

Barr Lake/Milton Reservoir Watershed Association
Technical Committee Meeting
Thursday, July 22nd, 2014 (9:00am – 11:00pm)
Metro Wastewater Reclamation District, Denver

Draft MINUTES

In attendance:

Steve Lundt – Metro Wastewater
Laurie Rink –FRICO (phone)
Jordan Parman – Metro
Jim Doersch - Metro
Julie Kinsey - EPA
James Boswell - Thornton
Al Baker – Centennial (phone)
Al Polonsky – Denver Environmental Health

Katie Fendel – Cherry Creek Basin Water Quality Authority
Kelly DiNatale – ECCV and United

Guests:

Amy Conklin – BMW
Nicole Muell – Brownstein Hyatt
Harvey Harper – ERD (phone)

Steve introduced everyone.

1. In-Canal Treatment Update (Harvey)

Steve told the group that our main task today is to discuss the Interim Report. We need to develop a plan to move the effort forward both with the treatment options and with the regulators. The group noted that two years of flow data were absent. **Steve** will send Harvey the missing data. Shelley Stanley asked if the change in pumping regimes would impact timing and/or quality of the water being diverted to Barr Lake. The change in pumping regimes should not make a significant change in the quantity of the flow in the Burlington canal but the quality may improve since the water shouldn't be direct effluent but river water that has been diluted. The variability in flows is a component that will need to be incorporated into the design of any treatment system. Harvey said that alum systems are very flexible in accommodating changes in flow rates. The BAM systems have finite capacity for treatments. Laurie Rink commented that the magnitude of the flows are likely to change with and without pumping.

Amy asked about water chemistry variability. Kelly thought the variability may occur between the headgate and the inlet to Barr because of gains along the canal. In addition there can be a lot of variability of water quality in the river because of the sources of river water driven by water rights. Because timing is so important, we might want to consider a treatment process that treats just the first 50 cfs, since the majority of the flow are 50 cfs or less. Harvey responded that total phosphorus (TP) is measured at the outflow, not the inflow. We would just add the appropriate amount of alum to achieve the desired TP in the outflow. The TP is highest during November to March when the lake is filling. Alkalinity follows the same pattern as the TP. Shelley asked if there was another parameter, such as turbidity that correlated closely to TP that we could use to guide alum application. The answer is unknown at this time.

Laurie shared her comments that included editorial comments as well as substantive. **Harvey** will send the group a Word document for ease in editing. Starting with page 2.3,

she suggested the section be renamed 'Evaporation and Transpiration' since some systems have more impacts from one or the other.

In Section 4.1, regarding the Rapid Infiltration Basin (RIB), she cautioned that the sizing assumptions CDM used may have been driven more by Nitrogen removal considerations that may not translate well to TP removal. The land costs may need some refining. Julie commented that she has done a little research and found land values ranging from \$6,000 to \$33,000 per acre. Kelly guessed that the land we're considering would be in the range of \$15,000 to \$50,000 per acre.

On page 4-10, she asked about the submerged weir measuring station, commenting that when the weir is submerged, the measuring station doesn't work. She asked about if the treatment would be effected by the measuring station. The consensus was that the measuring station is a problem that needs to be fixed but the problem shouldn't impact treatment.

On page 4-11, the increase in vertebrate and invertebrate species after floc treatment is discussed. He was requested to provide citations on where that situation has occurred. He was also requested to provide citations and to include if the floc would create a seal on the bottom of the lake. He was also requested to discuss how much floc would accumulate. Harvey responded that those issues were going to be discussed in the final report. The group was content to wait for the final report.

Laurie noted that the conceptual location of the treatment facility would be in the wildlife refuge area of the park, so there would need to be careful coordination of using heavy equipment in the wildlife area for minimizing impacts to wildlife. It was requested that the conflicts resulting from locating the treatment facility in the wildlife refuge be added to the final report. We should also include any potential permitting considerations of constructing a facility in a wildlife refuge.

Laurie asked for clarification that the floc would be non-hazardous. She asked if the groups was comfortable with the nature of the floc and its disposal. Kelly commented that the same issues occur in water treatment plants that use alum. Harvey commented that his thinking is that the forebay would be in the lake where the wetland enters the lake, not in the canal. The treatment would therefore be in the waters of the state and require appropriate permitting. Harvey was thinking that the area would dry out each year and the floc could be removed when dry which is a much easier process. There would be concerns about the eagle nests and the blue heron rookery.

The group discussed the potential for floc build up in the lake. Harvey will include calculations in the next report that will describe any floc build up. His experience is that the floc incorporates into the sediments. In Barr Lake, the majority of the sediment may fall out in the southern end, at the inlet. The floc may also migrate to the deeper parts of the lake. The final report will evaluate the potential for sealing the sediments and impacting reservoir capacity. There may also be a concern about flushing the floc out of the lake because the retention time is so short (8 months).

Laurie noted that alum treatment options may include some land costs. Some of the land conceptualized treatment area is owned by FRICO, some by Colorado Parks and Wildlife. There are some conservation easements on some of those properties.

Katie asked about how the alum behaves when it gets cold. Harvey commented that the alum tank would have to be in a climate controlled building but in terms of the treatment process, the alum performed as expected at the colder temperatures. In the final report, it would be good to include a citation about the effectiveness of alum treatment.

The group discussed the date for Harvey to come out, September 23rd and the potential conflict with the Confluence at the Confluence on September 22nd. The group didn't think the consecutive dates were a problem. We would also want Harvey to meet with the state's permitting personnel. Laurie reported that she has had discussions with Dick Parachini. The next step is for Laurie to talk with Dick and Janet Keillor.

Steve asked the group to discuss next steps after we get the final report. The big question would be the funding. The treatment would bring in the potential for nutrient trading. We could also consider a pilot project. If there were nutrient trading options, the benefactors may provide the funding.

The alum mixing rates in the lab and the natural environment may vary. Because most of Harvey's work has been done in warm Florida, we may want additional information about how alum treatment works in colder, natural conditions. Additional watershed and lake modeling may be needed to evaluate the impacts of treating the first 50 cfs to different levels.

Harvey identified a cost of about \$100 per kilogram of TP removal. That estimate should be lower than those from a Publicly Owned Treatment Works (POTW), because the capitol costs are so low. In addition there would be more flexibility in the treatment. It is easier to treat to a 'goal' than to a specific level. There is also the potential for maximizing treatments from POTWs (and maybe across the watershed).

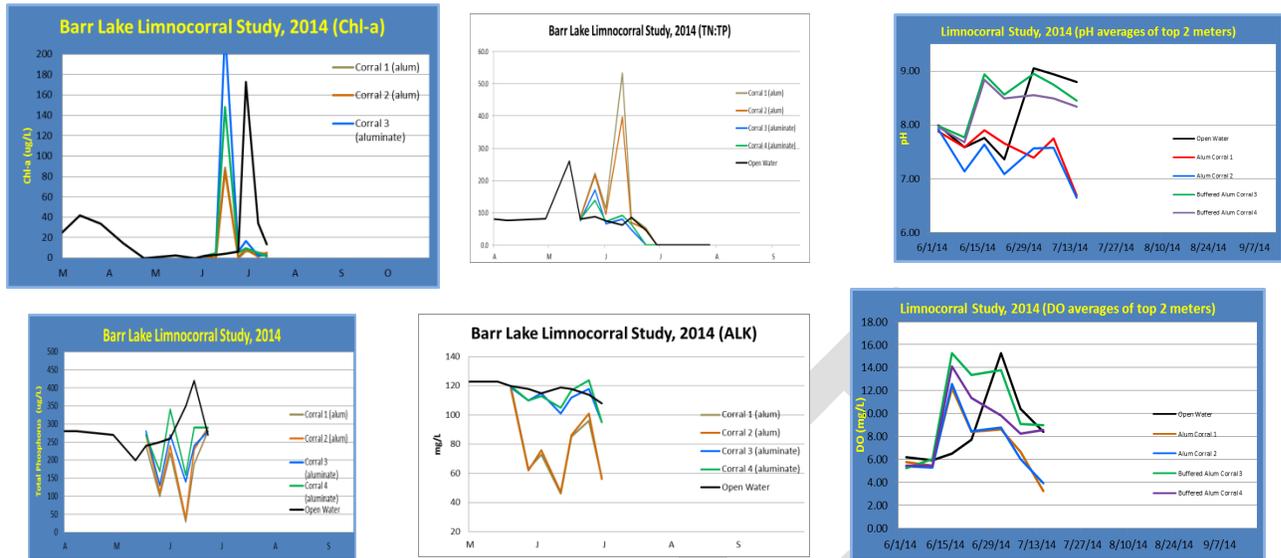
2. Carp Removal

Steve reported that composting the carp will cost hundreds of dollars. We could either use a dumpster or use a truck to haul the carp to the composting facility. We will also need a front end loader to pick up the carp. Steve said that the lake is so full, we may not be able to have the carp harvest this year. **Laurie** will talk to FRICO to see if they have plans to drain Barr Lake to work on the dam works. The collective thinking is that FRICO is unlikely to drain Barr Lake when they have water to store. Steve is keeping Paul Winkle informed and will wait and see.

3. Limnocorrals

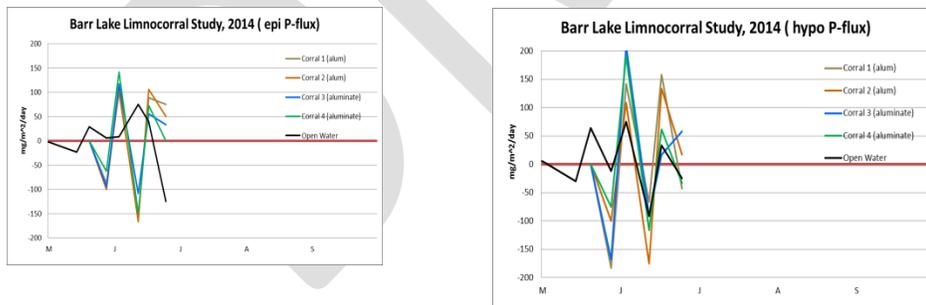
Steve reported on the data from the limnocorrals. There was one week where the limnocorrals had more algae than the open water. The algae bloom in the corrals happened before the bloom in the open water. Steve reported algae blooms in July are common. Katie reported that the bloom in Cherry Creek happened in June.

The Nitrogen to Phosphorus (N:P) ratio, TP, alkalinity, and the pH levels responded as expected. Two of the limnocorrals are being treated with Alluminate which doesn't reduce alkalinity, unlike alum. There have been three alum applications with the fourth scheduled



for later today. TP levels drop after each alum addition and slowly increase over a week or two. The corral are still not resting on the bottom of the lake but Steve thinks the mixing is minimal because there is thermal stratification. The dissolved oxygen (DO) in the corral is lower than the open water due to decreased mixing and lower algae blooms.

Steve explained how the alum treatment impacts the epi-limnion Phosphorus (P) flux. The TP reduction is very high but the internal loading replaced the TP that settles out. In the hypo-limnion the TP reduction rate is even higher. The hypo is the bottom 5 m. The epi P-flux shows that the TP from internal loading from the sediments on the bottom (hypo) is migrating up to the top 5 m of the corral.



The results of the limnocorral studies are going very well. We are getting very good measurements of the difference the alkalinity makes in TP reduction. We are also getting good information on the rate of internal loading.

4. TMDL Implementation

Jill Piatt-Kemper will be coming to the Board meeting to discuss language the Board drafted about MS4 Phase II permitting language. Denver, Aurora, Lakewood and CDOT are MS4 permit holders that discharge into Barr Lake.

5. Next Meeting

1. Tech. Committee: **August 28th**, 9:00am to 11:00am at Metro

DRAFT