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# Lower Minnesota River Low Flow Dissolved Oxygen TMDL

Water quality/basins #3.07, Revised May 2004

Section 303(d) of the federal Clean Water Act and the United States Environmental Protection Agency's Water Quality Planning and Management Regulations require states to develop Total Maximum Daily Loads (TMDLs) for water bodies not meeting water quality standards.

The TMDL process establishes the allowable loading of pollutants for a water body based on the relationship between pollutant sources and in-stream water quality conditions. The development of a TMDL Report provides states a basis for determining the pollutant reductions necessary from point and nonpoint sources to restore and maintain the quality of their water resources.

The purpose of this TMDL Report is to identify the allowable levels of phosphorus that will result in the attainment of the dissolved oxygen standard in the lower 22 miles of the Minnesota River during low flow conditions. The low dissolved oxygen problem occurs during low flow conditions in this stretch of the Minnesota River. Low flow conditions are important in this TMDL because that is when the low dissolved oxygen problem occurs.

## 1985 study - first phase

As a first step in solving the problem, a 1985 Waste Load Allocation Study (WLA Study) established wastewater treatment plant biochemical oxygen demand (BOD) discharge limits for those facilities in the lower 22 miles of the Minnesota River. The WLA Study also established a 40 percent BOD reduction goal for the Minnesota River upstream of Shakopee. In the WLA Study, the upstream area was treated as one unit (i.e. not separated by major watershed or

BOD source). The completion of the 1985 WLA Study was Phase I of the TMDL development.

This TMDL Report addresses Phase II. Phase II focuses on achieving the 40 percent BOD reduction goal by reducing the high phosphorus loading upstream of the metropolitan area. Phosphorus is targeted because the nutrient causes excessive algal growth, which in turn produces BOD as a result of algal decomposition. High BOD leads to the low dissolved oxygen.

## Advisory committee input

A model was used to determine the major phosphorus sources and to simulate changes in land use (i.e. effluent limits, stormwater BMPs, agricultural BMPs). A 45-member advisory committee met to discuss the modeling results and to offer input on the allocation. The advisory committee was composed of people representing cities and their consulting groups, industry, agriculture, commodity groups, counties, watershed projects, and environmental groups. The recommended land use changes proposed by the group were run through the model.

Components of a TMDL Report include a waste load allocation for point sources, a load allocation for nonpoint sources, a margin of safety, which was included in the modeling assumptions, and reserve capacity to allow for growth. The modeling process used an implicit margin of safety by using conservative assumptions.

Under current land use practices, approximately 1,240 pounds per day of phosphorus is projected to be generated in the Basin during critical low flow

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conditions. This TMDL Report reduces the amount to 752 pounds per day during lowflow conditions. Strategies to solve the problem involve decreasing the amount of phosphorus that reaches the river and increasing the amount of flow so low flow periods occur less frequently for shorter periods of time.

The emphasis of this low flow TMDL Report is on wastewater treatment facilities, although agriculture, noncompliant ISTS and stormwater each play a role in the reduction efforts. A watershed permit dealing exclusively with phosphorus will be drafted for the Minnesota River Basin.

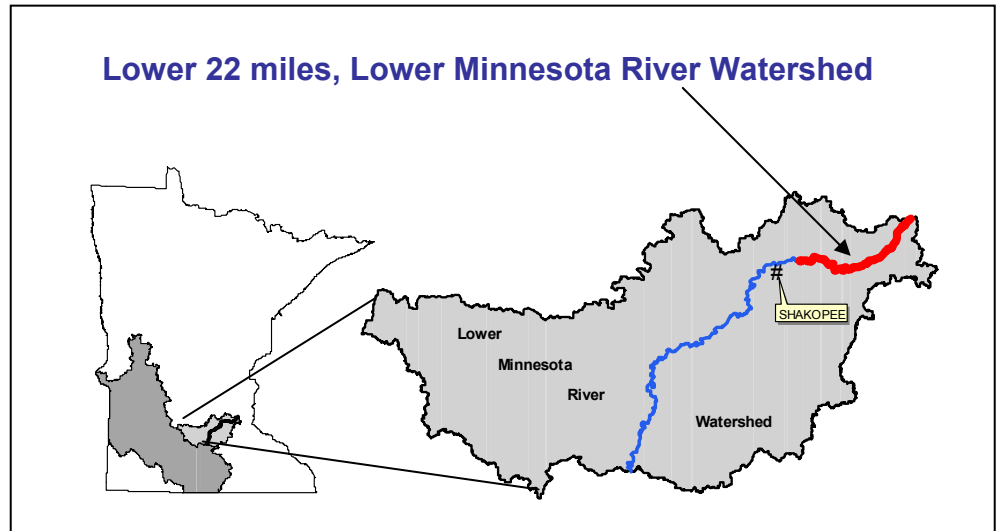
### Wastewater treatment facility options

As a part of the permit, all communities will evaluate the feasibility of 30 and 50 percent phosphorus reductions and implement the reductions where feasible. Two approaches are being considered for wastewater treatment facilities discharging over 1,800 pounds of phosphorus per year: 1) a 1 mg/l effluent limit (seasonal average or flow triggered) to achieve a 51 percent reduction in ten years; and 2) point-point trading to achieve a 35 percent reduction by the end of the first phase of the watershed permit (five years).

The first watershed permit will be followed by a second watershed permit requiring a 1 mg/l effluent limit or equivalent pollutant trading offsets by the end of the second phase of the permit (ten years). The method will be selected during the development of the watershed permit and the TMDL implementation plan. Additional information from other studies (e.g. updating the 1985 Waste Load Allocation Study) may update this TMDL Report and change the allocations or effluent limits.

Communities will reduce phosphorus in stormwater by stormwater prevention planning and using BMPs. Communities with and without Municipal Separate Storm Sewer permits will be involved.

Noncompliant ISTS that discharge to surface water are also a source of phosphorus. Ninety percent of these



systems that discharge to surface water will be moved to compliance.

The methods cited above involve phosphorus reductions. Flow is also a consideration. Because the dissolved oxygen problem occurs during low flow periods, agricultural runoff contributes less phosphorus due to lack of runoff during low flow conditions.

The agricultural sector can, however, implement BMPs to increase ground water recharge such as crop residue and protection of surface tile intakes (or equivalent BMPs). The benefits of these practices will be exhibited during low flow periods when the previously stored water flows into the river via springs, thereby maintaining the flow.

As a result of these proposed solutions, phosphorus, and consequently BOD, can be reduced enough to meet the dissolved oxygen water quality standard during low flow conditions.

### For more information

For more information, contact Jim Klang, 651-296-8402, or Larry Gunderson, 651-297-3825. On the Web, visit [www.pca.state.mn.us/water/tmdl](http://www.pca.state.mn.us/water/tmdl). The final report is located on the Web at: <http://www.pca.state.mn.us/water/basins/mnriver/mnriver-tmdl.html>