POTENTIAL ALUM TREATMENT

Background: Reduction of water clarity and the annual occurrences of green water in Little Saint are the result of excess phosphorous in the lake. While phosphorous is abundant year round, the phosphorous itself is not visible and does not turn the water green. It is the combination of phosphorous and warm water that triggers summer algal blooms.

Simply stated, algae are tiny green plant organisms having no roots, leaves or stems. They thrive on phosphorous and suspend in the water. When in high enough concentrations, they accumulate on the lake surface and look like scum. As the water temperature drops in the fall, the algae die and the water clarity improves. Phosphorous can come from many sources. Studies over the years have confirmed that the two primary sources in Little Saint are:

1. **Muskellunge Creek:** The volume of water entering Little Saint via the creek is sometimes half or less the volume that leaves Muskellunge Lake. The balance is ground water which flows into the creek between the two lakes. The watershed through which the creek flows is rich in natural phosphorous resulting in large amounts of phosphorous entering the stream and ending up in Little Saint.
2. **Lake sediments:** The annual cycle of aquatic plants growing, dying and settling to the lake bottom results in a gradual build up of phosphorous in the sediment. Sedimentary phosphorous is not typically "available" to support algae growth in the water, but studies have proven that under certain summer conditions, some of the phosphorous releases from the sediment. It is believe that such releases contribute to the sudden severe "spikes" in algae production.

Possible solutions: Barr Engineering, a Minneapolis firm specializing in phosphorous management in lakes, was hired by the Little Saint Lake District Board of Commissioners to determine the feasibility of removing phosphorous from Muskellunge Creek just prior to the creek flowing into Little Saint. Barr has successfully installed stream diversions and treatment ponds elsewhere to capture and remove phosphorous before streams flow into lakes. An aluminum compound known as "alum" is introduced in the treatment ponds. The alum binds around the phosphorous particles and settles to the pond bottom in the form of a flocculent which is periodically removed and used as upland fertilizer.

After assessment of the Little Saint situation, Barr determined that a Muskellunge Creek in-stream alum treatment system would theoretically work, but would be extremely impractical due the size of the system that would be necessary and the remoteness of the treatment site. Not only would initial costs to build the system be tremendously high, the annual operating expenses would be cost prohibitive.

However, Barr scientists suggested in December of 2007 that a more practical option might be an in-lake alum treatment system to bind sedimentary phosphorous to prevent it from releasing into the water column and becoming available to support algae growth. While such a system would do nothing to reduce algal blooms supported by phosphorous entering the lake via Muskellunge Creek, reducing sediment releases might prevent the sudden and severe algal bloom "spikes". Barr suggested that perhaps the early season water clarity, which is far better than what typically develops later in the season, could be maintained throughout the summer by managing phosphorous in the sediment. While this alternative would also be expensive and would have a treatment benefit of perhaps only five to eight years, it would be significantly more cost effective and affordable than the in-stream treatment option.

Consideration of Barr's suggested alum treatment: Barr's suggestion was forward to the DNR for consideration where it was circulated through various departments. A conference call was then arranged in May of 2008. Participants in the call included DNR lakes specialists and fisheries managers, representatives of the U. S. Geological Survey, commissioners from the Little St. Germain Lake District and scientists from Barr. The conclusion of the discussion was that more research was needed to verify Barr's contention that anoxic (lack of dissolved oxygen) conditions were occurring in

certain areas of the lake which resulted in sedimentary phosphorous releases which triggered spikes in algal blooms. The lake district board of commissioners worked with DNR scientists to launch the needed research which was conducted through mid-September of 2008. This was the status as of the 2008 lake district annual meeting.

Activities since 2008 annual meeting: Data collection for the 2008 summer research was completed shortly after the annual meeting. The study confirmed Barr's finding that sedimentary phosphorous releases were occurring during summer periods of anoxia in certain areas of Lower East Bay. These findings prompted further consideration and discussion within the DNR.

A second conference call in the fall of 2008 with the same participants as the May call lead to the suggestion by the DNR that Barr prepare a detailed alum treatment proposal. The proposal was to address several areas of concern raised during the call. The board of commissioners authorized Barr to proceed with preparing the proposal. The proposal was completed in March, 2009. It can be seen on the district's website under "Lake Studies" on the index page.

Barr's proposal was circulated and discussed within the DNR during the following months. A third conference call was then conduced in early July, 2009. Once again more issues were raised and a disparity of opinions became obvious regarding whether the proposed alum treatment should be allowed. The only topic of unanimous agreement within the DNR was that no State funding should be made available to assist the district with the cost of the treatment should the treatment ultimately be allowed. The discussion ended without a decision to either permit or deny the treatment.

Board of Commissioners comments in advance of the 2009 annual meeting: Alum treatments have occurred in WI lakes with varying results. However, none of them attempted to address the unique problem we are faced with in Little St. Germain Lake. Alum treatments are usually done following some other corrective action to eliminate the source of phosphorous. Such treatments are usually the final step in a series of actions that ultimately lead to improved water clarity. This is not the case here. Phosphorous continues to enter Little St. Germain Lake via inflow from Muskellunge Creek as discussed above. The faucet has not been shut off. It is for that reason that Barr is projecting a maximum benefit of up to 10 years from the proposed alum treatment rather than a "permanent" fix. Consequently, no alum treatment such as Barr is proposing has ever been attempted in a WI lake. The DNR regards the high monetary cost as a questionably unwise gamble for a project with an uncertain and at best limited term outcome. Furthermore, the question of potentially devastating impact to the fishery weighs heavy on the minds of DNR fishery managers who remember well the consequences of the 1984 copper sulfate treatment which went bad for no apparent reason following 19 previous successful annual treatments.

The board of commissioners has worked closely with the DNR throughout this lengthy process. It finds no fault with the DNR for wanting to be cautious about this proposal. However, frustration by the board is beginning to show as a result of the lack of decisiveness by the DNR in either approving or denying permission to proceed with the proposed treatment. It was hoped at the 2008 annual meeting that a fall of 2009 treatment would allowed. If not allowed, it would be denied. The district is now looking for an answer prior to the fall of 2010 and not knowing what additional information might be requested by the DNR or at what cost.

The board has requested that a representative of the DNR attend our 2009 annual meeting to explain the status of the proposed alum treatment and to field questions from the audience.