June 9, 2000

Robert Smith, Chief
Water Bureau/Standards and Planning Division
Connecticut Department of Environmental Protection
79 Elm Street
Hartford, CT 01606

Dear Mr. Smith:

Thank you for the submittal of **A Total Maximum Daily Load Analysis for an Unnamed Intermittent Tributary to Belden Hill Brook, Wilton, Connecticut** for chlorine. This surface water is included on Connecticut's 1998 303(d) list and was targeted for TMDL development by April 1st, 2000. This Total Maximum Daily Load (TMDL) analysis was developed to address the aquatic life support impairment in the unnamed tributary due to a single point source of pollution.

The U.S. Environmental Protection Agency New England (EPA New England) hereby approves Connecticut's final TMDL analysis for chlorine, received by EPA New England on June 6, 2000. We have determined that the Belden Hill Brook TMDL for chlorine meets the requirements of §303(d) of the Clean Water Act (CWA), and EPA's implementing regulations (40 CFR Part 130).

The TMDL submittal includes all the required elements of a TMDL; loading capacity, load allocations, waste load allocations, margin of safety seasonal variation, and public participation process. Consistent with EPA policies, the TMDL also includes an implementation plan addressing the primary point source contributing to the impairment. In addition, Connecticut DEP has provided reasonable assurances that the necessary controls will be implemented in a timely manner.

My staff and I look forward to continued cooperation with Connecticut DEP in exercising our shared responsibility to implement the requirements under Section 303(d) of the CWA. If you have any questions or comments regarding the attached approval documentation, please contact me at (617) 918-1500, or Ms. Jeanne Voorhees at (617) 918-1686.

Sincerely,

Linda M. Murphy, Director
Office of Ecosystem Protection

Enclosure

cc: Tom Morrissey, CT DEP
Lee Dunbar, CT DEP
Elizabeth Wikfors, CT DEP
Ron Manfredonia, EPA
Ann Williams, EPA
Lynne Hamjian, EPA
Roger Janson, EPA

EPA New England Approval Documentation for:

A Total Maximum Daily Load Analysis
for an Unnamed Intermittent Tributary
to Belden Hill Brook,
Wilton, CT

Effective Date: June 9, 2000

REVIEW ELEMENTS OF TMDLs

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. § 130 describe the statutory and regulatory requirements for approvable TMDLs. The following information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation.

The Connecticut Department of Environmental Protection (DEP) submitted the final ***Total Maximum Daily Load Analysis for an Unnamed Intermittent Tributary to Belden Hill Brook, Wilton, Connecticut****, to the Environmental Protection Agency New England (EPA New England) on June 6, 2000 to request EPA's review and approval of a TMDL for chlorine. The final TMDL submission includes the following documents:*

- *Cover letter dated May 24, 2000 and received by EPA New England June 6, 2000*
- ***A Total Maximum Daily Load Analysis for an Unnamed Intermittent Tributary to Belden Hill Brook, Wilton, CT***
- *Notice of Tentative Determination: Intent to Renew A National Pollutant Discharge Elimination System Permit for the Following Discharges into the Waters of the State of Connecticut*

The following pages provide EPA-New England's supporting documentation justifying the approval of this TMDL under the statutory and regulatory requirements in §303(d) of the Clean Water Act and 40 CFR Part 130.

1. Description of Waterbody, Pollutant of Concern, Pollutant Sources and Priority Ranking

The TMDL analytical document must identify the waterbody as it appears on the State/Tribe's 303(d) list, the pollutant of concern and the priority ranking of the waterbody. The TMDL submittal must include a description of the point and nonpoint sources of the pollutant of concern, including the magnitude and location of the sources. Where it is possible to separate natural background from nonpoint sources, a description of the natural background must be provided, including the magnitude and location of the source(s). Such information is necessary for EPA's review of the load and

wasteload allocations which are required by regulation. The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as: (1) the assumed distribution of land use in the watershed; (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources; (3) present and future growth trends, if taken into consideration in preparing the TMDL; and, (4) explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments, or chlorophyl *a* and phosphorus loadings for excess algae.

a. Surface Water, Pollutant of Concern and Priority Ranking

The draft TMDL document adequately describes the surface water on page 2 of the TMDL document. Belden Hill Brook was initially identified by the Connecticut Department of Environmental Protection (CTDEP) as impaired and was included on the 1998 303(d) list of ***Connecticut Waterbodies Not Meeting Water Quality Standards*** *(CT DEP, 1998). It was prioritized as surface water requiring the development of a TMDL by April 1st, 2000. Belden Hill Brook was listed for not attaining designated uses for contact recreation. This assessment was based on a conservative assumption that a point source discharge of treated sanitary wastewater from a private sewage treatment facility owned by the School Sisters of Notre Dame would cause elevated levels of indicator bacteria in the brook (TMDL document, page 3). Based on additional investigations and site visits, Connecticut DEP recognized that Belden Hill Brook was incorrectly listed as the receiving water, and the use impairment was also inaccurate. Additional investigations revealed that the treated sanitary effluent actually discharges to an unnamed intermittent tributary to wetlands adjacent to Belden Hill Brook. The discharge is located approximately 1.5 miles away from Belden Hill Brook. Aquatic life is unsupported in the unnamed tributary. This impairment was determined to be likely due to the presence of chlorine, used for disinfection purposes, in the effluent.*

It appears that the designated uses for contact recreation for Belden Hill Brook are not impaired due to elevated bacterial levels because the discharge is located 1.5 miles away from the Brook and because the treatment facility complied, and continues to comply, with disinfection requirements, and no significant non-point sources of bacteria exist (personal communication with Ms. Elizabeth Wikfors, CT DEP). DEP may decide to remove Belden Hill brook from the 303(d) list during the next listing cycle (April 2002), and substitute the unnamed tributary if, at the time of listing, the tributaty is not yet in comliance with water quality standards.

Based on the subsequent site visits and investigation, chlorine was identified to be the pollutant of concern especially since the intermittent unnamed tributary is effluent dominated and chlorine is known to be toxic to aquatic life. Therefore, the TMDL document describes the pollutant of concern as chlorine. Currently, chlorine is seasonally used for the disinfection of wastewater from the private sewage treatment facility owned by the School Sisters of Notre Dame. As stated in the TMDL document, chlorine is a fast-acting toxicant know to cause impairments to aquatic life at very low concentrations (see TMDL document, page 3).

b. Point and Nonpoint Sources: Description, Magnitude and Location

As described in the TMDL document, the only source of chlorine to the unnamed tributary originates

from a point source discharge; a small wastewater treatment facility which chlorinates seasonally for disinfection. This system is permitted under the National Pollutant Discharge Elimination System (NPDES) program by Connecticut DEP, and operated by the School Sisters of Notre Dame on their 36 acre parcel in Wilton, Connecticut. Under the NPDES permit, this facility is permitted to discharge 20,000 gallons per day of treated and seasonally chlorinated sanitary wastewater to the unnamed tributary. Effluent discharge constitutes the majority of the surface water flow in the unnamed tributary, and compromises the entire flow during extended periods of dry weather (TMDL document, page 3). Nonpoint sources of chlorine to the unnamed tributary do not exist. Since non-point sources do not exist, the point source accounts for 100% of the loading.

EPA New England has determined that the TMDL document adequately identifies and describes the single point source of the pollutant (chlorine), including the relative magnitude and location of the identified source.

c. Assumptions:
For the purposes of this TMDL, chlorine was identified as the assumed pollutant of concern based on best professional judgement (BPJ), and the fact that the treatment facility does not dechlorinate. This BPJ is based on the known fact that chlorine is a fast-acting toxicant which is detrimental to aquatic life at very low concentrations (TMDL document page 3). Also, given that the unnamed tributary is effluent dominated and that no dilution is available during critical conditions, the potential for detrimental effects from chlorine upon aquatic life is exacerbated.

EPA New England concludes that it is reasonable for Connecticut to identify chlorine as the assumed pollutant given that the treatment facility does not dechlorinate and the lack of dilution Finally, extensive data and information exists illustrating chlorine's toxicity to aquatic life and integrity (US EPA 1985b;Karr et. al. 1985; Szal et. al. 1991).

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribe water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. A numeric water quality target for the TMDL (a quantitative value used to measure whether or not the applicable water quality standard is attained) must be identified. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, usually site specific, must be developed from a narrative criterion and a description of the process used to derive the target must be included in the submittal.

Assessment: A description of the applicable WQS and numeric criterion for chlorine are provided on page 4 of the TMDL document. As described, the Belden Hill Brook watershed is designated Class AA in the upper section, and Class B/A below City Lake. The surface water classification for the unnamed tributary and adjacent wetlands is undesignated and therefore "defaults" to Class A in

accordance with Connecticut's water quality standard number 29; which states that surface waters, including wetlands, that are not otherwise designated, shall be Class A.

The designated uses for Class A surface waters include potential drinking water supplies, fish and wildlife habitat, recreational use, agricultural and industrial supply, and other legitimate uses, including navigation.

The numeric criteria for chlorine, as identified in the TMDL document, are consistent with Connecticut's WQS. Connecticut elected to base the TMDL target on a conservative endpoint of zero due to the lack of assimilative capacity in the tributary during low flows, the inability to confidently measure chlorine in the effluent below 50 ug/l (which is well above the criteria), and the need to protect fish and wildlife and their habitat.

EPA New England concludes that Connecticut appropriately identifies the applicable WQS, designated uses and numeric criteria for chlorine in the TMDL document.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

As described in EPA guidance, a TMDL identifies the loading capacity of a waterbody for a particular pollutant. EPA regulations define loading capacity as the greatest amount of loading that a water can receive without violating water quality standards (40 C.F.R. § 130.2(f)). The loadings are required to be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. § 130.2(i)). The TMDL submittal must identify the waterbody's loading capacity for the applicable pollutant and describe the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In most instances, this method will be a water quality model. Supporting documentation for the TMDL analysis must also be contained in the submittal, including the basis for assumptions, strengths and weaknesses in the analytical process, results from water quality modeling, etc. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation.

In many circumstances, a *critical condition* must be described and related to physical conditions in the waterbody as part of the analysis of loading capacity (40 C.F.R. § 130.7(c)(1)). The critical condition can be thought of as the "worst case" scenario of environmental conditions in the waterbody in which the loading expressed in the TMDL for the pollutant of concern will continue to meet water quality standards. *Critical condition*s are the combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. *Critical conditions* are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.

a. Loading Capacity

Connecticut set the Loading Capacity (LC)to zero for chlorine. Setting the LC to zero for chlorine will ensure that water quality standards for chlorine are met in the unnamed tributary year round

and that fish and wildlife are adequately protected.

EPA New England concludes that setting the LC to zero for chlorine is appropriate and reasonable because it will ensure that toxicity associated with chlorine will not occur. Also, this approach is appropriate because dilution is not available in the unnamed tributary during critical conditions, and chlorine in the effluent cannot be confidently measured at levels below 50 ug/l.

b. Strengths and Weaknesses

The TMDL document does not specifically address the strengths and weaknesses of the approach. However, EPA New England recognizes that although no actual data was used in the assessment, the loading capacity and resulting load allocations and waste load allocations are conservative.

c. Critical Condition

The critical condition identified for the unnamed tributary occurs during summer conditions of low flow when there is essentially no dilution available and the effluent discharge constitutes the majority, and at times all of the flow in the unnamed tributary. The identified critical condition also incorporates the intermittent nature of the flow in the unnamed tributary.

EPA New England concludes that Connecticut appropriately defined and identified the critical condition for the unnamed tributary, and that it represents the worst case conditions in the unnamed tributary in which water quality standards will be met.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity allocated to existing and future nonpoint sources and to natural background (40 C.F.R. § 130.2(g)). Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. § 130.2(g)). Where it is possible to separate natural background from nonpoint sources, load allocations should be described separately for background and for nonpoint sources.

If the TMDL concludes that there are no nonpoint sources and/or natural background, or the TMDL recommends a zero load allocation, the LA must be expressed as zero. If the TMDL recommends a zero LA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero LA implies an allocation only to point sources will result in attainment of the applicable water quality standard, and all nonpoint and background sources will be removed.

Assessment: Nonpoint and natural background sources of chlorine are not known to exist. Thus, the LA is set to zero. EPA New England agrees with the determination that non-point and natural background sources of chlorine do not exist, and that it is appropriate to set the LA to zero.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to existing and future point sources (40 C.F.R. § 130.2(h)). If no point sources

are present or if the TMDL recommends a zero WLA for point sources, the WLA must be expressed as zero. If the TMDL recommends a zero WLA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero WLA implies an allocation only to nonpoint sources and background will result in attainment of the applicable water quality standard, and all point sources will be removed.

In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern or if the source is contained within an aggregated general permit, an aggregated WLA can be assigned to the group of facilities. But it is necessary to allocate the loading capacity among individual point sources as necessary to meet the water quality standard.

The TMDL submittal should also discuss whether a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. In such cases, the State/Tribe will need to demonstrate reasonable assurance that the nonpoint source reductions will occur within a reasonable time.

Assessment: The only point source of chlorine originates from the sanitary effluent discharge from the School Sisters of Notre Dame's wastewater treatment facility. Connecticut set the Waste Load Allocation (WLA)to zero for chlorine. Connecticut DEP established a loading capacity of zero to ensure that WQS for chlorine are met year round. Therefore, the WLA must necessarily be zero as well.

EPA New England concludes that setting the WLA to zero for chlorine is reasonable because it is a conservative approach addressing the toxicity associated with chlorine, and it ensures that WQS will be met; especially since the only known pollutant source is the sanitary wastewater system at the School Sisters of Notre Dame.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)). EPA guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Assessment: The MOS is implied for chlorine. The conservative nature of the TMDL applies the most stringent controls possible by allocating zero amount to chlorine for the WLA and LA, and ultimately the LC.

EPA New England concludes that setting the MOS to zero is adequate and sufficient to ensure the attainment of WQS because the TMDL is conservative with LCs, WLAs, and LAs set at zero.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The method chosen for including seasonal variations in the TMDL must be described (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)).

Assessment: The TMDL for chlorine, allocating and requiring zero discharge for chlorine, will be apply for the entire year. EPA New England concludes that seasonal variation is adequately accounted for in the TMDL and that the TMDL will be protective of all seasons.

8. Monitoring Plan for TMDLs Developed Under the Phased Approach

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan when a TMDL is developed under the phased approach. The guidance recommends that a TMDL developed under the phased approach also should provide assurances that nonpoint source controls will achieve expected load reductions. The phased approach is appropriate when a TMDL involves both point and nonpoint sources and the point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. EPA's guidance provides that a TMDL developed under the phased approach should include a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of water quality standards.

Assessment: Under the terms of the draft NPDES permit, total residual chlorine monitoring will occur at a frequency of twice per work day during May 1st through September 30th until the installation and start up of the new ultraviolet disinfection system. Once the ultraviolet disinfection system is installed, disinfection will be required year round and monitoring for chlorine will be unnecessary.

9. Implementation Plans

On August 8, 1997, Bob Perciasepe (EPA Assistant Administrator for the Office of Water) issued a memorandum, "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)," that directs Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired solely or primarily by nonpoint sources. To this end, the memorandum asks that Regions assist States/Tribes in developing implementation plans that include reasonable assurances that the nonpoint source load allocations established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. The memorandum also includes a discussion of renewed focus on the public participation process and recognition of other relevant watershed management processes used in the TMDL process. Although implementation plans are not approved by EPA, they help establish the basis for EPA's approval of TMDLs.

Comment: This TMDL offers an implementation plan through the provisions of the draft NPDES permit. Elimination of chlorine will occur by the conditions of the reissued NPDES permit requiring the installation of a UV disinfection system. Based on review of the draft NPDES permit, the UV disinfection system is required to be installed within six months of the date of reissuance of the NPDES permit (see 9(c)) of the draft permit). Ultimately, the reissued NPDES permit will require the discharge to be eliminated, such that compliance with Connecticut WQS prohibiting sanitary wastewater discharges to Class A surface waterswill also be achieved. Upon successful implementation of the TMDL, and complete elimination of the discharge, surface water classifications for Belden Hill Brook and Silvermine River may be considered for upgrading.

10. Reasonable Assurances

EPA guidance calls for reasonable assurances when TMDLs are developed for waters impaired by both point and nonpoint sources. In a water impaired by both point and nonpoint sources, where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will happen must be explained in order for the TMDL to be approvable. This information is necessary for EPA to determine that the load and wasteload allocations will achieve water quality standards.

In a water impaired solely by nonpoint sources, reasonable assurances that load reductions will be achieved are not required in order for a TMDL to be approvable. However, for such nonpoint source-only waters, States/Tribes are strongly encouraged to provide reasonable assurances regarding achievement of load allocations in the implementation plans described in section 9, above. As described in the August 8, 1997 Perciasepe memorandum, such reasonable assurances should be included in State/Tribe implementation plans and "may be non-regulatory, regulatory, or incentive-based, consistent with applicable laws and programs."

The NPDES permit, once reissued in final form with the requirement to eliminate chlorine, will be legally enforceable and offers reasonable assurances that controls will be implemented, and that WQS will be met.

11. Public Participation

EPA policy is that there must be full and meaningful public participation in the TMDL development process. Each State/Tribe must, therefore, provide for public participation consistent with its own continuing planning process and public participation requirements (40 C.F.R. § 130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval must describe the State/Tribe's public participation process, including a summary of significant comments and the State/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. § 130.7(d)(2)).

Inadequate public participation could be a basis for disapproving a TMDL; however, where EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or

by EPA.

Assessment: Public participation for this TMDL was achieved in accordance with Connecticut's statutes. Given that the major source of pollution to the unnamed tributary was determined to be the School Sister's of Notre Dame sanitary wastewater treatment system, the TMDL was public noticed with the draft NPDES permit on March 3, 2000 in the Norwalk Hour. No comments were received on either the permit or the TMDL during the formal period of public comment.

12. Submittal Letter

A submittal letter should be included with the TMDL analytical document, and should specify whether the TMDL is being submitted for a *technical review* or is a *final submittal*. Each final TMDL submitted to EPA must be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final submittal, should contain such information as the name and location of the waterbody, the pollutant(s) of concern, and the priority ranking of the waterbody.

Assessment: The submittal letter identified the TMDL document as a final TMDL submittal under Section 303(d) of the Clean Water Act for EPA New England's review and approval.

REFERENCES

Connecticut Department of Environmental Protection. 1997. Connecticut Water Quality Standards.

Connecticut Department of Environmental Protection. 1998. Connecticut Waterbodies not Meeting Connecticut Water Quality Standards.

Grothe, Donald et. al. 1975. **Chlorine-induced mortality in fish**. Trans. Am. Fish Soc., vol. 104, p. 800.

Karr, J.R. 1985. **Effects of chlorine and ammonia from wastewater treatment facilities on biotic integrity**. Journal WPCF, vol. 57(9), p. 912.

Szal, Gerald M. et. al. 1991. **The toxicity of chlorinated wastewater: instream and laboratory case studies**. Research Journal WPCF, vol 63 (6), p. 910.