Guidance Manual at 11.

EPA determined to impose a winter phosphorus limit consistent with the foregoing principles. The winter phosphorus limit of 1.0 mg/l is not based on a biomass accumulation since, as the Town points out, there are a number of factors that inhibit plant growth during the winter months. Rather, the winter limit is based upon the concern that

the phosphorus in the treatment plant's effluent can accumulate in downstream sediments and contribute to excessive growth during the growing season. This in turn will lead to further settling of biomass and nutrients into the sediments, where they will be available for future uptake by aquatic plants. In order to restore the Contoocook River to health, it is important for this eutrophic cycle to be broken by placing reasonable limitations on phosphorus inputs at their source rather than trying to later remediate far field impacts once such phosphorus loading has accumulated in the sediments. Winter loading of phosphorus is of particular concern due to the fact that the discharge is upstream of a large impoundment, Powder Mill Pond. According to New Hampshire's *2006 List of Threatened or Impaired Waters That Require a TMDL*, Powder Mill Pond is not attaining aquatic life and primary contact recreation standards. Aquatic life standards are not met due to dissolved oxygen saturation and dissolved oxygen concentration while primary contact recreation standards are not being met because of chlorophyll *a*.

While the vast majority of the phosphorus discharged should be in the dissolved fraction, this is only true provided that wastewater receives treatment. During the TMDL sampling program two 24-hour composite samples were taken from the Jaffrey Wastewater Treatment Plant and analyzed for total phosphorus and orthophosphorus. These samples were taken on August 4 and 11, 2004. The sample taken on August 4 had a total phosphorus concentration of 2.604 mg/l and an orthophosphorus concentration of 2.551 mg/l. The sample taken on August 11 had concentrations of 3.06 and 2.81 mg/l, respectively. On August 4 orthophosphorous accounted for 97% of the total phosphorus in the discharge and on August 11 it accounted for 92%.

Although most of the phosphorus in the discharge is in the dissolved form (based on 2 samples from the TMDL project) the monitoring requirement for orthophosphorous shall remain in the permit so that the Region can confirm that the wastewater is receiving adequate treatment and that the majority of the phosphorus is in the dissolved form during the winter months.

COMMENT NO. 5:

"The Peterborough section of the river, downstream of the upper Contoocook/Jaffrey river reach, particularly Powder Mill Pond, has been described as impaired due to cultural eutrophication and nutrient enrichment. EPA's reliance on any impairment at Powder Mill Pond is misplaced. The phosphorus load leaving the upper Contoocook River section becomes a source to the Peterborough section of the river. The phosphorus load at this location has a component that is from the Jaffrey WWTP and from non-point sources (NPS) from the upper Contoocook drainage area and tributaries. The upper Contoocook load needs to be taken into account along with phosphorus from the Peterborough WWTP and NPS loads from the pond drainage area located in the Peterborough river section.

Although neither the DES nor the HydroQual analyses directly calculate the impact of the Jaffrey WWTP discharge on Powder Mill Pond, both analyses did calculate the total phosphorus remaining at the downstream end of the Jaffrey segment of the Contoocook River. This downstream concentration then provides the upstream load for the

Peterborough segment of the river. The August 2004 data used to calibrate the model for the Jaffrey segment indicates that the phosphorus is not conserved in the river downstream of Jaffrey. The Jaffrey WWTP load is joined by many non-point sources. At the downstream end of the Jaffrey segment (25Y-CTC), the measured total phosphorus load in the river is substantially less than the sum of the Jaffrey and non-point source loadings. For example, during the August 22, 2004 low flow survey by DES, Jaffrey discharged 7.5 pounds per day (lb/day) phosphorus and the non-point sources are estimated at 1.8 lb/day, for a total loading of 9.3 lb/day, yet the measured total phosphorus load at 25Y-CTC is only 4.4 lb/day. Even if the non-point source portion is assumed to be conserved, then the existing Jaffrey load decreases from 7.5 to 2.6 lb/day, a 67 percent reduction.

A similar non-conservative behavior for total phosphorus is noted in the 2002 data and TMDL model for the Peterborough segment of the Contoocook. Using the 25Y-CTC data, 3.0 lb/day entered the Peterborough segment during the August 22, 2002 DES survey. This consists of the non-point source and residual Jaffrey WWTP loads. The data indicate that Peterborough discharged approximately 24.6 lb/day at that time. The measured total phosphorus and flow at 25-CTC immediately upstream of Powder Mill Pond shows that of the 27.6 lb/day load at Peterborough, only 6.65 lb/day actually enters the pond. Thus, approximately 75 percent of the total phosphorus load is removed from the system between the Peterborough WWTP discharge and the pond. Only the phosphorus that actually enters the pond contributes to the impairment, if any, in the pond. The measured total phosphorus in Powder Mill Pond during the August 2002 survey averaged approximately 0.04 mg/l. If the EPA Gold Book recommendation of 0.025 mg/l within impoundments is used as the target total phosphorus concentration for the pond then a reduction of 37.5 percent in total phosphorus loading to the pond is required. On this basis, the August 2002 loading entering the Peterborough reach of 6.65 lb/day during low flow should be reduced to 4.2 lb/day

With a phosphorus reduction of 75 percent between the Peterborough WWTP and Powder Mill Pond, total phosphorus of 16.8 lb/day is the allowable load at Peterborough, consisting of the Peterborough WWTP, Jaffrey non-point sources, and the residual Jaffrey WWTP loading. For a Peterborough design flow of 0.6 mgd and effluent total phosphorus limit of 0.88 mg/l[2], the phosphorus loading would be 4.4 lb/day. The remainder 12.4 lb/day is available for the Jaffrey non-point source and residual Jaffrey WWTP loadings. If the Jaffrey non-point source load is 1.8 lb/day, then the Jaffrey residual is 10.0 lb/day. With a phosphorus reduction of 67 percent between the Jaffrey WWTP and the beginning of the Peterborough river segment, then Jaffrey WWTP total phosphorus loading of 31.8 lb/day is allowable. At the design flow of 1.25 mgd, Jaffrey's effluent concentration should not exceed 3.0 mg/l. Further, the DMR data shows that the Jaffrey WWTP presently discharges at a monthly average of 2.8 mg/l. Based on the above conservative mass balance analysis, reduction of Jaffrey to a summer effluent limit of 0.16 mg/l is simply not justified. While the TMDL analysis can be shown to justify no phosphorus limit for either summer or winter, the Town has indicated a willingness to accept the summer monthly average limit arrived at in DES's final TMDL limits of 0.5 mg/l."

[2] The draft Peterborough WWTP permit contains a 0.88 mg/l monthly average limit for total phosphorus.

RESPONSE NO. 5:

Although measured instream phosphorus concentrations below Jaffrey's discharge at sampling station 25Y-CTC are below the target of 0.1 mg/l (0.031 mg/l on August 4, 2004 and 0.028 mg/l on August 11, 2004), the analysis in the comment above does not take into account the phosphorus that settles to the stream bed and that which is taken up in plant and algal biomass. While a certain amount of phosphorus does settle out and is taken up by plant and algal biomass, this growth contributes to violations of water quality standards at these points in the river. Estimated periphyton coverages below Jaffrey's outfall from the 2004 TMDL sampling program are shown in the Table 3 below.

Table 3

Percent Periphyton Coverage Below Jaffrey WWTF

Sampling Station	August 4	August 11
32-CTC	0	0 – 33
31C-CTC	0 – 33	0 – 33
31B-CTC	67 – 100	67 – 100
31AT-CTC	34 – 66	67 -100
31AF-CTC	67 – 100	67 – 100
31-CTC	0 – 33	0 - 33

As explained further below in Response 6, estimates of percent cover are often a useful indicator of the intensity of algal proliferation in gravel/cobble bed stream and as an index of aesthetic appeal. Further, nuisance level of algal biomass (e.g. > 10 ug chl a cm^{-2}, > 5 mg AFDM cm^{-2}, > *40% cover by macroalgae* [emphasis added], see review Biggs, 1996) do indicate nutrient or organic enrichment. Also, according to *A Literature Review for use in Nutrient Criteria Development for Freshwater Streams and Rivers in Virginia* (Virginia Polytech 2006) filamentous algal coverage of the streambed by about 20% (Welch et al. 1988) and 30% (Biggs 2000b) has also been proposed at thresholds for identifying nuisance conditions.

It needs to be emphasized that phosphorus taken up in the plant and algal biomass is not "removed" from the system. Rather, it is only temporarily taken up by the plant and algal biomass. At the end of the growing season as the vegetation dies and decomposes, the phosphorus will be released and will be transported down stream, where it has the potential to settle into impoundments or other slow-moving reaches of the river, and again contribute to the cycle of eutrophication. Also, during periods of higher flows, phosphorus accumulated in the sediments will be transported downstream to areas such as Powder Mill Pond.

Despite the assertions in the comment that phosphorus concentrations are reduced below the Jaffrey and Peterborough discharges, the fact remains that Powder Mill Pond, an impoundment below the Jaffrey and Peterborough discharges, is on the 2006 303(d) list.

Aquatic life uses are not being met due to dissolved oxygen saturation, and dissolved oxygen concentration and primary contact recreation uses are not being met due to chlorophyll *a* concentrations.

Finally, in order to establish effluent limitations, the permitting authority must demonstrate actual impacts to the receiving water body. The applicable regulations, however, do not require such a showing. Pursuant to section 122.44(d)(1)(i), the permitting authority must impose limits on pollutants that "have the reasonable potential to cause or contribute to an excursion above any [s]tate water quality standard, including [s]tate narrative criteria for water quality." 40 C.F.R. § 122.44(d)(1)(i). Therefore, the permitting authority need only show that the regulated discharge has the potential to cause or contribute to violations of the applicable standard. In this case, after concluding that 0.1 mg/l was the appropriate criterion to follow, the Region determined that the available data showed that the discharge of total phosphorus from the facility has the reasonable potential to cause or contribute to exceedances of this criterion at the point of discharge.

Please see *In re City of Attleboro Department of Wastewater*, NPDES Appeal No. 08-08, slip op. at 63, 72, 14 E.A.D. (EAB, September 15, 2009) and Response No. 4 above, both discussing Region's conservative approach to nutrient permitting.

COMMENT NO. 6:

"Moreover, there is no indication that the periphyton represents an impaired condition. The DES Contoocook River survey program, approved by EPA, was conducted to determine the water quality in the upper Contoocook, did not quantitatively measure periphyton. A visual assessment of the presence/absence was made. When present, the spatial coverage of the periphyton was estimated. Very broad categories were used for assessments of coverage: 0 – 33%, 34 – 66%, and 67 – 100%. Presence of periphyton is not surprising. The upper Contoocook River is a shallow, clear, relatively fast moving stream with an abundance of suitable substrate (rocks, sticks, etc.) for periphyton growth and minimal tree canopy cover. There is no indication that the periphyton represents an impaired condition. Since there were no periphyton biomass measurements made, there are no data for comparison with DES TMDL model results. The model, therefore, cannot be considered as calibrated/verified for periphyton. Any biomass levels calculated in the calibration/verification process are interesting but there is no way of independently being sure that the calculation is correctly representing the periphyton levels.

Periphyton effects dissolved oxygen in receiving water. An assessment should be made in the TMDL modeling analysis as to the importance of this parameter as modeled in the overall dissolved oxygen calibration success. If the dissolved oxygen can't be satisfactorily represented using the data collected (if there is a significant "missing piece") and the periphyton is postulated as being a possible dissolved oxygen source (through its photosynthesis) and/or dissolved oxygen sink (through its respiration), including periphyton in the model to "test" the theory is a logical first step. However, if periphyton is suspected as a major factor, measurements should be obtained to include periphyton in the analysis."

RESPONSE NO. 6:

Periphyton are benthic algae that grow attached to surfaces such as rocks or larger plants. Periphyton are primary produces and sensitive indicators of environmental change in lotic waters. Because periphyton are attached to the substrate, this assemblage integrates physical and chemical disturbances to the stream reach. The periphyton assemblage serves as a good biological indicator due to:

- a naturally high number of species
- a rapid response time to both exposure and recovery
- identification to a species level by experienced biologists
- ease of sampling, requiring few people
- tolerance or sensitivity to specific changes in environmental condition are known for many species

While detailed periphyton sampling which would identify different species and total periphyton biomass was not performed, the TMDL sampling project did estimate benthic coverage at the each of the sampling stations. According to the *Nutrient Criteria Technical Guidance Manual* (EPA, 2000), the extent of periphyton coverage of a stream bed can be an important indicator of algal biomass problems. As enrichment increases, the fraction of periphyton biomass composed of filamentous greens increases, as does the percent of stream bed covered with algae. Although the guidance indicates there may be an uncoupling between percent cover and total biomass depending on the thickness of the algal mat (i.e. a system might have 100% algal cover) but if the algal growth was very thin the total biomass could be far less than a system with 50% cover. Nevertheless, the guidance states that estimates of percent cover are often a useful indicator of the intensity of algal proliferation in gravel/cobble-bed streams and as an index of aesthetic appeal.

Further, the *Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition* (EPA 1999) states that high algal biomass can indicate eutrophication, but high algal biomass can also accumulate in less productive habitats after long periods of stable flow. Low algal biomass may be due to toxic conditions, but could be due to a recent storm event and spate or naturally heavy grazing. Thus, interpretation of biomass results is ambiguous and is the reason that major emphasis has not been placed on quantifying algal biomass for RBP. However, nuisance level of algal biomass (e.g. > 10 ug chl a cm^{-2}, > 5 mg AFDM cm^{-2}, > *40% cover by macroalgae* [emphasis added], see review Biggs, 1996) do indicate nutrient or organic enrichment.

Finally, according to *A Literature Review for use in Nutrient Criteria Development for Freshwater Streams and Rivers in Virginia* (Virginia Polytech 2006) filamentous algal coverage of the streambed by about 20% (Welch et al. 1988) and 30% (Biggs 2000b) has also been proposed at thresholds for identifying nuisance conditions.

COMMENT NO. 7:

"Periphyton can also affect primary contact recreation use. High levels of periphyton can cause aesthetic impairment. There is no indication of aesthetic impairment or an impairment of primary contact recreation in the upper Contoocook River due to periphyton. High levels of periphyton can also limit biodiversity of the benthic invertebrates in a system. The FS statement that "as enrichment increases, the fraction of periphyton biomass composed of filamentous greens increases as does the percent of stream bed covered with algae (U.S. EPA, July, 2000)" may be true as a generality in a case where the amount of phosphorus in the stream is low enough to be limiting periphyton growth. This is not the situation observed in the upper Contoocook. But if the judgment of DES is that there is an impairment, the section(s) of the river where the impairment exists should be listed on the 303(d) list, periphyton data should be obtained to determine existing conditions, and a TMDL target for its reduction established."

RESPONSE NO. 7:

The recently approved 2006 303(d) (approve August 30, 2007) list includes the segments of the Contoocook River below the Jaffrey WWTP shown in Table 4 below:

Table 4

303(d) Listing for River Segments and Impoundments Downstream from the Jaffrey WWTP

Assessment Unit ID	Primary Town	Assessment Unit Size	Use Description	Impairment
NHRIV700030101-16	Jaffrey	0.68 miles	Aquatic Life	D.O. Saturation D.O Phosphorus (Total)
			Primary Contact Recreation	Chlorophyll a Escherichia coli Phosphorus (Total)
NHRIV700030101-17	Jaffrey	6.05 miles	Aquatic Life	D.O. Saturation D.O Phosphorus (Total)
			Primary Contact Recreation	Chlorophyll a Phosphorus (Total)
NHRIV700030104-03	Sharon	8.40 miles	Aquatic Life	D.O. Saturation D.O Phosphorus (Total) pH
			Primary Contact Recreation	Chlorophyll a Phosphorus (Total)
NHRIV700030104-12	Peterborough	1.35 miles	Aquatic Life	D.O. Saturation D.O Phosphorus (Total)
			Primary Contact Recreation	Chlorophyll a Phosphorus (Total)

NHRIV700030104-16	Peterborough	1.41 miles	Aquatic Life Primary Contact Recreation	D.O. Saturation D.O Phosphorus (Total) Chlorophyll a Phosphorus (Total)
NHRIV700030104-17	Peterborough	3.07 miles	Aquatic Life Primary Contact Recreation	pH Chlorophyll a Phosphorus (Total) Escherichia coli
NHIMP700030104-04	Peterborough	20 acres	Aquatic Life Primary Contact Recreation	D.O. Saturation D.O Phosphorus (Total) pH Chlorophyll a Phosphorus (Total)
NHIMP700030104-08	Peterborough	3.08 acres	Aquatic Life Primary Contact Recreation	D.O. Saturation D.O Phosphorus (Total) Chlorophyll a Phosphorus (Total)
NHIMP700030104-12	Peterborough	20 acres	Aquatic Life Primary Contact Recreation	D.O. Saturation D.O. Phosphorus (Total) Chlorophyll a Phosphorus (Total)
NHLAK700030107-03 (Powder Mill Pond)	Hancock	482.9 acres	Aquatic Life Primary Contact Recreation	D.O. Saturation D.O. Chlorophyll a

While periphyton is not specifically cited as an impairment parameter, related parameters such as chlorophyll a, dissolved oxygen saturation, dissolved oxygen, and total phosphorus are included as causes for impairment. Further, each of these impairments is cited as resulting from, at least in part, municipal point source discharge.

The 303(d) list was developed using the *2006 Section 305(b) and 303(d) Consolidated Assessment and Listing Methodology* (NHDES 2005) (CALM). Section 3.2 of the CALM outlines the assessment criteria for each designated use. For the designated uses described above, aquatic life and primary contact recreation, periphyton is not a criterion that is analyzed. Criteria for primary contact recreation include bacteria, discharges of untreated sewage, chlorophyll a, and color, foam, debris, scum, slicks, odors, and surface floating solids. Criteria for aquatic life include dissolved oxygen, pH, biological assessments, habitat assessments, water quality criteria for toxic substances in the ambient water, toxicity tests of the ambient water, sediment quality, exotic macrophytes, flow, and benthic deposits. It should be noted that not each of the criteria for each designated use are analyzed to include a water segment on the 303(d) list.

The impairments noted above related to dissolved oxygen saturation, dissolved oxygen, chlorophyll *a*, and total phosphorus combined with percent periphyton coverages noted in the *2004 Contoocook River Data Report* (NHDES 2004) (See Table 3 above) downstream of the Jaffrey WWTP are indicative that the treatment plant contributes to excessive periphyton growth in the Contoocook River and violations of water quality standards.

COMMENT NO. 8:

"The above discussion indicates strongly that EPA's draft summer limit of 0.16 mg/l is simply not justifiable. The generic guidance documents relied upon by EPA are not instructive in the context of a riverine discharge that has been studied and analyzed in a very thorough fashion through the TMDL process. A case can even be made that no permit limit for phosphorus is justified at all. However, again, the Town believes that the new Jaffrey WWTP will achieve a phosphorus discharge level of 0.5 mg/l as a monthly average for the summer months, and the Town is will to accept that permit limit. Similarly, the Town is willing to accept an average monthly limit for phosphorus of 1.0 mg/l during the winter months."

RESPONSE NO. 8:

EPA believes that the administrative record supports the summertime total phosphorus limit of 0.16 mg/l. While EPA applauds the town for moving forward with the construction of a new treatment plant and appreciates the willingness of Jaffrey to accept a total phosphorus limit of 0.5 mg/l, EPA does not agree that this limit would ensure compliance with water quality standards applicable to the Contoocook River. Therefore, the total phosphorus limit of 0.16 mg/l remains in the permit. Refer to Responses 1 and 2 above concerning the draft TMDL and derivation of the limit for total phosphorus.

As outlined in EPA's March 15, 2007 letter to the Town (Roger A. Janson to Randall Heglin), in situations where a Town's wastewater treatment plant is not capable of achieving compliance with a new water-quality based limit, it is EPA's practice to issue an administrative order after a permit is issued with more stringent water-quality based limits. These orders typically contain interim limits based on the capabilities of the wastewater treatment plant. EPA anticipates that such a schedule would provide time for the Town to complete construction and commence operation of the plant upgrade, evaluate the capabilities of the new upgraded facility, and determine whether chemical addition could meet the phosphorus limits or whether additional facilities such as effluent filters would be needed to comply with the new limits. The schedule would also provide time for construction of filters if determined to be necessary to meet the new limits. Such a schedule would also provide the Town with the opportunity, if it so chooses, to conduct effluent and receiving water monitoring following completion of construction and initiation of operation, with the intent of demonstrating that the additional filters are not necessary to attain water quality standards. Of course Jaffrey can decide to immediately construct the effluent filters as part of the new plant upgrade construction since installing the technology now presumably would be cheaper than retrofitting the treatment plant at a later time.

Based on current information, we anticipate that any administrative order issued to address more stringent limits in the new final permit would contain an interim monthly average phosphorus limit of 0.5 mg/l.

Since the March 15, 2007 letter, the Town was selected for federal American Recovery and Reinvestment Act (ARRA) funds. The funds will be used by Jaffrey to construct a pellet boiler and effluent filtration to achieve the total phosphorus limit. While the initial plan was to construct cloth disk filters, the Town has decided to move forward with the design of a ballasted floc clarification system (Actiflo or Co Mag) that would allow the treatment plant to meet total phosphorus effluent concentrations of 0.1 mg/l or lower. As a result of Jaffrey's receipt of ARRA funds and the decision to move forward with effluent filtration some items in the March 15, 2007 letter such as evaluation of options to achieve the permit limit, performing in-stream monitoring, and the implementation schedule and interim limit may no longer be necessary.

COMMENT NO. 9:

Appendix A of the comments submitted by the Town of Jaffrey refutes the reference documents on phosphorus cited in the Fact Sheet as not supporting 0.1 mg/l as a river standard as the bases for the proposed Jaffrey WWTP effluent limit. The issues raised in Appendix A are summarized on the second page of Appendix A and reads as follows:

"Thus, the EPA Maximum Instream Total Phosphorus Numeric "Criterion" = 0.1 mg/l (cited as the "Gold Book" standard) does not apply automatically to generate water quality-based limits absent information confirming that (1) nuisance levels of plant growth are present and (2) regulating phosphorus will result in a meaningful reduction in those nuisance algal/plant levels. The underlying EPA documents serving as the basis of the criteria confirm that this approach was necessary to ensure that nutrient criteria are properly applied and were not used to impose requirements where regulations of nutrients would not provide meaningful improvements. The application of phosphorus standards, therefore, requires consideration of site-specific factors in all cased unlike other pollutants that may cause adverse impacts regardless of location (i.e. toxics). As stated by EPA in *Development and Adoption of Nutrient Criteria into Water Quality Standards:*

> Nutrients, unlike toxics, typically manifest their effects over an extended period of time, like a growing season or flow year. Therefore, when evaluating criteria attainment, it important to ensure that the sampling period and frequency of sampling are adequate to reflect long term conditions, and to use an averaging period that represents that used for criteria development (e.g., a weekly, monthly, or seasonal median measurement taken over a year). EPA would not consider a single sample representative of the longer-term conditions that nutrient criteria are designed to reflect and protect. P 18"
>
> In addition EPA's *Guidelines for Deriving Numerical Criteria for the Protection of Aquatic Organisms and Their Uses* (1985) explicitly states that developing nutrient

criteria and assessing criteria attainment are based on an evaluation of long term conditions, not daily conditions. EPA's recommendation is that nutrient criteria for all waters apply over the algal growing season.

The averaging period used to evaluate criteria attainment must represent that used for criteria development such as a growing season or flow year.....*A single sample is not representative of the longer tern conditions that nutrient criteria are designed to reflect and protect.* (Emphasis supplied)

The nutrient criteria guidelines also state "A statement of a criterion as a number that is not to be exceeded any time or place is not acceptable because few, if any, people who use criteria would take it literally and few, if any, toxicologists would defend a literal interpretation."(*Id*)."

RESPONSE NO. 9:

The data used in establishing reasonable potential is described in the fact sheet and included instream sampling data from August 4 and 11, 2008 and effluent phosphorus data that was required as a condition of the previous permit. The sampling data from August 4 and 11, 2008 was part of the State's TMDL project for the Contoocook River. This sampling effort documented, among other items, total phosphorus, dissolved oxygen, dissolved oxygen saturation, and chlorophyll "*a*" concentrations at stations both upstream and downstream of the Jaffrey's discharge. With respect to effluent phosphorus, data from January 2004 through April 2006 is summarized in the fact sheet.

In establishing a numeric phosphorus effluent limit to implement the narrative nutrient criterion, EPA characterized the state of the river by analyzing the relationship between in-stream phosphorus, chlorophyll *a*, and periphyton levels. This characterization is described in Responses 5, 6, and 7. The Region then looked to a broad range of relevant evidence, including Ecoregional Criteria, the New England-wide recommended value, the Gold Book recommended value, and other effects-based values to determine a protective total phosphorus effluent limit.

Under 7Q10, which is the hydrological condition under which NH Standards must be met and water quality-based permit limits calculated, a phosphorus effluent limit of 0.16 mg/l will result in an instream concentration (including background phosphorus levels in the receiving water) of 0.1 mg/l which is the ambient concentration consistent with the Gold Book recommended value.

The 0.16 mg/l limit also falls with the range of effects based values cited in the *Nutrient Criteria Technical Guidance Manual* and in the peer reviewed scientific literature (10 – 90 ug/l to control periphyton and 35 – 70 ug/l to control plankton [See Table 1 in Response 2]) after adjustments are made to account for the differing flow assumptions underlying the permit limit and the literature values (i.e. 7Q10 versus summer seasonal flows). See Attachment A.

For comparison purposes, the Region estimated flows just downstream of the Jaffrey Wastewater Treatment Plant outfall for mean summer flow conditions, low flow mean summer conditions, and low month flow conditions using flow data collected at the USGS gaging station in Peterborough. An upstream total phosphorus concentration (background) was estimated by averaging the results from sampling station 32M-CTC from the *2004 Contoocook River Data Report*. This analysis shows that the expected instream concentrations of total phosphorus fall within the threshold values recommended in the *Nutrient Criteria Technical Guidance Manual* and but above the ecoregional recommended criteria of 0.01 mg/l. Specifically, under mean summer low flow conditions the estimated instream concentration of total phosphorus would be about 0.036 mg/l. At monthly low summer and the summer mean flow the total phosphorus concentrations would be about 0.09 and 0.03 mg/l, respectively. The results of this analysis are shown in Attachment A.

Based on the current record, EPA has concluded that achievement of the recommended *Gold Book* value instream will be sufficient to ensure compliance with NH Standards, as it can be expected to control excessive plant growth.

For more detail, please see *In re City of Attleboro Department of Wastewater*, NPDES Appeal No. 08-08, slip op. at 47-75, 14 E.A.D. (EAB, September 15, 2009), which sets forth and upholds the Region's technical and legal justification for deriving phosphorus limits in NPDES permits, including the expression of the limit a monthly average limit applied seasonally assuming 7Q10 dilution flow.

COMMENTS FROM THE TOWN OF PETERBOROUGH

COMMENT NO. 1:

"The Town of Peterborough fully supports the Town of Jaffrey's efforts to upgrade their wastewater treatment facility. As we know, this effort is a monumental undertaking and Jaffrey will need the support of everyone involved.

Presently we are moving forward with our own wastewater treatment facility design for upgrades and have received our new NPDES permit, NH0100650. We expect to begin construction at the end of 2007. Background concentrations of contaminants play a role in determining discharge limits. Our reopener clause, Item F, stipulates that our permit may be modified, or alternatively revoked and reissued, if a future analysis of a Total Maximum Daily Loading (TMDL) or any other water quality based study of the Contoocook River performed by EPA New England and/or NHDES-WD demonstrates the need for additional or modified permit levels. Clearly there is an interconnection of Jaffrey's permit levels and discharge quality and Peterborough's background concentrations.

Finally, we can not lose sight of our goal to protect our water resources and the difficulty of achieving this goal affordably. It requires that these efforts are planned and carried out in an honest open cooperative manner by all involved. As always, Peterborough is supportive of these goals and looks forward to being part of the solutions."

RESPONSE NO.1:

These comments have been included in the administrative records. EPA recognizes the interconnection between Jaffrey's permit levels and discharge quality and Peterborough's background concentrations. These factors will be taken into account for future permitting actions.

TESTING METHOD FOR *ESCHERICHIA COLI* BACTERIA

On March 26, 2007, 40 C.F.R. Parts 136 and 503 were modified. Among these modifications, were changes to the approved methods for *Escherichia coli* (E. coli) bacteria testing. EPA method 1103.1 which was specified in the draft permit is no longer approved for E. coli testing in a wastewater matrix. The permit has been modified to specify E. coli testing using a method approved in 40 C.F.R. Part 136, List of Approved Biological Methods for Wastewater and Sewage Sludge.

STATE OF NEW HAMPSHIRE SECTION 401 WATER QUALITY CERTIFICATION

Section 401(a)(1) of the Clean Water Act (CWA) requires all NPDES applicants to obtain certification from the appropriate State agency validating the permit's compliance with the pertinent federal and State water pollution control standards. *See* CWA § 401(a)(1). The regulatory provisions pertaining to state certification provide that EPA may not issue a permit until a certification is granted or waived by the State in which the discharge originates. 40 C.F.R. § 124.53(a). The regulations further provide that "when certification is required.....no final permit shall be issued.....unless the final permit incorporates the requirements specified in the certification under § 124.53(e)." 40 C.F.R. § 124.53(a). Section 124.53(e) provides that the State certification shall include any conditions more stringent than those in the draft permit which the State finds necessary to assure compliance with, among other things, State water quality standards, 40 C.F.R. § 124.53(e)(2), and shall include "[a] statement of the extent to which each condition of the draft permit can be made less stringent without violating the requirements of State law, including water quality standards," *id.* § 124.53(e)(3). Under 40 C.F.R. § 124.55(c), "a State may not condition or deny a certification on the grounds that State law allows a less stringent permit condition."

EPA's "duty under CWA Section 401 to defer to considerations of State law is intended to prevent EPA from *relaxing* any requirements, limitations, or conditions imposed by the State law." *In re City of Jacksonville*, 4 E.A.D. 150, 157 (EAB 1992); *In re City of Moscow*, 10 E.A.D. 135, 151 (EAB 2001); *accord In re Ina Rd. Water Pollution Control Facility*, 2 E.A.D. 99, 100 (CJO 100). However, "when the Region reasonably believes that a State [WQS} requires a more stringent permit limitation than that specified by the State, the Region has an independent *duty* under Section 301(b)(1)(C) of the CWA to include more stringent permit limitations." *Moscow*, 10 E.A.D. at 151 (emphasis in original); *accord In re City of Marlborough*, 12 E.A.D. 235, 252 n. 22 (EAB 2005); *Jacksonville*, 4 E.A.D. at 158; *ina Rd.*, 2 E.A.D. at 100 (stating that such "duty is independent of State certification under [Section] 401"). EPA's regulations similarly interpret the statute to impose such an independent duty when EPA issues and NPDES permit. 40 C.F.R. §§ 122.4(a), (d); 122.44(d)(1), (5).

EPA received Section 401 Water Quality Certification from the State of New Hampshire in a letter dated July 29, 2009. As a result of this certification a number of effluent limitations contained in the draft permit have been changed. These changes are described below.

1. **Effluent Flow:**

   A flow limit of 0.75 mgd for the months of July, August, and September has been incorporated into the permit.

2. **$CBOD_5$:**

The draft permit contains the following seasonal limits for $CBOD_5$.

$CBOD_5$ Limits in the Draft Permit			
Timeframe	**Monthly Ave.**	**Weekly Ave.**	**Daily Max.**
Nov. 1 – April 30	14 mg/l (146 lb/d)	23 mg/l (240 lb/d)	40 mg/l (417 lb/d)
May 1 – October 31	10 mg/l (104 lb/d)	12 mg/l (125 lb/d)	16 mg/l (167 lb/d)

The following limits for $CBOD_5$ are contained in the State Certification.

$CBOD_5$ Limits from State Certification			
Timeframe	**Monthly Ave.**	**Weekly Ave.**	**Daily Max.**
Oct. 1 – June 30	10 mg/l (104 lb/d)[1]	10 mg/l (104 lb/d)[1]	17 mg/l (174 lb/d)[1]
July 1 – Sept 30	10 mg/l (63 lb/d)[1]	10 mg/l (63 lb/d)[1]	17 mg/l (104 lb/d)[1]

[1] Mass limits for July 1 through Sept 30 are based on a plant flow of 0.75 mgd. Mass limits for Oct. 1 through June 30 are based on plant flow of 1.25 mgd.

The effluent limitations contained in the State Certification have been incorporated into the permit with the exception of the daily maximum for the month of May. For each month of the year, the effluent limitations proposed in the State Certification are more stringent and result in a lower ultimate oxygen demand. However, the effluent limitations from the State Certification for the month of May result in a higher ultimate oxygen demand. This is shown in the table below.

Daily Maximum Ultimate Oxygen for the month of May			
	Daily Maximum Limit $CBOD_5$ (mg/l)	**Daily Maximum NH_3 Limit (mg/l)**	**UOD[1] (mg/l)**
Draft Permit	16	8.6	63.3
State Cert.	17	25	139.8

[1] Ultimate Oxygen Demand (UOD) = $1.5(CBOD_5) + 4.57(NH_3)$

As described in the Response to Comments above, the Contoocook River in the Town of Jaffrey and in stretches downstream is on New Hampshire's 303(d) list for, among other items, dissolved oxygen and dissolved oxygen saturation. Because of the water quality limited segments of the Contoocook River, EPA has adopted a reasonably conservative stance designed to prevent any further impairment in the receiving water body. Therefore, the daily maximum $CBOD_5$ limit for the month of May contained in the draft permit (16 mg/l) remains in the final permit.

3. **TOTAL PHOSPHORUS:**

The following mass limits for total phosphorus have been incorporated into the permit.

Total Phosphorus Mass Limits	
Timeframe	**Monthly Ave.**
Nov. 1 – March 31	10.4 lb/d
April 1 – June 30	1.67 lb/d

July 1 – Sept 30[1]	1.0 lb/d
October	1.67 lb/d

[1] Mass limits based on a plant flow of 0.75 mgd. Mass limits for the remainder of the year are based on a plant flow of 1.25 mgd.

4. **DISSOLVED OXYGEN:**

For the period October 1 through May 31 of each year, the dissolved oxygen (D.O.) concentration of the effluent must not be less than 8.0 mg/l at any time. The draft permit contained at limitation of 7.0 mg/l throughout the year.

5. **AMMONIA:**

The following effluent limitations for ammonia have been incorporated into the permit:

Effluent Limitations for Ammonia			
Timeframe	**Monthly Ave.**	**Weekly Ave.**	**Daily Max.**
Nov. 1 – April 30	7.0 mg/l (73 lb/d)	7.0 mg/l (73 lb/d)	25 mg/l (260 lb/d)
June	1.1 mg/l (11.5 lb/d)	1.1 mg/l (11.5 lb/d)	2.8 mg/l (29.2 lb/d)
July 1 – Sept 30	1.1 mg/l (6.9 lb/d)	1.1 mg/l (6.9 lb/d)	2.8 mg/l (17.5 lb/d)
October	1.1 mg/l (11.5 lb/d)	1.1 mg/l (11.5 lb/d)	7.2 mg/l (75 lb/d)

With respect to ammonia the State Certification also contained limits for the month of May of 7.0 mg/l for a monthly and weekly average and 25 mg/l for a daily maximum. These limits, with the exception of the 7.0 mg/l for a weekly average, are less stringent than the ammonia limits contained in the draft permit. The draft permit contains a monthly average limit of 5.3 mg/l and daily maximum limit of 8.6 mg/l.

In reviewing the $CBOD_5$ and ammonia limits contained in the State Certification, EPA compared the ultimate oxygen demand (UOD) of the $CBOD_5$ and ammonia limits contained in the draft permit with those in the State Certification. For each month of the year, with the exception of May, the $CBOD_5$ and ammonia limits in the State Certification resulted in a lower UOD compared to the limits contained in the draft permit. Because these limits resulted in a lower UOD (i.e. were more stringent), they were incorporated into the final permit.

During the month of May, the draft permit contains $CBOD_5$ and ammonia limits of 10 mg/l and 5.3 mg/l, respectively. This yields a UOD of 39 mg/l. $CBOD_5$ and ammonia limits in the State Certification are 10 mg/l and 7.0 mg/l, respectively, resulting in a higher UOD of 47 mg/l. As described in the Response to Comments above, the Contoocook River in the Town of Jaffrey and in stretches downstream are on New Hampshire's 303(d) list for, among other items, dissolved oxygen and dissolved oxygen saturation. Because of the water quality limited segments of the Contoocook River, further impairment cannot occur. Therefore, the ammonia monthly average and daily maximum limits of 5.3 and 8.6 mg/l, respectively, for the month of May remain in the

final permit. However, the weekly average limit for ammonia of 7.0 mg/l from the State Certification has been incorporated into the permit.

6. **TOTAL SUSPENDED SOLIDS:**

The draft permit contains the following limits for total suspended solids (TSS).

TSS Limits in the Draft Permit			
Timeframe	**Monthly Ave.**	**Weekly Ave.**	**Daily Max.**
Nov. 1 – April 30	14 mg/l (146 lb/d)	23 mg/l (240 lb/d)	40 mg/l (417 lb/d)
May 1 – October 31	7 mg/l (73 mg/l)	12 mg/l (125 lb/d)	16 mg/l (167 lb/d)

The following limits for TSS are contained in the State Certification.

TSS Limits from State Certification			
Timeframe	**Monthly Ave.**	**Weekly Ave.**	**Daily Max.**
Oct. 1 – June 30	15 mg/l (156 lb/d)	15 mg/l (156 lb/d)	25 mg/l (261 lb/d)
July 1 – Sept 30	15 mg/l (94 lb/d)	15 mg/l (94 lb/d)	25 mg/l (157 lb/d)

[1] Mass limits for July 1 through Sept 30 are based on a plant flow of 0.75 mgd. Mass limits for Oct. 1 through June 30 are based on plant flow of 1.25 mgd.

In their comments on the draft permit, the Town of Jaffrey also requested that the TSS limits be increased to 15 mg/l for the monthly average (refer to Comment 3 on Page 5 of this document).

With the exception of the weekly average and daily maximum TSS limits for the timeframe of November 1 through April 30, the TSS limits in the State Certification are less stringent than those contained in the draft permit.

There are no numeric water quality criteria pertaining to TSS; however, there are narrative criteria in the State of New Hampshire Water Quality regulations that pertain to deposition of solids and turbidity. Env-Wq 1703.03(c)(1) states that all surface waters shall be free from substances in kind or quantity which:

- Settle to form harmful deposits;
- Float as foam, debris, scum or other visible substances;
- Produce odor, color, taste, or turbidity which is not naturally occurring and would render it unsuitable for its designated uses;
- Result in the dominance of nuisance species; or
- Interfere with recreational activities.

Env-Wq 1703.08 further states that Class B waters shall contain no benthic deposits that have a detrimental impact on the benthic community, unless naturally occurring. Finally, Env-Wq 1703.11(b) states that Class B waters shall not exceed naturally occurring conditions by more than 10 NTUs.

At the Federal level, the 1986 Quality Criteria for Water (the "Gold Book") recommends the following for solids (suspended, settleable) and turbidity, "Settleable and suspended solids should not reduce the depth of the compensation point for photosynthetic activity by more than 10% from the seasonally established norm for aquatic life." Additionally, secondary treatment regulations found at 40 C.F.R. 133.102(b) state the 30-day average shall not exceed 30 mg/l, the 7-day average shall not exceed 45 mg/l, and the 30-day average percent removal shall not be less than 85 percent.

In evaluating the TSS loadings to the Contoocook River, the resultant instream concentrations from the loadings in the draft permit and from the State Certification were calculated. The instream concentrations were calculated by dividing the limits in the draft permit and the state certification by the dilution factor of 1.78. The results of these calculations are shown below.

Instream TSS Concentrations			
Timeframe	**Monthly Ave.**	**Weekly Ave.**	**Daily Max.**
Draft Permit			
Nov. 1 – April 30	7.9 mg/l	12.9 mg/l	22.5 mg/l
May 1 – October 31	3.9 mg/l	6.7 mg/l	9.0 mg/l
State Certification			
Oct. 1 – June 30	8.4 mg/l	8.4 mg/l	14.0 mg/l
July 1 – Sept 30[1]	6.4 mg/l	6.4 mg/l	10.6 mg/l

1 For the period July 1 through September 30, the State Certification limits the effluent flow to 0.75 mgd. This increases the dilution factor for this time frame to 2.36.

From the table above, the greatest difference in instream TSS concentrations between the TSS limits in the draft permit and those in the State Certification occurs in the months of May, June, and October. During this timeframe the monthly average TSS limits in the draft permit result in an instream TSS concentration of 3.9 mg/l. The monthly average limits from the State Certification result in an instream concentration of 8.4 mg/l of TSS. This is a 4.5 mg/l difference between the instream concentrations from the draft permit and State Certification. EPA does not feel that an increase of 4.5 mg/l of TSS would affect the water quality of the Contoocook River for the reasons explained below. TSS concentrations at this level would not lead to benthic deposits that would have a detrimental impact on the benthic community.

Although the correlation between TSS and turbidity can vary widely, *Wastewater Engineering – Treatment, Disposal, and Reuse* (Metcalf and Eddy, Inc., Third Edition, 1991) describes a typical relationship of TSS to turbidity for the effluent from an activated sludge process as the following:

Suspended Solids (mg/l) = (2.3 to 2.4) x (Turbidity (NTU))

Using this equation and the TSS increase of 4.5 mg/l the turbidity of the Contoocook River downstream of the discharge would increase by approximately 1.87 to 1.95 NTU. These numbers are well below the10 NTU threshold found in State of New Hampshire Water Quality Regulations.

Because the TSS limits requested by the Town of Jaffrey in their comments on the draft permit and those contained in the State Certification would comply with applicable water quality standards and the Contoocook River is not listed for not meeting any criteria due to solids concentrations, the TSS limits contained in the State Certification have been incorporated into the final permit.

Attachment A

	June	July	August	September	June-Sept Ave.
2002	155.9	30.1	8.58	7.65	50.6
2003	130.3	20.1	96.4	41.6	72.1
2004	67.6	28.1	37.4	100.9	58.5
2005	108.7	91.8	30.5	11.7	60.7
2006	294.5	90.3	46.7	31.1	115.7
Ave.	151.4	52.1	43.9	38.6	71.5

Data from USGS Gage 01082000 at Peterborough, NH

Low Mean Summer Flow = 50.6 cfs
Low Summer Flow Month = 7.65 cfs
Mean Summer Flow = 71.5 cfs

Flow Ratios:

7Q10 Flow of Contoocook River at the Peterborough USGS gage = 8.11 cfs

Low Mean Summer Flow/7Q10 = 50.6/8.11 = 6.2

Low Summer Flow Month/7Q10 = 7.65/8.11 = 0.9

Mean Summer Flow/7Q10 = 71.5/8.11 = 8.8

Flows Just Below Jaffrey Outfall:

7Q10 Just below Jaffrey Outfall = 1.89 cfs

Low Mean Summer Flow = (1.89)(6.2) = 11.7 cfs

Low Summer Flow Month = (1.89)(0.9) = 1.7 cfs

Mean Summer Flow = (1.89)(8.8) = 16.7 cfs

Projected Summer TP Instream Concentrations:

Jaffrey Design Flow = 1.93 cfs

Jaffrey TP Effluent Limit = 0.16 mg/l

Upstream Concentration = 0.0155 = Average of two samples from 8/4 and 8/11 2004 from sampling location 32M-CTC

Instream Concentration at Summer Mean Low Flow = [(1.93)(0.16) + (11.7)(0.0155)]/(1.93 + 11.7) = 0.036 mg/l

Instream Concentration at Low Summer Flow Month = [(1.93)(0.16) + (1.7)(0.0155)]/(1.93 + 1.7) = 0.09 mg/l

Instream Concentration at Mean Summer Flow = [(1.93)(0.16) + (16.7)(0.0155)]/(1.93 + 16.7) = 0.03 mg/l