

Lauren A. Liss, Commissioner  
Department of Environmental Protection  
1 Winter Street  
Boston, MA 02108

Dear Commissioner Liss:

It is my pleasure to approve 13 Total Maximum Daily Loads (TMDL's) for lakes targeting total phosphorus located in the Connecticut River and Chicopee River watersheds. These include for the Connecticut River: Aldrich Lake East, Aldrich Lake West, Leverett Pond, Loon Pond, Lake Warner, and Lake Wyola; and for the Chicopee River: Browning Pond, Long Pond, Minechoag Pond, Mona Lake, Spectacle Pond, Sugden Reservoir, and Wickeboag Pond.

I want to congratulate you and the staff of the Division of Watershed Management for the excellent work in developing these TMDL's.

Sincerely,

Linda Murphy, Director  
Office of Ecosystem Protection

cc: Cynthia Giles  
Glenn Haas

## EPA NEW ENGLAND'S TMDL REVIEW

**TMDL:** 7 Chicopee Lakes, Chicopee Watersheds. Browning Pond, Oakham Long Pond, Minechoag Pond, Mona Lake, Spectacle Pond, Sugden Reservoir, Wickeboag Pond..

**STATUS:** Final

**IMPAIRMENT/POLLUTANT:** Nuisance aquatic plant growth (6), Turbidity (1), Nutrients (1), Low DO (2), due in part to excessive nutrient loading. The TMDLs are proposed for total phosphorus.

**BACKGROUND:** The Massachusetts Department of Environmental Protection (MADEP) submitted draft TMDLs dated April 3, 2000. EPA-New England responded with undated comments in June, 2000 with comments directed primarily at specifics in the draft Blackstone Lakes TMDL's, but most comments also applied to the Chicopee Lakes TMDL's. MADEP in turn responded to these comments in a letter dated July 26, 2000. Based on this response, EPA indicated it would issue final approval in a letter dated August 2, 2000 pending adequate public participation and development of a monitoring program. DEP submitted final TMDLs for the Chicopee Lakes and requested final approval in a letter dated February 4, 2002.

**REVIEWER:** Bruce Rosinoff (617) 918-1698.

### 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.*

#### **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 chlorophyll a and phosphorus loadings for excess algae and reduced clarity in the water column.*

*Assessment:*

The Chicopee Lakes TMDL's adequately describe the waterbodies and the causes of impairment as identified on the 1998 303(d) list. The document describes the pollutant of concern, total phosphorus, using a mass balance approach as the basis for characterizing existing pollutant loading. Land use categories using loading values from the literature, together with the DEP's NPSLAKE model adequately address existing pollutant loadings to the waterbodies. In the case of Leverett Pond

the NPSLAKE model predictions of in-lake total phosphorus does not agree with observed concentrations. In this case, MA DEP assumed that the additional source was probably internal phosphorus recycled from sediments. This load was factored in so that the model predictions agreed with observed concentrations.

Important assumptions made in developing the TMDL's are discussed in the draft TMDL document and in the DEP response letter dated July 26, 2000 (see Comment #1 and response) regarding the linkage between phosphorus loading and aquatic weed growth, turbidity, and low DO. EPA agrees that DEP has made a reasonable assumption, lacking detailed data, that both in-lake controls and watershed controls through phosphorus reduction are necessary for the restoration of lakes experiencing macrophyte or algal growth. Likewise, turbidity and low DO problems in lakes are caused in great measure by both erosion that injects particulate phosphorus to a lake and excessive algae which reduces water clarity and available oxygen. EPA agrees that it is reasonable for DEP to conclude that by controlling phosphorus, turbidity and low DO will also be addressed.

EPA concludes that the TMDL document has adequately characterized the impairments and the causes of impairment to the Chicopee Lakes.

## 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:*

The TMDL document describes the applicable water quality standards on page 45 which include narrative criteria as well as designated uses. MA DEP has interpreted its narrative criteria by selecting a quantitative water quality target using in-lake total phosphorus ranging from 15-30 ppb. (See pages 45-46) The numeric targets varied based upon other typical lakes in equivalent eco-

regions. The target ranges are statistically based on the median range found in that eco-region. EPA believes that this is a reasonable approach at this time pending final EPA criteria and in general this approach should meet water quality standards. The approach of selecting targets based on eco-regions is similar to EPA's present guidance on developing nutrient criteria.

EPA concludes that MA DEP has properly presented its water quality standards and has made a reasonable interpretation of the narrative water quality criteria in the standards. EPA concludes that DEP has made a reasonable judgment that T.P. targets in conjunction with in-lake management practices to control nuisance macrophytes will attain water quality standards.

### **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 conditions 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.*

#### *Assessment:*

The loading capacities for the Chicopee Lakes (pages 46-49) were established in order to reduce average in-lake T.P. concentrations to the appropriate level as described under #2 above. The loading capacity was set to protect water quality and support uses during critical conditions most favorable for aquatic plant growth. Attainment of water quality standards will rely on the use of in-lake management practices to control rooted macrophytes in combination with reducing phosphorus loading from the watershed.

The Chicopee Lakes TMDL's are expressed in terms of allowable annual loadings of total phosphorus rather than daily loadings. As specified in 40 CFR 130.2(i), TMDL's may be expressed in terms of either mass per unit time, toxicity or other appropriate measures. MADEP justifies setting an annual load, as opposed to a daily load, because the Chicopee Lakes' overall water quality including excessive aquatic plant growth is a function of long-term average pollutant loadings rather than short-term daily loadings. The use of annual loading targets is a widely accepted practice in lake

management. With respect to eutrophication it is important to consider annual loadings because of the long residence time of lakes and the fact that the phosphorus that is bound up in particulate matter accumulates, and may become available at much later times for plant growth.

Due to the lack of data on mean depth and other parameters, a simple water quality model was used by MADEP to link watershed phosphorus loading to in-lake total phosphorus concentration targets. Based on the NPSLAKE model phosphorus loading output and predicted water runoff volumes, estimated in-lake total phosphorus concentrations were derived based on the well-established Rechow Model.

EPA concludes that MA DEP has used best available information and that the approach that MADEP has used to determine the loading capacity for the Chicopee Lakes is reasonable and widely accepted in establishing the relationship between pollutant loading and water quality. EPA also concurs with expressing the TMDL's as an annual loading based on the reasons cited.

#### **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:*

The TMDL document sets the load allocations for the Chicopee Lakes based on seven land use categories. (Pgs 47-49. ) Allocations are listed in kg/yr total phosphorus. Information on internal cycling is unknown and therefore was not accounted for explicitly in the TMDLs. EPA agrees that it is reasonable for these TMDLs to not explicitly account for an internal source because of the lack of site specific information and the difficulty of providing internal estimates of internal sources without site specific data. Also, MA DEP's planned approach of using future monitoring data to evaluate the importance of internal sources and apply controls if necessary at a later date to attain water quality standards is reasonable.

EPA-New England concludes that load allocations are adequately specified in the TMDLs at levels necessary to attain and maintain water quality standards.

#### **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:*

MA DEP has not identified any point sources in any of the Chicopee Lakes. Thus, the Waste Load Allocation is appropriately set at zero.

#### 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 margin of safety is set for all the Chicopee Lakes by establishing targets ( see pg. 46) that are well below that expected to meet the 4-foot swimming standard for water clarity (40 ppb.) This is supported by the Carlson Trophic State Analysis (Carlson,1977.) The lower phosphorus concentrations will lessen the chance of nuisance algal blooms, which may occur as macrophyte biomass is reduced. Additionally, targets for most lakes are below or at the lower end of the range by Rohm ecoregion. These lakes are listed for nuisance aquatic vegetation, which is loosely related to watershed loads. There is no impairment from nuisance algae now so DEP believes these are protective TMDLs to maintain current conditions with regard to algae.

EPA-New England concludes that adequate MOS is provided in the TMDLs to address the rooted macrophyte problems and the threat of nuisance algal blooms.

## **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 Chicopee TMDLs (see page 49) were developed to be protective of the most environmentally sensitive period (summer season), when conditions are most favorable for plant growth. Therefore, the TMDL will also be protective of water quality during all seasons. Anticipated phosphorus controls are expected to be in place throughout the year and will achieve pollutant reductions necessary to protect water quality on a year-round basis.

EPA-New England concludes that seasonal variations have been adequately accounted for in the TMDL.

## **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:*

Monitoring by MA DEP (page 54) will be continued on a regular basis according to the five year watershed cycle. The document describes the extent of the proposed monitoring to evaluate the efficacy of the controls and the adequacy of the TMDL. Also, MA DEP will work with and encourage volunteer monitoring groups. Field surveys will also be conducted with watershed residents to help identify additional pollution sources as part of the implementation plan.

EPA-New England concludes that the proposed monitoring by MA DEP together with the volunteer monitoring will be sufficient to evaluate the adequacy of the TMDL over the next 10 to 15 years.

## **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.*

*Assessment:*

The Implementation Plan for the Chicopee Lakes TMDLs is described on pages 49-53. The plan outlines a process for collecting additional information to identify phosphorus sources, provide watershed residents with nonpoint source pollution and water quality training and give guidance to apply for grant and loan funding to control sources. It also relies heavily on the watershed team that will be the focal point for bringing together technical experts and grant writers to work with local governments and watershed associations. Tasks and responsible parties are identified in Table 5 on page 51. MA DEP will also implement additional measures such as in-lake control of sediment phosphorus recycling if the lakes do not meet water quality standards.

## **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."*

*Assessment:*

The responsible organizations for nine of the 14 implementation tasks in Table 5 on page 51 are either MA DEP or the watershed team which is headed by the Executive Office of Environmental Affairs. This will provide the high level attention necessary to assure that appropriate load reductions occur. MA DEP will utilize available regulatory tools such as expanded use of its wetlands regulations to help ensure these reductions. EPA-New England also has the opportunity through the Performance Partnership Agreement process to work with MA DEP to provide reasonable assurance for implementing the Chicopee Lakes TMDLs.

Chicopee Lakes implementation rests mostly on nonpoint source BMPs. No point source is being



given a less stringent waste load allocation in that nonpoint source reductions will occur. Therefore, reasonable assurance is not required in order for the TMDL to be approved.

## **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:*

A summary of the comments received during the public participation process and the responses are described on pages 54-55. MA DEP provided an opportunity for public comment and held a public meetings on October 30, 2001. The list of attendees is included as Appendix III. on pages 61-62..

EPA-New England concludes that MA DEP has done an adequate job involving the public during the development of the TMDL.

## **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:*

MA DEP's, February 4, 2002, letter clearly states that the TMDLs are submitted under Section 303(d) for EPA approval.