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## **Grand Lake St. Marys Alum Treatment Pilot Project** (September 2010)

### **What is fueling the algae blooms in Grand Lake St. Marys?**

The primary cause of algae blooms is the very high levels of phosphorus (> 250 µg/L) within the water and the top 2-4 centimeters of sediment on the bottom of Grand Lake St Marys (GLSM). However, once a bloom begins, we believe they are sustaining themselves by the phosphorus that is being released as algae dies off.

### **Why was alum selected to treat GLSM?**

Inactivating the phosphorus in the lake is critical to limiting the nutrients that algae need to thrive. Alum has been successfully used for phosphorus inactivation since the 1960s with scientifically documented successes in more than 150 lakes worldwide.

### **What is “alum” and is there anything else going to be added to the lake?**

Alum is aluminum sulfate. Aluminum sulfate (alum) binds chemically to phosphorus in the water and sediments to inactivate the phosphorus so that it is not available to algae. Alum has been used in the water treatment and wastewater treatment industries for many years. In addition to alum, sodium aluminate will be added as a buffer to prevent the pH of the water from changing.

### **What is the purpose of the demonstration projects?**

The demonstration projects at GLSM are designed to evaluate the effectiveness of alum treatments at maintaining an 85 percent reduction in the internal phosphorus loads in the water and sediments; refine dosing needs for a potential future whole lake treatment; and to enhance public understanding and awareness of alum as a potential means to restore water quality in GLSM.

### **How were the demonstration sites selected?**

Several criteria were used to make these selections including site accessibility and the ease with which each site could be isolated with a curtain. We also selected a variety of sites to ensure we would be able to evaluate multiple conditions around the lake. This includes sites in the east and west end of GLSM as well as some relatively open sites, such as the marina and beach area, to monitor the influence of wind and wave action on the alum’s effectiveness.

### **How will we know if the demonstration project is successful?**

Ohio EPA will conduct weekly water quality monitoring to measure the phosphorus levels before and after alum treatment. If phosphorus levels in the demonstration sites are reduced 60-85 percent and remain at those levels for at least 28 days, then the projects will be successful.

### **Why have isolation curtains been installed on demonstration sites?**

The Tetrattech report recommends that we close off the demonstration sites to minimize the water exchange from the untreated portions of the main lake. Separating the project sites from untreated areas of the main lake will ensure the reliability of demonstration project results.

### **Are there special precautions or steps that the public needs to take?**

The public is asked to keep from disturbing the turbidity curtains that have been placed around the areas which will be studied for the alum treatment project until ODNR removes the curtains at the conclusion of the pilot project, which is approximately 60 days. In addition, ODNR asks those people who normally access the lake from areas behind the curtains to find an alternative access until the curtains have been removed.

### **Will the demonstration projects eliminate the blue-green algae?**

The purpose of the alum demonstration project is to measure the effectiveness of alum in reducing the phosphorus content within GLSM. Alum does not directly kill algae, however, by inactivating phosphorus it will reduce the availability of nutrients that the algae need and we expect they will die within 21-28 days in the demonstration areas.

### **Is there a hazard to human health from the chemicals used in this project?**

None of the compounds pose a hazard to human and/or pet health provided they are applied according to the recommendations. The alum applicators will be using protective gear, such as eyewear and gloves; however, this is simply a precaution for extended exposure to the compounds. The alum treatments pose no risk to residents.

### **Will fish or wildlife be affected by the alum treatments?**

We expect that fish and wildlife will not be affected by the alum treatment projects. As an added precaution, sodium aluminate will be added to the alum as a buffering agent to ensure that pH levels remain constant during treatment. There is a small chance that the existing algae in the water will die off quickly after the alum treatment is applied. If the algae death occurs rapidly enough, the dissolved oxygen in the water may also drop quickly, which may impact fish. If fish are impacted, it will be due to the decrease in oxygen and not as a result of the chemicals used in the treatment. Unfortunately, it is not possible to predict whether this will occur, as it is largely dependent upon how much existing algae is present and how rapidly it may die off.

### **What should people expect to see following the alum treatment?**

People should expect to see a white cloudy substance immediately following the application of alum to the demonstration sites. When the cloudiness settles, several hours later, we anticipate that water clarity will substantially improve. The color of the water will shift from green to blue. We expect that this improved water clarity will be maintained throughout the duration of the demonstration project.

### **How long will the benefits of an alum treatment last?**

The visible benefits of the demonstration projects are expected to last throughout the period of the demonstration (approximately 60 days). One of the objectives of the demonstration project is to help gather data that will be used to run a mass-balance model of the entire lake. We expect that completion of this model will provide information that will help us better understand how long we can expect to see benefits from a whole-lake alum treatment. However, it is important to recognize that the duration of benefits from any in-lake alum treatment are directly proportionate to the speed with which external phosphorus loads entering the lake can be substantially reduced.

## **When can we expect to see a whole-lake alum treatment for Grand Lake?**

Following evaluation of the effectiveness of the alum demonstration projects, we will consider the feasibility of conducting a whole-lake alum treatment if it appears that doing so will improve water quality. Until we complete the demonstration projects and evaluate the gathered data, and then run the mass-balance model, we won't know whether a whole-lake treatment is appropriate. However, if the benefits of a whole-lake treatment are evident, we will conduct that treatment as quickly as funding is obtained, perhaps as early as next year.