



Minnesota Pollution Control Agency

Office of the Commissioner

February 26, 2004

The Honorable John Marty, Chair
Environment and Natural Resources Committee
Minnesota Senate
323 Capitol

The Honorable Dallas Sams, Chair
Environment, Agriculture and Economic
Development Budget Division
Minnesota Senate
328 Capitol

The Honorable Linda Scheid, Chair
Commerce Committee
Minnesota Senate
303 State Capitol

The Honorable Tom Hackbarth, Chair
Environment and Natural Resources Policy
Committee
Minnesota House of Representatives
409 State Office Building

The Honorable Dennis Ozment, Chair
Environment and Natural Resources Finance
Committee
Minnesota House of Representatives
479 State Office Building

The Honorable Gregory Davids, Chair
Commerce, Jobs and Economic Development
Committee
Minnesota House of Representatives
379 State Office Building

Dear Committee Chairs:

I am pleased to submit to you the enclosed report entitled, "Detailed Assessment of Phosphorus Sources to Minnesota Watersheds" produced by Barr Engineering Company (Barr) under contract to the State of Minnesota. This letter and report are submitted to you to fulfill the requirements of Minn. Laws 2003, Ch. 128, Art. 1, Sections 122 and 166 which asked MPCA to report to the 2004 Legislature on the levels of non-ingested phosphorus discharged to wastewater treatment systems, the effect of lowering phosphorus on water quality, and a review of the MPCA's rules on nutrients in cleaning agents. As noted in a letter to you dated January 20, 2004, although this report was required to be submitted by February 2, it was necessary to extend the submittal date to March 1, 2004.

As nutrients in fertilizer cause crops and lawns to grow, nutrients, which get into surface water, cause excessive growth of algae and other aquatic plants. Phosphorus is the primary nutrient causing the pollution of Minnesota's surface waters. The presence of phosphorus in automatic dishwasher detergent (ADWD) was discussed by the Legislature during the 2003 Session and legislation to eliminate virtually all phosphorus in ADWD was introduced. The various perspectives of interested parties and a lack of solid data led the Legislature to charge the MPCA to research a series of questions and develop a study of the sources of phosphorus statewide. The MPCA contracted with a local consultant, Barr, to conduct the study and assist the MPCA in answering the questions posed by the Legislature. Barr has performed in an outstanding manner in this very large and complicated effort and was able to deliver a final report to the agency on February 19, 2004. Their report is enclosed with this letter.

The questions posed by the Legislature were:

1. What is a reasonable estimate for the amount of phosphorus entering municipal wastewater systems (Publicly Owned Treatment Works – (POTW's) from non-ingested sources?

Non-ingested sources of phosphorus are commercial/industrial process water, residential and commercial ADWD, food soils (dishwashing and garbage disposals food wastes), dentifrices (oral hygiene products), noncontact cooling water, drinking water treatment agents and groundwater inflow/infiltration. Non-ingested sources of phosphorus make up 57.6 percent (2,573,000 kg/yr.) of the total amount (4,468,000 kg/yr.) of phosphorus entering POTW's. Commercial and industrial process water is 46 percent of the non-ingested phosphorus entering POTW's and food soils are about 28 percent of the non-ingested phosphorus. The phosphorus from residential and commercial use of ADWD, combined, is almost 19 percent of the non-ingested phosphorus entering POTWs. The remainder of the sources totals less than 8 percent.

2. What is a reasonable timeline for achieving a 50 percent reduction of phosphorus from non-ingested sources to municipal wastewater systems?

Each individual POTW receives phosphorus from varying non-ingested sources. The source, or combination of sources, of non-ingested phosphorus that enters a POTW and the practicality of removing non-ingested phosphorus from specific individual sources will determine the feasibility of reaching a 50 percent removal goal in any reasonable timeframe.

According to the Barr report, the achievement of a 50 percent reduction of non-ingested phosphorus appears to be an ambitious goal. It is theoretically possible to achieve a 50 percent reduction in non-ingested phosphorus entering a POTW, but the practicality and timeline for doing so is reliant upon a thorough examination of the data in the Barr report and ultimately, is a public policy decision. The report outlines several options that could lead to a significant reduction in non-ingested phosphorus entering POTW's. One example of the type of approach that would be necessary to achieve a significant reduction in non-ingested phosphorus entering a POTW would require a reduction to zero phosphorus in residential and commercial ADWD and a 50 percent reduction in phosphorus from commercial and industrial process water. These reductions combined would result in a reduction of 42 percent of phosphorus entering a POTW.

3. What is the effect on water quality of receiving waters as a result of lowering phosphorus in the wastewater stream?

One method of estimating the effect of lowering the phosphorus content of the wastewater stream is to determine the relative amount of phosphorus contribution from a specific source when compared to other sources in a major basin or statewide. While this was the general approach used in this study, it is important to note that this statewide/basin method has limitations because the effect of a phosphorus reduction on water quality is related to many factors, such as type of water body (river, wetland, or lake), size of water body, geographical location, types of phosphorus sources and many others. The Barr report includes detailed estimates of the relative

phosphorus contributions to surface water of the ten major basins and statewide, however an evaluation of all such individual conditions was not conducted.

There is a vast amount of information in the Barr report. Although the full content of the report has yet to be thoroughly analyzed, preliminarily we find the following information to be, in our view, significant:

- a) For average flow conditions, nonpoint sources of phosphorus account for 69 percent of the phosphorus entering Minnesota surface waters and point sources account for 31 percent.
 - b) Of the nonpoint sources, cropland runoff (26 percent) is the single largest source followed by atmospheric deposition (13 percent) and streambank erosion (11 percent).
 - c) For point sources, human waste (34 percent) accounts for the single largest contribution, although the combination of the amount of phosphorus from commercial and industrial stand-alone facilities and commercial and industrial discharges treated at POTWs equals 38 percent of all point source phosphorus discharged.
 - d) As the water flow in rivers increases, the percentage contribution of phosphorus from point sources decreases and nonpoint source increases. Streambank erosion is the source most impacted under high flow conditions and ranges from 62,300 kg/yr. at low flow to 3,605,900 kg/yr. at high flow conditions.
 - e) For non-ingested phosphorus entering POTWs, commercial and industrial process water is the largest source (46 percent), residential ADWD phosphorus is 12.6 percent and commercial ADWD phosphorus is 5.9 percent.
 - f) The bioavailability of phosphorus was highly variable for some sources and fairly consistent for others. Bioavailability of ADWD phosphorus was 100 percent, while POTW effluent was 86 percent and cropland runoff was 58 percent.
 - g) Minor sources of phosphorus at the basin scale may be significant sources at the local level.
4. What is the best way to assist local units of government in removing phosphorus at public wastewater treatment plants?

The Barr report provides a review of select facilities with phosphorus removal. Treatment type, removal efficiencies and influent reduction activities are generally considered. Two Portland, Oregon facilities are noted as achieving effluent phosphorus concentrations of 0.07 mg/L. These are some of the lowest effluent concentrations in the United States. Generally, phosphorus effluent limitations are 1.0 mg/L in Minnesota, with two facilities having effluent limitations of 0.3 mg/L.

In addition, Minn. Laws Ch. 128, Art. 1, Sec. 9, Subd. 7e appropriated \$296,000 to the MPCA in cooperation with the Minnesota Environmental Science and Economic Review Board (MESERB), to conduct an independent examination of selected wastewater treatment facilities by nationally recognized experts in phosphorus removal. These experts will prepare a report on influent reduction strategies and on effective phosphorus removal technologies and disseminate this information. MESERB will use the findings from data review and facility examinations to develop recommendations on low-cost, high-benefit strategies that will be most effective for facilities of various sizes and types, in various regions of the state. This information will be compiled into a report, designed to assist wastewater operators in identifying and implementing

effective phosphorus removal techniques. The project is scheduled for completion June 30, 2005. At that time, MESERB and MPCA should have valuable information to report to the Legislature on this question.

5. What are the results of the Agency's review of rules on nutrients in cleaning agents under Minn. Stat. § § 116.23 and 116.24?

The MPCA has the authority to adopt rules limiting the amount of nutrients in cleaning agents and water conditioners. Sufficient technical information and resources would be necessary to revise or promulgate rules. In Minn. Stat. § § 116.23 and 116.24, the Legislature found that nutrients contained in many cleaning agents and water conditioning agents served a valuable purpose in increasing their overall effectiveness, but the Legislature also found that they can lead to an acceleration of the natural eutrophication process of our state waters. The Legislature listed three factors that should be considered when rules imposing nutrient limitations were developed in accordance with Minn. Stat. § § 116.23 and 116.24:

- a. The availability of safe, nonpolluting and effective substitutes.
- b. The differences in the mineral content of water in various parts of the state.
- c. The differing needs of industrial, commercial and household users of cleaning agents and chemical water conditioners.

Minn. R. 7100.015 through 7100.024 relate to the limitation of phosphorus in cleaning agents and water conditioners. No new nutrient rules or modifications of the original rules have been adopted since the mid-1970s. The MPCA has no plans to conduct rulemaking to remove phosphorus from additional cleaning agents and water conditioners without a legislative public policy decision and further legislative direction.

If you have any questions regarding this report, please contact Nelson French, of my staff at (651) 296-7352.

Sincerely,



Sheryl A. Corrigan
Commissioner

SAC:cmbg

Enclosure