

Sulfate and municipal wastewater: Study confirms lack of affordable technology

To meet water quality standards, new methods for removing sulfate are needed.

Removing sulfate from wastewater in sewage treatment plants is a key challenge for Minnesota cities right now. Sulfate is a salt that is very difficult to remove from water, yet we know that too much sulfate is harmful to wild rice. Minnesota faces a tough challenge to control sulfate at an affordable cost. One part of meeting this challenge is determining which sulfate removal treatments are both feasible and affordable. Many cities cannot afford the engineering research necessary to obtain this information. To meet this need, the MPCA got Legislative funding for a study by two independent engineering firms to compare some 31 sulfate treatment options and determine the costs of each.

The study results show that reverse osmosis is the one treatment method that is closest to being feasible – but that it is not currently affordable. The 30 other treatment processes evaluated either would not effectively remove sulfate from wastewater, were not yet developed enough to be used, or would cost even more than reverse osmosis. The study was funded by the Minnesota Environment and Natural Resources Trust Fund.

Practicality of reverse osmosis

Reverse osmosis uses a filter to separate sulfate from wastewater. This filtration process produces a high-sulfate waste stream that must be treated by “boiling” the water off the sulfate using large amounts of energy. The study found that reverse osmosis, while the most effective way to remove sulfate, remains impractical for Minnesota communities for several reasons:

- The reverse osmosis process is complex and the equipment is difficult to maintain.
- The equipment for the evaporative process is extremely expensive to build and has a high energy demand.
- The sulfate waste that is left over at the end of the reverse osmosis process is very expensive to manage and dispose of.



Water quality standard for sulfate

To protect water quality, Minnesota's sulfate water quality standard is critical. It is required by the federal Clean Water Act. Until affordable treatment technology exists, the sulfate water quality standard provides a goal that everyone can work towards achieving. Minnesotans expect government and businesses to do their part in protecting our waters.

Next steps

MPCA is working hard to address the sulfate treatment challenge. Prevention is a key strategy. MPCA works with cities and businesses to develop customized methods to reduce the amount of sulfate flowing in to wastewater treatment plants. Many times, businesses and manufacturing concerns can reduce their sulfate discharge through simple and inexpensive changes in their operations. Another preventive option comes through the timing of releases from pond treatment facilities. The twice-yearly release of pond water can be timed to coincide with high-flow periods in the receiving waters, so that the sulfate that is released can be diluted quickly.

Another strategy is a variance, or special conditions written into a city's water discharge permit that allow the city to deviate from normal requirements. Federal law allows states to give cities a variance when treatment is not affordable. The sulfate study described in this fact sheet provides MPCA with better data on which to issue variances.

As always, MPCA is constantly tracking new sulfate treatment technologies, and working with cities, industry, and academia to evaluate these technologies' potential for removing sulfate from wastewater affordably.

For more information

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