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TMDL Program Supplemental Guidance: The TMDL Concept (draft of 12/12/94)

Introduction

This guidance document is intended to supplement the U. S. Environmental Protection Agency's guidance to EPA regional offices and states on the Total Maximum Daily Load (TMDL) concept and related definitions under §303(d) of the Clean Water Act (CWA) and implementing regulations. The intent of this guidance is to clarify the TMDL concept's scope and flexibility, and to describe what must be included in a complete TMDL submittal. This guidance builds upon EPA's April 1991 publication, *"Guidance for Water Quality-Based Decisions: The TMDL Process"* and draws from EPA Regional TMDL program guidance as well as national policy. Regional program guidance to states should be consistent with EPA's national policy, regulations and guidance, but may also include elements not specifically addressed in national program documents.

As described in EPA regulations, a TMDL is defined as the sum of the individual wasteload allocations (WLAs) for point sources plus the sum of load allocations (LAs) for nonpoint sources plus a margin of safety (MOS). A reserve for future growth may also be included and is expressed as a part of the WLAs, the LAs or the MOS. Mathematically, the TMDL is expressed as follows:

$$TMDL = \Sigma(WLAs) + \Sigma(LAs) + MOS$$

The TMDL concept applies to any type of chemical, physical or biological pollutant or other stressor[1] affecting the Nation's waterbodies. TMDLs span a wide range of sizes and levels of complexity. Although each TMDL will be unique to the waterbody and the stressor it addresses, TMDLs must possess certain basic elements to be approvable under CWA §303(d). In addition to addressing these elements, this supplemental guidance also discusses:

- the purpose of TMDLs;
- statutory and regulatory language concerning TMDLS;
- the primary characteristics of TMDLs;
- the phased approach to TMDLs; and
- the required components of a TMDL submittal.

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[1] Stressor is defined in EPA's *Framework for Ecological Risk Assessment* as "Any physical, chemical or biological entity that can induce an adverse response," and thus is a broadly defined term that encompasses all pollutants.

This document is intended only as Agency guidance. It does not establish or affect legal rights or obligations. It does not establish a binding norm and is not finally determinative of the issues addressed. Agency decisions in any particular case will be made by applying the law and regulations on the basis of the specific facts in that case.

The Purpose of TMDLs

The TMDL is a tool used to achieve applicable water quality standards. The TMDL process quantifies the loading capacity of a waterbody for a given stressor and ultimately provides a quantitative scheme for allocating loadings (or external inputs) among pollutant sources. In doing so, the TMDL quantifies the relationships among sources, stressors, recommended controls and water quality conditions. For example, a TMDL may mathematically show how a specified percent reduction of a pollutant is necessary to reach the pollutant concentration reflected in a water quality standard.

TMDLs are vital elements of a growing number of state programs. The process used to develop and implement a TMDL is the technical backbone of the Watershed Protection Approach and is integral to many ecosystem-based initiatives. As more permits incorporate water quality-based effluent limits, TMDLs are becoming an increasingly important component of the point source control program. Moreover, the TMDL's broad applicability to nonpoint source pollution, non-chemical stressors such as habitat degradation, and other impairments is increasingly being realized. The TMDL process is also appropriate for addressing cross-media problems such as aerial deposition of pollutants, pollutant transfer through contaminated sediments; inflow of contaminated ground water, and pollutant migration from waste sites. In brief, TMDLs are applicable to waterbodies impaired by point sources only, nonpoint sources only, or a combination of both point and nonpoint sources.

Statutory and Regulatory Language Concerning TMDLs

Section 303(d) of the Clean Water Act requires each state to establish, in accordance with its priority rankings, the Total Maximum Daily Load for each water identified by the state as failing to meet or not expected to meet applicable water quality standards after imposition of technology-based controls.

The term "Total Maximum Daily Load" does not immediately convey the full meaning of the TMDL concept. Historically, there has been confusion concerning the applicability of TMDLs, particularly with respect to nonpoint source (NPS) pollution, nonattainment of water quality standards based on narrative criteria and impairments like physical degradation of aquatic habitat. In fact, as provided for in EPA's implementing regulations and as stated in guidance, the TMDL process has

the flexibility needed for developing comprehensive, watershed-based solutions for many types of problems that affect aquatic ecosystems. The excerpts below demonstrate a broadly defined TMDL concept.

The fact that TMDLs can be developed to address NPS problems is demonstrated by EPA's regulations at 40 C. F. R. §130.2(i), which define a TMDL as:

> *"... the sum of the individual WLAs [Waste Load Allocations] for point sources and LAs [Load Allocations] for nonpoint sources and natural background. If a receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure.[2] If Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs."*

The development of load allocations for nonpoint sources and background conditions is also recognized at 40 C. F. R. §130.2(g), where load allocations are described as:

> *"... best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading."*

Further, the regulations also establish the applicability of TMDLs to situations involving water quality standards (WQS) based on narrative criteria. 40 C. F. R. §130.7(c)(1) states:

> *"... TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. Determinations of TMDLs shall take into account critical conditions for stream flow, loading and water quality parameters."*

In summary, the regulations provide the flexibility to use TMDLs in a wide

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[2] Water temperature is an example of "appropriate measure" other than mass or toxicity.

range of situations where reductions in nonpoint and/or point source loadings are needed to meet the appropriate water quality standard.

Primary Characteristics of TMDLs

- ***TMDLs address water quality standards on specific waterbodies.*** Meeting as well as maintaining water quality standards is the primary goal of the TMDL. Above all, TMDLs are intended to specify controls that will enable a given waterbody to attain and maintain the applicable water quality standard(s), including designated uses, numeric and narrative criteria, and antidegradation provisions through the achievement of measurable loading reduction targets or endpoints. TMDLs may also be developed for threatened waters that have not yet been impaired.

- ***TMDLs can be developed for waterbody segments, whole waterbodies or watersheds.*** A TMDL may be established for any "waters of the United States," including stream segments or entire streams, rivers, estuaries, lakes, wetlands, or the watersheds of any of the above waterbodies. The right geographic scale depends on the type, location and extent of all significant sources of the stressors and the geographic extent of impaired uses as well as the size and type of waterbody. Although the development of TMDLs for large waterbodies and watersheds may be complicated by the number and variety of stressors, TMDLs for these systems should still be developed.

- ***TMDLs can be developed to address any kind of stressor.*** TMDLs are suitable for non-chemical as well as chemical stressors. This includes all stressors that contribute to the failure to meet water quality standards, as well as any stressor that presently threatens but does not yet impair water quality. TMDLs are applicable to waterbodies impacted by point sources only, nonpoint sources only, or a combination of both point and nonpoint sources. Some stressors, such as sediment deposition or physical alteration of instream habitat, might not clearly fit traditional concepts associated with chemical stressors and loadings. For these non-chemical stressors, it may sometimes be difficult to develop TMDLs because of limitations in the data or in the technical methods for analysis and modeling. In the case of nonpoint source TMDLs, another difficulty arises in that the Clean Water Act does not provide well-defined support for regulatory control actions as it does for point source controls, and controls based on another statutory authority may be necessary. Despite these possible complications, TMDLs nevertheless are appropriate and provide a useful management tool for addressing non-chemical as well as chemical impairments.

- ***A TMDL typically addresses a single pollutant or stressor.*** A waterbody might be impacted by one or several stressors that contribute to the nonattainment

of each applicable water quality standard. Thus, it is sometimes necessary to determine whether a single TMDL or several TMDLs are needed to address a waterbody's problems. Generally, the TMDL addresses a single stressor[3]. A TMDL for multiple stressors may be developed, however, if it is efficient to do so and the resulting TMDL will be scientifically sound, in the judgement of the regulatory agency.

The technical analyses required to develop a TMDL, such as water quality modeling, can vary significantly depending on the type of pollution. Moreover, the assessments necessary to develop a single, all-encompassing TMDL might be exceedingly complex. Therefore, it may not be technically feasible to develop a single TMDL encompassing multiple pollutants or stressors. By focusing each TMDL on individual instead of multiple stressors, scientific and mathematical procedures for each TMDL can be simplified. On the other hand, occasionally one model may be applicable to many stressors, and the same set of controls may reduce many kinds of loadings. Under these circumstances, a multiple stressor TMDL may be feasible and should be developed where appropriate.

A TMDL process focused on single stressors or properties of pollution is fully compatible with whole-watershed management, and states are encouraged to take a watershed approach to identifying problems and developing TMDLs. In view of the technical complications described above, however, EPA's support for watershed-based management of water quality should not be interpreted as direction to develop one all-encompassing TMDL per watershed.

- ***TMDLs must consider all significant sources of the stressor of concern.*** The TMDL development process should identify, to the maximum extent practicable, all pollutant sources that significantly contribute to the actual or threatened impairment of that waterbody. In addition, the TMDL should identify the recommended approaches or controls for addressing and/or

[3] The Clean Water Act's requirement that states set priorities when developing TMDLs to account for the severity of the pollution problems authorizes a state to issue, for a particular waterbody, a single TMDL for the most serious pollutant first in lieu of establishing a TMDL for all pollutants at once. See Dioxin/Organochlorine Center et al. v. Rasmussen, slip op., No. C93-33D (W.D. Wash) (Aug. 13, 1993). This principle is also expressed in the preamble to the 1985 regulations implementing 33 USC § 1313(d), which states, "a single TMDL covers only one specific pollutant ..." 50 F.R. 1,776 (1985). A TMDL may also address one *property of pollution*, described in the preamble to the 1985 regulations as, "... for example, acidity, BOD, radioactivity, or toxicity." Id.

controlling each source for which a loading reduction is envisioned. If a significant source of the stressor is not readily identifiable, the TMDL should describe the approach that shall be taken to determine the source.

To establish allocations, it is necessary to quantify allowable stressor loading from different sources and to calculate allowable loading and/or significant reductions in loading needed to meet target conditions, taking into account the inherent uncertainties for the site at hand. When calculating load allocations for nonpoint sources, estimates of loadings "may range from reasonably accurate estimates to gross allotments..." as stated in 40 C. F. R. §130.2(g). Ultimately, however, all allocations must reflect realistic expectations of loads or load reductions that can be achieved through the anticipated control actions, including but not limited to NPDES permits and implementation of BMPs.

- ***Allocations need not be made for all contributing sources immediately.*** All sources of a stressor must be *identified and considered* in developing a TMDL to the maximum extent practicable, but it is permissible to allocate loads only to a subset of these sources. An allocation scheme may expedite the most pressing needs for action by addressing contributing sources in priority order. The August 1993 court decision in a lawsuit concerning a TMDL developed for dioxin on the Columbia River states, "While a TMDL should consider all discharges of a pollutant, nothing in the relevant statutes or regulations explicitly requires that a TMDL set wasteload allocations for all point sources or load allocations for all nonpoint sources." All sources must be considered but not all contributors need to receive allocations of loads at once, as long as the required controls along with the margin of safety are expected to achieve water quality standards. This is best accomplished through the phased approach. Where individual sources of the pollutant cannot be identified, loadings from those sources should be consolidated into a single allocation so that their cumulative contributions are taken into account when assigning loads to the receiving waters' other sources of pollution.

- ***TMDLs are quantitative.*** As stated above, TMDLs are developed to attain and maintain water quality standards. Water quality standards are based on either numeric or narrative criteria, designated uses and antidegradation policies. Regardless of how it (or a component of it) is expressed, a TMDL must contain a quantified target or endpoint and quantified allocations that will attain the target. In developing a TMDL to address nonattainment of a numeric criterion for a specific chemical or physical parameter (e.g., dissolved oxygen, ammonia nitrogen or cadmium), the criterion itself, often expressed as a concentration, is the measurable endpoint for the TMDL. When a TMDL is developed to address nonattainment of a narrative criterion (e.g., habitat quality or biological diversity) or a designated use (e.g., cold water fishery),

identifying the endpoint may be less straightforward and may rely heavily on best professional judgement. For example, in a waterbody where elevated sediment loadings prevent attainment of a narrative criterion that prohibits excessive sediment loadings, a TMDL might recommend as a measurable endpoint that only a specific percent by weight of river bottom sediments are allowed to be fine sediments. Allocations would then be quantified as an estimate of percent reduction in sediment loadings.

- ***There is flexibility in expressing quantitative measures in a TMDL***. For example, TMDLs, loadings, and allocations can be expressed as mass per unit of time, energy (e.g., heat), toxicity, or other appropriate measures, depending on the stressors and potential ecological effects that contribute to impairment.

- ***A TMDL contains a Margin of Safety (MOS)***. The statutory requirement that TMDLs incorporate a margin of safety is intended to account for uncertainty in the available data or in the actual effect controls will have on loading reductions and receiving water quality. The MOS may be implicit, as in conservative assumptions with respect to WLAs and LAs, or explicitly stated as an added, separate quantity in the TMDL calculation. The MOS is not meant to compensate for a failure to consider certain sources, although it may compensate for the inability to set WLAs or LAs for certain sources by considering possible inputs from those sources.

- ***TMDLs are supported by the best available scientific information***. The degree of certainty that a TMDL will accomplish its objective can vary by stressor or waterbody, and may be limited by the complexity of the impairments and the data available. The development of a TMDL therefore may involve the use of best professional judgement, application of empirical relationships developed elsewhere for similar sites, or direct measurement of stressor-response or cause-effect relationships on the waterbody itself. In complex situations (e.g., where pollutant loadings result from aerial deposition, contaminated ground water inflow, or contaminated sediment), it is particularly important to document the process used to arrive at TMDL calculations and associated controls. However calculated, a TMDL will not be approved if it has not utilized the best "existing and readily available" scientific data as described at 40 C.F.R. §130.7(b)(4).

- ***A TMDL can be developed and implemented in phases***. A phased approach may be appropriate to address particularly complex problems where uncertainty is high, where estimates of loading involve best professional judgement, or where non-chemical stressors and nonpoint sources are involved. A TMDL developed under the phased approach encompasses all the other TMDL characteristics, and also includes schedule information on phased

implementation and a monitoring plan to determine whether TMDL revisions are appropriate (see *The Phased Approach to TMDLs*, below.)

- ***A TMDL has an implementation schedule.*** A TMDL is action-oriented and must be implementable; therefore a clear schedule is expected. TMDL schedules differ slightly, however, depending on whether the regular or the phased approach is used. Under the regular approach, a TMDL implementation schedule names the anticipated control actions (e.g., NPDES permits, BMPs) and specifies a schedule for their implementation consistent with schedules authorized in water quality standards or implementation regulations. In the phased approach, since meeting water quality standards by a certain date is less certain, the schedule should show plans for ongoing TMDL refinement during phased implementation and should include projected dates for monitoring and TMDL revisions based on new monitoring data (see *The Phased Approach to TMDLs*, below.)

- ***A TMDL has a public participation process.*** EPA guidance documents clearly indicate that public review and comment are an important part of the TMDL development process. Copies of public notices or a statement that the state complied with the general public participation process outlined in 40 C.F.R. Part 25 should be included with a TMDL submittal. Where a TMDL is limited in scope to a single point source, it is acceptable to amend the public notice for NPDES permits to meet the public participation requirement for TMDLs. State procedures for including public participation, where applicable, should be followed.

- ***TMDLs fit well with other water quality management activities.*** Combining TMDL development with other assessment and planning efforts such as resource management plans, basin plans, and watershed analyses is encouraged. For example, the Clean Lakes program (CWA §314) has coordinated its program requirements with the TMDL process so that assessments conducted under Phase 1 of the program may qualify as TMDLs. A functional equivalent of a TMDL may be developed through activities such as CWA §319 nonpoint source management programs and implementation projects, Lakewide Area Management Plans (LAMPs) in the Great Lakes, upcoming activities under §6217 of the Coastal Zone Act Reauthorization Amendments (CZARA), watershed analysis/planning under the President's Forest Plan, other land management planning by federal or state land management agencies, water quality-based effluent limits (WQBELs), and ecological risk assessments. In order to qualify as TMDLs, however, these other efforts must satisfy all statutory and regulatory requirements applicable to TMDLs.

The Phased Approach to TMDLs

The 1991 publication *Guidance for Water Quality-based Decisions: the TMDL Process* describes when it is appropriate to use a phased approach to TMDL development and implementation. The phased approach to TMDL development is an alternative to the regular TMDL process and is ultimately intended to produce the same result -- a TMDL capable of supporting water quality standards -- on a longer time frame. For a waterbody identified as a high priority for TMDL development, the phased approach is appropriate when existing data are not adequate to determine needed load reductions from pollutant sources being addressed by the TMDL or to determine the controls necessary to address impairments. The addition of a monitoring plan and TMDL revision process in the phased approach is intended to resolve the initial data limitations and to validate the TMDL or revise it if necessary. The phased approach is therefore an iterative approach that, first, provides for pollution reduction while waiting for new monitoring data collection and analysis, and second, uses the new monitoring data and performance to date of existing controls to evaluate and revise the TMDL.

The intent of the phased approach is initially to consider point and nonpoint sources of the same stressor together and to identify general controls for these sources, while later providing for the implementation of specific controls in stages. The phased approach is not intended to separate the consideration of point and nonpoint sources, nor is the phased approach intended as a way to postpone indefinitely the implementation of nonpoint source controls. Specifically, the phased approach should not consist of developing and implementing point source controls alone followed by nonpoint source controls alone, without considering both as contributing sources in the same TMDL.

The phased approach is often necessary to address non-traditional problems (e.g., nonpoint sources or habitat degradation) because data, models and predictive tools are generally less well-developed than for traditional point source pollution problems. The phased approach may therefore be an appropriate mechanism to address particularly complex situations, for example where there are cross-media issues, and where completing the development and implementation of a TMDL is complicated by financial, programmatic, and technical limitations and complexities.

As with any TMDL, TMDLs and recommended controls developed through the phased approach are based on best available information, sound professional judgement, and a margin of safety to account for uncertainty in the data or in the relationships among controls, loading reductions, and receiving water quality. TMDLs developed through the phased approach require the development of quantified targets or endpoints that are based on consideration of all pollutant sources and on the identification of those sources that require allocations. Similarly, allocations and controls identified through the phased approach must be reasonably expected to result in the attainment of applicable water quality standards within a reasonable period of time. In situations involving certain

complex pollution problems (i.e., impairment due to aerial deposition or other cross media sources), it may be appropriate for the TMDL to accommodate an expanded time frame of several years if necessary for implementation of certain controls and attainment of water quality standards. However, implementation of controls may be phased only to the extent authorized by law, and the basic characteristics of a TMDL must still be fulfilled. For example, if the applicable water quality standards authorize a three-year schedule for compliance with a water quality-based effluent limit pertaining to a pollutant for which a TMDL has been developed, then EPA expects that water quality standards under the TMDL will be attained no later than eight years after the establishment of that TMDL. That eight-year period reflects the period of time in which permits are to be reissued and point source limits consistent with the TMDL are to be met (up to five years for the expiration of existing permits and up to three years for the point source holding the last-issued permit to come into compliance with the new limit based on the TMDL). EPA also believes that in most situations it is appropriate to consider nonpoint source reductions that are reasonably expected to occur within the illustrative eight year time period when calculating wasteload allocations for a TMDL developed through a phased approach.

TMDLs developed through the phased approach initially tolerate greater uncertainty due to data limitations. Therefore, when evaluating whether a TMDL developed through the phased approach will result in attainment of water quality standards within a reasonable period of time, EPA will consider the extent to which the state has established specific monitoring plans and implementation schedules to fill data gaps. States are already required under § 106(e)(1) of the CWA to establish appropriate monitoring methods and procedures necessary to compile and analyze data on the quality of waters of the United States. See 40 C.F.R. § 130.4 (a). Under EPA's regulations, the results of such monitoring are to be used, among other purposes, to determine abatement and control priorities and to develop and review TMDLs (including WLAs and LAs). See 40 C.F.R. § 130.4 (b). While such monitoring and TMDL review is important for all TMDLs, it is particularly critical for TMDLs developed through the phased approach, because EPA recognizes that water quality standards will not be met for a period of time while controls are being implemented and because there is a degree of uncertainty regarding the ultimate success of the controls being implemented. For this reason, as required by 40 C.F.R. § 130.4 (a), a state must establish a monitoring program to address, inter alia, the waterbody for which a TMDL being developed through the phased approach is being implemented and to use the data collected to evaluate the effectiveness of the controls used to implement the TMDL, to validate the TMDL's assumptions and expected load reductions, and to revise the TMDL as necessary. Monitoring plans should include a description of data collection methodologies and quality assurance/quality control procedures, a review of current discharger monitoring reports, and be integrated with volunteer and cooperative monitoring program where possible.

Similarly, when considering whether to approve a TMDL developed through the phased approach, EPA will also consider the extent to which the TMDL incorporates schedules for implementation of the various regulatory requirements associated with TMDLs. Without such schedules, EPA will be unable to determine whether a TMDL developed through a phased approach in fact provides for the attainment of water quality standards in a reasonable time. Accordingly, EPA expects the state to develop schedules for the following requirements:

- attainment of wasteload allocations and load allocations by each source receiving such allocation (whether by implementation of controls specified in the TMDL or by other means);
- collection of monitoring data, including performing additional modeling if necessary, to verify load reductions and evaluate effectiveness of controls; and
- assessment of Water Quality Standards attainment.

Components of a Complete TMDL Submittal

A complete, final TMDL submittal should contain the information listed below. Requirements specific to the phased approach are identified as such.

- ***Transmittal Letter.*** The main purpose of the transmittal letter is to indicate that the TMDL and allocations have been established in accordance with CWA §303(d) and submitted to EPA for review. The letter should also state whether the submittal is draft or final, as submission of a final report triggers the statutory 30-day time frame for EPA approval action. Within 30 days of the receipt of the final transmittal letter and complete submittal package, EPA will determine whether to approve or disapprove the TMDL submittal.

- ***Problem Formulation.*** The purpose of the problem formulation (also called problem assessment) is to diagnose the water quality problems and likely causes, what has been done, and what else needs to be done as a proper course of action. The problem formulation step does this by briefly characterizing the waterbody and describing the water quality problem using available information. Problem formulations are considered to be "living documents", and may be updated when new information becomes available. In describing the problem, the state should identify the applicable water quality standards and, to the maximum extent practicable, the applicable state and local regulations, the pollutants or other stressors of concern and their relative significance, and all sources of these pollutants including point and nonpoint sources. In addition, the problem formulation should describe the control actions taken to date and the strategy for planned future actions. Problem formulations may vary considerably in length and detail as needed,

and may even be a separate, stand-alone document. Above all and regardless of length or detail, the problem formulation needs to provide an early focus on the key factors to be considered in the TMDL and, in turn, a well organized and scientifically sound basis for the TMDL's implementation.

- ***The TMDL Calculations and List of Supporting References.*** A TMDL submittal should include calculations showing the appropriate component parts (WLAs, LAs, MOS, and reserve) and a clear description and justification for each. The submittal should describe the waterbody boundaries, specific segments or areas of concern, and the reference point locations that signify where the terms of the TMDL apply. It should also contain copies of the calculations used to derive the waterbody's loading capacity (e.g., numeric reductions based on narrative standards) and how to allocate the allowable loading (e.g., equal percent removal for all parties or specific wasteload and load allocations). Modeling information, including the basis for any assumptions about background conditions, should also be provided. Technical reports used to develop the TMDL and any intergovernmental agreements on loadings to interstate waters should also be referenced or made available upon request.

- ***Control Actions.*** The submittal should provide descriptions of the controls or actions that correspond to individual allocations, including the affected NPDES permits, Nutrient Management Plans, Farm Plans, BMP Plans, city and county ordinances, and others. Relevant controls need not be limited to CWA itself; RCRA, CERCLA/SARA, CZARA, Clean Air Act, or other federal, state, tribal or local statutory or regulatory actions may also authorize important controls and these should be mentioned where applicable. In addition, where adequate data and modeling information is available, reasonable projections can be made of loading reductions that will result from natural processes, such as the effects of siltation or release of contaminants from sediments. Supporting information should document how the anticipated controls and loading reductions will result in the attainment of water quality standards. The information should also identify the year by which the state reasonably expects such water quality standards to be achieved, and should set forth the basis for this expectation. Although a precise determination of loading reductions is not required to initiate a TMDL, the submittal should contain the best current estimate and a schedule indicating when the determination shall be made. TMDLs, including TMDLs developed under the phased approach, should describe what steps will be taken, including available sanctions, to assure full implementation of the remedial actions recommended in the TMDL.

- ***Implementation Schedule.*** EPA expects that each TMDL will contain a schedule for implementing all requirements associated with TMDLs. Schedules for the regular and the phased approaches differ slightly, as discussed in the preceding section. For both approaches, the schedule clearly

describes the main steps and milestones in implementing the TMDL. The schedule also contains dates for installing controls (both), meeting interim objectives or mid-course evaluations (phased), planned additional data collection (phased), assessment of standards attainment (phased), and target dates for TMDL revision if necessary (phased) and full implementation (both).

- ***Follow-up Monitoring Plan.*** States are required to collect and analyze data through their water quality monitoring programs. At a minimum, those data are to be used to review TMDLs developed through the phased approach. Information regarding the existing monitoring program or new monitoring plan, including parameters, frequency of sampling, and evaluation process, should be included. The most important function of monitoring is to improve the data on loadings and on the impacts of loadings from all identified sources on ambient water quality, either to fill data gaps or to reduce uncertainty in the analysis, revision and implementation of the TMDL. It is also useful for the monitoring plan to track and account for program actions related to TMDL implementation and attainment of standards, such as permit issuance and adoption of state or local regulatory authorities.

- ***Public Participation.*** Copies of public notices, or a statement that the state complied with the public process outlined in 40 C.F.R. Part 25, should be included in every TMDL development process and TMDL submittal. The state should offer an opportunity for public comment on the TMDL under review. In addition, the submittal should include or have available upon request a copy of all public comments received and the state's written response. Many states carry out this step during water quality management plan updates.

For additional information on the EPA's national TMDL program, contact Don Brady, Watershed Branch Acting Chief at 202-260-7074, or Mimi Dannel, TMDL/Innovative Solutions Team Leader at 202-260-1897.