UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

February 10, 2009

Mr. Douglas A. Walsh, Superintendent
Department of Public Works
584 Main Street – Room 24
Athol, MA 01331

Re: NPDES Permit No. MA0100005
Part I. F. Special Conditions

Dear Mr. Walsh,

We have received an October 21, 2008 letter on your behalf from Stantec Consulting Services Inc. requesting clarification of Part I. F. SPECIAL CONDITIONS found in the Town of Athol's final NPDES permit issued on June 24, 2008. The first paragraph of that permit language reads as follows:

> ***"Within one year of the effective date of the permit**, the permittee shall complete an evaluation of alternative methods of operating the existing wastewater treatment facility to optimize the removal of nitrogen, and submit a report to EPA and MassDEP documenting this evaluation and presenting a description of recommended operational changes. The methods to be evaluated include, but are not limited to, operational changes designed to enhance nitrification (seasonal and year round), incorporation of anoxic zones, septage receiving policies and procedures, and side stream management. The permittee shall implement the recommended operational changes in order to maintain the existing mass discharge loading of total nitrogen. The annual average total nitrogen load from this facility (2004 – 2005) is estimated to be 199 lbs/day."*

Your letter raised the following three issues relative to the above language and provided information regarding the Athol WWTP and its process control.

1. **"Optimize the removal of nitrogen."** Denitrification was neither a requirement nor included in the design of the recently completed WWTP upgrade. The facility, however, does include some capability for denitrification by turning off the submersible mixers in the aeration basins creating anoxic conditions. Limited data beginning in April 2008 shows total nitrogen (TN) effluent concentrations less than 6 mg/l, indicating some denitrification is occurring.

2. **"Operational changes for enhanced nitrification."** Since startup, the Athol WWTP effluent ammonia (NH_4-N) has been consistently below 0.5 mg/l. This is the best

achievable nitrification. Arguably, one or two aeration basins could be taken out of service to save energy and allow the effluent ammonia to rise so it achieves a concentration consistent with the total nitrogen load of 199 lbs/day.

3. **"Maintain mass discharge loading of total nitrogen."** Using this as a guide would require no process changes as the data indicate a maximum effluent total nitrogen (TN) load of approximately 74 lbs/day, well below the annual average total nitrogen load of 199 lbs/day cited in the permit. A strict interpretation could allow the plant to reduce aeration and allow effluent BOD and TSS to rise from the present low values ($\leq$ 5mg/l) to the permit limits of 30 mg/l. In this case neither nitrification nor denitrification would occur and the annual average TN load would not be exceeded by virtue of the low values of flow and TN.

As explained in the Fact Sheet, the above-referenced language is included in permits for POTWs in Massachusetts discharging to the Connecticut River watershed for the purpose of reducing the nitrogen loads to Long Island Sound. The total nitrogen load specified in the permits is a baseline limit so that, at a minimum, the current total nitrogen loadings do not increase. These loadings were based upon effluent monitoring data where available or as a value equal to the average of Massachusetts secondary treatment facilities (TN of 19.6 mg/l), the average of Massachusetts seasonal nitrification facilities (TN of 15.5 mg/l), or the average of Massachusetts year-round nitrification facilities (TN of 12.7 mg/l). The Town of Athol's permitted annual average total nitrogen loading of 199 lbs/day was based upon an annual average flow of 1.39 million gallons per day and a TN concentration of 17.2 mg/l (effluent data from 2004-2005), prior to the facility upgrade.

Your letter raises important questions regarding the nitrogen optimization language in your NPDES permit and also about the general requirements for proper operation and maintenance of your facility. As a general matter, the operation of your WWTP must be sufficient to achieve the facility's effluent limitations at all times. Effluent violations caused by having insufficient treatment units on line or by failure to operate those units properly are clearly not allowed by the permit (see Part II B. 1 of your permit). Also, if your WWTP was achieving its effluent limitations, but available treatment units that would significantly enhance treatment were being bypassed, this would also be a violation of the bypass conditions of the permit (see Part II B. 4. of your permit). Please note EPA's recent enforcement action against the Massachusetts Water Resources Authority ("MWRA"), which cited the MWRA for its secondary treatment operations bypasses.

Regarding the nitrogen removal conditions in Part 1.F. of your permit, this requirement is to ensure that the nitrogen load discharged by your facility does not increase from the baseline loading of 199 pounds per day, estimated from the 2004-2005 data. As you reported in your letter, the upgraded facility easily achieves this loading. Based upon the information contained in your consultant's letter, it does not appear that any additional operational changes will be required in the immediate future to maintain permit compliance.

It is expected that future updates to the Long Island Sound TMDL will require significant reductions in the current nitrogen loads from wastewater treatment facilities in the Connecticut

River Watershed. Consequently, the permit also requires that you investigate operational modifications and low capital cost improvements to further enhance nitrogen removal. This requirement will ensure that your WWTP will be able to be quickly brought into compliance should more stringent limits on the control of nitrogen be imposed in a modified or reissued permit. It also has the additional benefit of providing process control alternatives for maintaining the current mass loading should the flow to your WWTP increase.

If you have any questions, please call Mark Malone at (617) 918-1619.

Sincerely,

Brian Pitt, Team Leader
Municipal Permits Branch

cc: Thomas J. Manhanna, P.E., Stantec Consulting Services
MassDEP Division of Watershed Management

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Mr. Douglas A. Walsh, Superintendent
Department of Public Works
584 Main Street – Room 24
Athol, MA 01331

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Your letter raised the following three issues relative to the above language and provided information regarding the Athol WWTP and its process control.

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"Operational changes for enhanced nitrification." Since startup, the Athol WWTP effluent ammonia (NH_4-N) has been consistently below 0.5 mg/l. This is the best

CONCURRENCES								
SYMBOL	CMP	CMP						
SURNAME	Malone	PJT						
DATE	2/4/09	2/10/09						

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3. **"Maintain mass discharge loading of total nitrogen."** Using this as a guide would require no process changes as the data indicate a maximum effluent total nitrogen (TN) load of approximately 74 lbs/day, well below the annual average total nitrogen load of 199 lbs/day cited in the permit. A strict interpretation could allow the plant to reduce aeration and allow effluent BOD and TSS to rise from the present low values ($\leq$ 5mg/l) to the permit limits of 30 mg/l. In this case neither nitrification nor denitrification would occur and the annual average TN load would not be exceeded by virtue of the low values of flow and TN.

As explained in the Fact Sheet, the above-referenced language is included in permits for POTWs in Massachusetts discharging to the Connecticut River watershed for the purpose of reducing the nitrogen loads to Long Island Sound. The total nitrogen load specified in the permits is a baseline limit so that, at a minimum, the current total nitrogen loadings do not increase. These loadings were based upon effluent monitoring data where available or as a value equal to the average of Massachusetts secondary treatment facilities (TN of 19.6 mg/l), the average of Massachusetts seasonal nitrification facilities (TN of 15.5 mg/l), or the average of Massachusetts year-round nitrification facilities (TN of 12.7 mg/l). The Town of Athol's permitted annual average total nitrogen loading of 199 lbs/day was based upon an annual average flow of 1.39 million gallons per day and a TN concentration of 17.2 mg/l (effluent data from 2004-2005), prior to the facility upgrade.

Your letter raises important questions regarding the nitrogen optimization language in your NPDES permit and also about the general requirements for proper operation and maintenance of your facility. As a general matter, the operation of your WWTP must be sufficient to achieve the facility's effluent limitations at all times. Effluent violations caused by having insufficient treatment units on line or by failure to operate those units properly are clearly not allowed by the permit (see Part II B. 1 of your permit). Also, if your WWTP was achieving its effluent limitations, but available treatment units that would significantly enhance treatment were being bypassed, this would also be a violation of the bypass conditions of the permit (see Part II B. 4. of your permit). Please note EPA's recent enforcement action against the Massachusetts Water Resources Authority ("MWRA"), which cited the MWRA for its secondary treatment operations bypasses.

Regarding the nitrogen removal conditions in Part 1.F. of your permit, this requirement is to ensure that the nitrogen load discharged by your facility does not increase from the baseline loading of 199 pounds per day, estimated from the 2004-2005 data. As you reported in your letter, the upgraded facility easily achieves this loading. Based upon the information contained in your consultant's letter, it does not appear that any additional operational changes will be required in the immediate future to maintain permit compliance.

It is expected that future updates to the Long Island Sound TMDL will require significant reductions in the current nitrogen loads from wastewater treatment facilities in the Connecticut

River Watershed. Consequently, the permit also requires that you investigate operational modifications and low capital cost improvements to further enhance nitrogen removal. This requirement will ensure that your WWTP will be able to be quickly brought into compliance should more stringent limits on the control of nitrogen be imposed in a modified or reissued permit. It also has the additional benefit of providing process control alternatives for maintaining the current mass loading should the flow to your WWTP increase.

If you have any questions, please call Mark Malone at (617) 918-1619.

Sincerely,

Brian Pitt, Team Leader
Municipal Permits Branch

cc: Thomas J. Manhanna, P.E., Stantec Consulting Services
MassDEP Division of Watershed Management

Stantec

Stantec Consulting Services Inc.
5 LAN Drive Suite 300
Westford MA 01886-3538
Tel: (978) 692-1913
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October 21, 2008

File: 195111092

Mr. Mark Malone
USEPA
Municipal Permits Branch
One Congress Street, Suite 1100
Boston, MA 02114-2023

Reference: NPDES Permit No. MA0100005
Town of Athol, MA

Dear Mr. Malone:

On behalf of the Town of Athol, we are requesting clarification of the language in Paragraph F, Special Conditions, for the Wastewater Treatment Plant (WWTP) Discharge Permit. Depending on the interpretation of this condition, the operation of the WWTP will be effected and it will determine whether effluent water quality complies with the permit limits. We are specifically requesting clarification of the following phases:

- "...optimize the removal of nitrogen..." (first sentence)
- "...operational changes designed to enhance nitrification (seasonal and year round)..." (second sentence)
- "...implement the recommended operational changes in order to maintain the existing mass discharge loading of total nitrogen." (third sentence)

The following issues raised concerns from our review of the permit language and we request clarification on:

Issue 1 - "Optimize the removal of nitrogen"

The engineering profession defines "denitrification," as a process whereby nitrate nitrogen (NO_3-N) is biologically reduced to nitrogen gas (N_2) using anoxic conditions. The recently completed upgrade of the Athol WWTP includes some capability for denitrification by the use of submersible mixers in the aeration basins. These allow aeration to be turned off resulting in anoxic conditions. Denitrification was neither a requirement nor was included in the design although hydraulic allowance for a future anaerobic selector tank for denitrification was provided.

The upgraded WWTP began full operation in December 2007 with one of four basins in the anoxic mode. Complete nitrogen series testing began in April 2008. This limited data shows total nitrogen (TN) effluent less than 6 mg/l, indicating some denitrification is occurring.

Issue 2 – "Operational changes for enhanced nitrification"

If this language guides operation, no additional process changes at the WWTP will be needed as the effluent ammonia (NH_4-N) has been consistently below 0.5 mg/l since startup. This is the best achievable nitrification. Arguably one or two aeration basins could be taken out of service to save energy and allow the effluent ammonia to rise so it achieves a concentration consistent with the total nitrogen load of 199 lb/day.

Issue 3 – "Maintain the mass discharge loading of total nitrogen"

Using this as a guide would require no process changes as the data indicate a maximum effluent total nitrogen (TN) load of approximately 74 lb/day, which is well below the annual average of 199 lb/day. A strict interpretation could allow the plant to reduce aeration and allow effluent BOD and TSS to rise from the present low values (≤5mg/l) to the permit limits of 30 mg/l. In this case neither nitrification nor denitrification would occur, and the annual average TN load would not be exceeded by virtue of the low values of flow and TN.

We request that EPA advise the Town of Athol and Stantec as to the interpretation of Paragraph F and revise the wording accordingly. In this way the Town will have clear direction on how to operate its WWTP within the permit limits and not be burdened by unnecessary additional treatment. It is Athol's obligation to comply with the permit, but at the same time we recognize that additional treatment over and above the permit will require increased costs in labor, energy and materials.

We have attempted to read Paragraph F as a total concept and offer the following elements for consideration in your clarification response.

1. Operate the process to reduce TN load without construction of new facilities.

2. Consider nitrification during summer months to lessen oxygen demand in the Millers River.

3. Clarify the relationship between the actual effluent TN load and the average permitted TN load of 199 lb/day.

Reference: NPDES Permit No. MA0100005

4. Provide flexibility in effluent TN load while evaluating TN reduction alternatives.

Through June 2009 we will be working with WWTP staff to evaluate process operations which could lower the TN load. These operations will extend for several months in order to demonstrate process performance under several configurations. As some options will perform better than others, these could result in higher TN loads for a short time. This should be considered the permit language revised accordingly.

We appreciate your attention to this matter and are available to discuss these issues at your convenience. If you have any questions or require any additional information, please contact either myself or Warren Terrell at our office.

Sincerely,

STANTEC CONSULTING SERVICES INC.

Thomas J. Mahanna, P.E.
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c. Douglas Walsh, Supt. Public Works