

The Link Between TMDLs and NPDES Permits for Salt Creek and the East Branch of the DuPage River: Practical Application of Adaptive Management and a Phased Approach for Meeting the Dissolved Oxygen Standard
Illinois EPA
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Introduction

It is important that all participants in the development and implementation of the TMDLs and in the review of ongoing and future NPDES permits fully understand the process, limitations and practical application of the TMDL, as proposed by the Illinois EPA. Toward that end, this paper documents the link between the permits and the TMDLs in terms of approximate timeframes and a step-wise sequence. The deadlines for each permit may vary according to public input, staff resources and other considerations. We believe that the adaptive management and phased approach described in the TMDLs requires a rigid, step-wise application of the implementation plan. Application of the implementation plan would allow for comprehensive, but not necessarily time consuming, investigation of the option of dam removal and in-stream aeration before imposition of lower effluent limits on WWTPs. To the extent that either or both of the first two options are deemed effective and economical, we will attempt to implement and monitor results prior to applying other remedies. Monitoring of results should be fully discussed with the Watershed Group, and must be consistent with a program developed for the entire basin and all times of the year.

TMDLs and Adaptive Management/Phased Approach

Illinois EPA plans to use a phased TMDL with an adaptive management¹ approach to bring both Salt Creek and the EBDR into compliance with the water quality standards (WQS) for DO. This will be accomplished with the help of a newly created local watershed committee consisting of representatives from Illinois EPA, point source dischargers (including MS4 regulated dischargers), environmental groups, USEPA, and the public. The approach will be flexible and adaptable and will include a phased-in, step-by-step implementation plan concurrent with monitoring, capable of reviewing and revisiting model calibration and verification.

The adaptive management aspects, to be employed consistent with the monitoring program, will allow us to identify success or failure in achieving WQS for DO as each remedy is implemented successively, or as the plan is modified as needed over time. The monitoring program will address several needs and be designed to:

1. Measure results of the implemented plan.

¹ Adaptive management is a systematic process for continually changing and improving management policies and practices by applying lessons learned from previous actions. Further details on this concept may be found in studies by C.S. Holling, University of British Columbia, Institute of Resource Ecology. In applying the same concept to the TMDL program, using a slightly different term, the National Research Council June 2001 report "Assessing the TMDL Approach to Water Quality Management" (page 90) stated "Adaptive implementation is, in fact, the application of the scientific method to decision-making. It is a process of taking actions of limited scope commensurate with available data and information to continuously improve our understanding of a problem and its solutions, while at the same time making progress toward attaining a water quality standard."

2. Collect additional data (DO, nutrients and other parameters).
3. Pin-point DO levels now and as management steps occur.
4. Supplement existing Agency monitoring efforts.
5. Allow the Agency to list or delist current and future causes of impairment.
6. Support development of nutrient standards and control strategies.
7. Support permit decision making for the possible future expansion of existing wastewater treatment plants (WWTP) and establishment of new sources/WWTPs.

The implementation plan for these TMDLs will be phased-in. The following steps will be taken in sequence, though alternative restoration activities (Step 2) will be explored concurrently:

Step 1: Organize local watershed committee. Establish meeting schedule and organizational structure and funding mechanisms. Begin monitoring program (e.g., participants, QAPP, schedule). The monitoring program will follow an approved Quality Assurance Project Plan to ensure that IEPA will use the data in future 303(d) listing decisions and TMDL development. This program will also be coordinated with the monitoring programs developed by MS4 regulated communities in accordance with part I.I.C. of General NPDES Permit ILR40. This step will continue throughout the process, regardless of which ensuing steps are taken.

Step 2: Explore and implement restoration activities for the rivers and tributaries in the watershed. The watershed committee will prioritize these activities, giving higher priority to activities that are most likely to meet the DO water quality standards and also help remove the impaired status of the watersheds by promoting healthy fish and macroinvertebrate assemblages. The following actions will be considered:

Removal of low head dams in EBDR and the Fullersburg or Oak Brook dams in Salt Creek. If dam removal fails institutionally (i.e., we can not convince the dam owner to rectify the situation) or technically (we remove or bypass the dam and the WQS for DO is not attained and maintained), this will be discussed by the local watershed committee.

Identify and implement structural and non-structural BMPs for stormwater control that will achieve the necessary pollutant reductions from MS4 regulated discharges. If these reductions are not achieved through coverage under the general NPDES permit, individual permits may be issued.

Potential stream channel enhancements will be explored for the capacity to improve dissolved oxygen concentrations. Such improvements might include wetland restoration and/or restoration of meanders that allow pool and riffle complexes in the channel.

Determine whether installation of instream aerators would be legal, effective, and would not adversely affect aesthetic quality of the streams. If found to be acceptable, place reaerators at strategic locations in the stream to achieve WQS for DO. Conduct pre- and post installation monitoring over a critical period. Make adjustments to the monitoring and reaeration system as necessary to attain WQS. If this proposition is not cost-effective or for some reason not institutionally acceptable or practical, information regarding this option will be discussed by the local watershed committee.

Step 3: If restoration activities in Step 2, do not bring EBDR and Salt Creek into compliance with the WQS for DO, then with the understanding of the local watershed committee, appropriate effluent limits will be incorporated in the NPDES permits of the point source dischargers on these two streams.

As indicated in Step 2 of the phased approach, we will continue to rely on Phase II storm water controls and CSO control strategies to reduce the volatile suspended solid (VSS) input to reduce SOD. Also, when nutrients standards become available, we will re-visit the model to develop a strategy for compliance with DO and nutrient water quality standards.

Step 3 may or may not be required to achieve the DO water quality standard. If it is required, it will come into play after we have satisfactorily explored and ruled out our options under Step 2. In so doing, we will have exhausted these possible remedies (dam removal, stream/channel enhancements, and in-stream aeration) and found them unworkable or untenable, concurrently enhancing the Step 3 option as the lone, remaining practical alternative while improving our understanding of the water quality problem through additional monitoring of the watershed. If it is necessary to reduce loading by using Step 3, the studies related to nutrients should have progressed sufficiently by that time that this information may be used to calculate appropriate, effective wasteload allocations for those pollutants found to be causing the DO impairment.

Proposed NPDES Permit Condition

The Illinois EPA intends to propose the following text as a special condition for all NPDES permit in these watersheds:

“This Permit may be modified to include alternate or additional final effluent limitations pursuant to an approved Total Maximum Daily Load Study or upon completion of an alternate Salt Creek/EBDR Water Quality Study. Permit effluent limits for CBOD5 and ammonia-N shall be reduced to be consistent with the recommendations in the TMDL, if this becomes necessary in accordance with the implementation plan associated with the TMDL.”

Under this condition, the effluent limits would remain as specified in the prior permit for an existing discharger, except for any updates necessary due to changes in state or federal limits that may have occurred since the permit was last issued. Changes could also occur if the nature of the discharge or method of treatment were modified. Limits would remain as they are until the Illinois EPA needed to re-open the permit to make changes to effluent limits as indicated in the TMDLs.

In maintaining the status quo for the effluent limits in existing permits, we intend to allow sufficient time for the multi-step investigation of alternatives that could resolve the DO deficiencies in these waters. The five steps are discussed below. In deferring imposition of lower limits, we believe that all practical and more economical remedies will have been fully investigated, and if possible, attempted. However, deferring imposition of lower limits is contingent upon active and effective work on the part of local communities through the watershed committee. If at any time, the Watershed Committee recommends to the Illinois EPA or the Illinois EPA, acting on its own initiative and authority, finds that none of the alternatives described above is feasible in the short term or that the feasible alternatives will be ineffective, permit limits shall be reduced in accordance with the TMDL. If some of these alternatives are feasible and are implemented, the impact of the enhancements shall be assessed over a reasonable period of time. If these enhancements do not appear to be bringing the waters into compliance with DO water quality standards, permit limits shall be reduced in accordance with the TMDL and/or new information beginning on January 1, 2008.

It is hoped that this deadline will allow sufficient time for identification of all appropriate limits necessary to address the DO impairments, thereby decreasing the risk of “false starts” in new construction. An out-of-phase scenario—requiring two separate construction stages to accomplish DO improvement through BOD₅ and ammonia reduction followed some months or years after by nutrient removal—would likely prove economically unsound due to duplication of treatment units and may be difficult to manage at some treatment plants. Furthermore, the TMDLs do not mandate immediate reductions in effluent limits. Simply stated, the model suggests other equally plausible remedies to the DO problem. These equally plausible remedies (i.e., dam removal and in-stream aeration) may be accomplished faster, more economically and with equivalent water quality outcome.

Permits issued for new facilities must adhere to applicable state and federal NPDES and TMDL regulations. For new permits, federal regulations that apply to both programs state:

“No permit may be issued:...

- (i) To a new source or a new discharger, if the discharge from its construction of operation will cause or contribute to the violation of water quality standards. The owner or operator of a new source or new discharger proposing to discharge into a water segment which does not meet applicable water quality standards or is not expected to meet those standards even after the application of the effluent limitations required by sections 301(b)(1)(A) and 301(b)(1)(B) of the CWA, and for which the State or interstate agency has performed a pollutants load allocation for the pollutant to be discharged, must demonstrate, before the close of the public comment period, that:
 - (1) There are sufficient remaining pollutant load allocations to allow for the discharge; and
 - (2) The existing dischargers into that water segment are subject to compliance schedules designed to bring the segment into compliance with applicable water quality standards.” 40 CFR 122.4

The TMDLs include a margin of error that accounts for growth through 2020, based on NIPC population projections. It is possible that a new source or new discharger, or an expansion of an existing discharge, could rely on a portion of the allocation attributed to future growth. Other possible scenarios also exist for new sources and dischargers (e.g., pollutant trading, land application of wastewater). In any event, the Agency must conclude that the new load, from whatever source, would comply with the applicable water quality standards (including antidegradation), prior to issuing the NPDES permit. The requirement to establish water quality standards compliance prior to permit issuance is contained in 35 Ill. Adm. Code 309.141 and 309.142.

Conclusions: Schedules and Actions

We are committed to conduct, complete and implement TMDLs for these waters and to issue, revise or renew NPDES permits for dischargers to these streams. These actions need not be mutually exclusive and in fact must be done in a coordinated manner, consistent with the state and federal water quality regulations. By conditionally issuing NPDES permits as discussed above, it is important to note that the “approved TMDL Study” would include taking actions between the time of TMDL approval and the imposition of more stringent effluent limits. This in effect establishes the schedule for actions under the TMDLs relative to NPDES permit issuance. The actions described in the TMDLs are:

1. Convene a watershed committee

2. Establish a monitoring program
3. Use new monitoring data to investigate or support dam removal and reeration
4. Catalogue NPS activities in the watersheds
5. Initiate CSO controls in expedited timeframe

The Salt Creek/E-WBDR Watershed Group has been convened and started work on some of these actions.

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