Barr Lake/Milton Reservoir Watershed Association

BMW Stakeholder Meeting
October 20, 2009 - 9:00am – 12:00pm
Wes Brown Water Treatment Plant, Thornton CO

Minutes

In Attendance:

Hope Dalton – Tri County Health
Sarah Reeves – SP CURE
Shelley Stanley – City of Northglenn
Dennis Stowe – Littleton/Englewood WWTP
Charlene Seedle – South Adams Co. Water & San
Lucia Machado – CDPHE WQCD
Carter Coolidge – Brown & Caldwell
Kelly DiNatale – United Water and Sanitation Dist.
Laurie Rink – FRICO
Alan Polonsky – Denver Dept. of Environmental Health
Vic Lucero – City of Thornton
Steve Lundt – Metro Wastewater
Paul Grundemann – Centennial Water & San
Blair Corning – South Adams Co. Water & San
Kipp Scott – East Cherry Creek Valley
Darren Bradshaw – UDFOD
Alan Searcy – City of Lakewood
Jim Dorsch – Metro Wastewater
Joni Nuttle – CDPHE WQCD
Steve Jeffers – Lochbuie (call-in)

Guests

Ken Wagner – AECOM
Darcie Garland-Renn – Integral Consulting
Anthea White – Integral Consulting
Marc Lorenzen – Integral Consulting

Meeting Objectives

- Where we are in terms of loading
- Where we think you need to be in terms of loading
- What we came up with as an actual TMDL (Total Maximum Daily Load)

1. Opening

Darcie opened meeting by stating that we finally have the draft TMDL out. Ken Wagner will be speaking more about the TMDL. Darcie asked for everyone to introduce themselves.

2. Welcome Note by Laurie Rink (Board Chair)

Laurie gave introduction by stating that today is a joint meeting for the coalition for South Platte CURE and the Barr Milton Watershed Association. Laurie stated that the BMW Association meets on the 4th Tuesday of the month; however, Ken could not make it at that time, thus choosing October 20th, 2009. The BMW Association thought this would be a great opportunity to bring the two groups together and would like to thank Darcie and Sarah for their putting this together. Laurie also thanked Vic for making the room available.

Laurie stated that the purpose of today's meeting is to hear from Ken Wagner, who has been working very hard over the past several months on the first cut of the TMDL. This is the very first opportunity to look at the TMDL, and it is currently a first-cut draft from AECOM and should not be considered final. The meeting will also include a presentation from Ken explaining the elements in the TMDL. Ken will answer questions and generally talk about the TMDL.

Laurie stated that the intent, from here on forward, is to work on this as a draft and get to a point, this time next year, to have a final form that we can pass on to the State Water Quality Control Division. During this informal process and meeting we want to get all questions out in the open, clear up any and all issues, and get the State involved in the process before it is finalized.

Laurie understands from Joni that the State has been in touch with EPA and asked about EPA's first impressions and how they are feeling about how the TMDL is put together. It will be great to have feedback from EPA in the next several months and incorporate some of their comments and issues before this TMDL is finalized.

3. Overview of DRAFT pH TMDL by Ken Wagner, AECOM

(Presentation can be downloaded from the website)

******THE FOLLOWING NOTES WERE TRANSCRIBED VERBATIM FROM A RECORDING OF THE MEETING. An audio file of this meeting is available online at www.barr-milton.org******

OBJECTIVE: What we did, how we did it, and show it in three steps:

a. Where we are at in terms of loading
b. Where we think you need to be in terms of loading
c. What we came up with as an actual TMDL (Total Maximum Daily Load)

The problem is the daily time scale is not really relevant to those lakes. By law it must be expressed that way. Does not mean you have to manage it that way.

Part 1: Where We Are

(Slide 1: Table 1.1) We looked at all actual pH data that was available through 2002-2008 and came up with these statistics for the two lakes. The bottom line is you are to stay at a pH of less than 9, 85% of the time. The mean is over 9 for surface waters in the summer only. Maximums at least not 10; at least historically. They're reasonable approaches to get an idea for where we are at in each of these and we are obviously not where we need to be.

pH being predominantly high is a production of photosynthesis by algae. We have a lot of algae because we have a lot of nutrients. Phosphorus in particular is the one we worry the most about. You can have a healthy debate over phosphorus vs. nitrogen, carbon, or other trace nutrients. It is generally accepted that phosphorus is your primary target. There is no way to create much algae if you don't have phosphorus. Nitrogen, which is generally the second choice, you may get some results. However, a lot of the blue green algae that we are most concerned with can fix gaseous nitrogen which comes out of the atmosphere and into the lake water. You can't control that. I do not suggest pushing for nitrogen control without phosphorus control. Both is fine but you have to get the phosphorus.

(Slide 3) The catch is that the value at which we start seeing pushing returns is that phosphorus doesn't really lead to higher algae, not in a linear sense. Around .1 mg/L and the point at which more phosphorus ever leads to more algae is .2 mg/L. We are 2-5 times higher than the highest possible phosphorus beyond which it doesn't matter. Has an inflection point at around .1 mg/L. It has to come way back before you start seeing any reaction. The pH being high is a photosynthesis process... 1mlg/L equals little algae. This feeds into some of the lack of relationship we have been seeing.

(Slide 4) The watershed is this huge area that goes out into the Rockies. It is the whole South Platte system. The watershed we are dealing with is this red chunk, includes most of Denver and the areas downstream. The reality of this is that we have turned the quality of water downstream into something very different than upstream, and that water is diverted over into each of these reservoirs to fill them each winter. This changes everything about the water chemistry.

(Slide 5) The Relationship or Lack Thereof: Chlorophyll vs. phosphorus
The lowest numbers we have seen in Barr in the last 7 yrs or so is .25. There are a few lower ones in Milton but they are in the winter; in the summer it has never been below .2 . Phosphorus is not limiting algae production. We need to make phosphorus the controlling thing and we know that that works.

(Slide 6) Chlorophyll vs. pH
With high chlorophyll you get high pH. When you have low chlorophyll you don't necessarily get low pH. The issue here partially has to do with fluctuation with the amount of algae and time scale in which things are measured and the alkalinity in the water. Alkalinity is the measure of the ability of the water to resist change in pH and you have fairly high alkalinity in these lakes.

Summer is when most pH violations occur. Mid June to mid September has twice as many pH violations as the rest of the year put together. The catch is, in the summer, what is going on is that you have high phosphorus values and that pH fluctuates around 9. Don't know what is going on here but I believe, and data supports it, that the background pH data is around 7.6.

(Slide 8) This is just the schematic of the watershed. I boiled it down to this for simplicity. You have the two lakes connected to the BB Canal. If you are looking for what happens where, this is the simplest way to look at it. There is a map that shows which watershed is which.

(Slide 9) This came from comments about wanting to see a breakdown in model. So what we did was to take each influence that was itemized out, run the model, and see what the change in concentration was. So we are actually looking at it as a percent change from current conditions if you simply remove that influence. We did it by removing the influence of phosphorus; we didn't do it by removing the water. What you come up with is the ability to say which source represents what percentage of the phosphorus load of concentration if each of these two reservoirs under the current prevailing hydrologic conditions. This is based on 2003-2004 to calibrate the data. Pretty reasonable match to what Lewis and McCutchen have done; they are in the same ball parks.

The ones most important to look at for Barr Lake, looking at the external load, less than 40% comes from the pump works which is Metro net flow being diverted to Burlington-O'Brian and a little better than 51% for Littleton-Englewood being discharge to the South Platte and then being diverted in. Everything else is rather minor. Nothing consequential because we have those huge loads, but those 2 are the biggies. You are looking at 90% plus.

Jumping off to Milton, most of the Metro waste water for when it is normally discharged comes in below the diversion of Burlington-O'Brian, it can go down and be picked up in the South, the Platte Valley canal, and that can wind up being about 79% . Littleton-Englewood is still the next biggest thing

because of its size, it is getting much more dilute going downstream than a lot of other things coming in, most definitely the Metro discharge, and it winds up being a little better than 5%. Those two together are like 84% of what is going on over there. The other biggies for that area are all the sub-watersheds. The other influences are the other treatment plants and chunks of watershed that come in like Clear Creek and Big Dry Creek. This point source is important from a TMDL perspective. This break down helps us understand where things come from and where you are going to have to go to get the kind of reductions we need, doesn't tell you what the reduction has to be. The other piece to this is the internal load.

The general rule when you have high phosphorus concentrations in the water it is very hard to have anything come out of the sediment which is based on equilibrium chemistry. The cut is about .1mlg/L. About half of all phosphorus coming into these reservoirs precipitates out and ends up on the bottom bound to iron or bound to organic forms making some other things we have never tested. If we could lower the phosphorus concentrations it will sky rocket the internal load. If we could control the internal load we could make pretty good headway, even without the external load. There is potential there to make a difference. In terms of the internal load the conclusion for Barr: refer to slide 8 and 11

(Slide 10) Comparison of three different efforts. TP loading estimates for three canals in the Barr-Milton system. The percentage break downs are based on our model. The model is showing the direction of change in the order of magnitude, where you need to choose the average value. Work with an average value with each of these lakes. How important is the internal load? We don't know the actual answer yet. (Recorder 33:40)

(Slide 11) Narrows down to what are existing load is. Not a TMDL. Did not want to give rounded numbers so one could go back and calculate for same results. That is where we are at in terms of what is coming in.

Q & A

Q: (Recorder at 18:37) What type of phosphorus values are associated with the 7.6 (Slide 6)
A: 0.02 -0.05 It's not high. Definitely less than 0.1. We are trying not to get to background here, at least I don't expect to see that. We need to get somewhere to where we stay below 9.

Q: Why would one not have a dashed line (Slide 6) that implies there is something real there?
A: We could do that. Not a bad idea and what you are saying makes more sense. (Action Item 3) When you have values fluctuating around the place the phosphorus really doesn't matter that much at this point. It is averaging somewhere close to 9 and that is why we are in trouble.

Q: Could the numbers go up sustainability? (Recorder 36:20)
A: Yes. It could be higher than what it is right now.

Q: Mark Lorenzen: (Recorder 37:00) I am curious about the background pH about 7.6. – did you calculate the equilibrium with the atmosphere of pH with the absence of any photosynthesis or respiration?
A: No because that would not be realistic in any of these lakes. You are going to have photosynthesis and respiration. All I am doing is looking at others lakes in the area that don't quite have the problems these do and trying to see where they might come out in terms of a normal pH.

Q: Mark Lorenzen: The equilibrium of the atmosphere of when you are trying to project what the lake would be as you intercept with no productivity if that would be the appropriate number and it turns out to be about 8.8 for an alkalinity of 200 mg/L. I think that is worth looking at.
A: Ken Wagner: You will have to explain that to me because I don't know if we have 200 mg/L of alkalinity. And I don't know how you got the equilibrium with that but I understand what you are saying. (Action Item 4) About 150 is normal average (Recorder 38:05)

A: Suggest it would not be appropriate because of alkalinity – based on how you remove phosphorus. If you just lowered phosphorus. Levels you would not get…… just don't know what the numbers would be.

Q: Could you look at 85th percentile?
A: We did. Did the same thing.

Q: Internal Loading – thought the IL is based on assumptions on the model on release rates instead of …. I don't think we have done core samples.
A: Sediments samples need to be taken for phosphorus levels. If a lot of it is organic you need to see how much is…. In the model, the way the IL is calculated by process of calibration. Saw a decline in the model. Annual average declines after original loading. In the summer it comes back again. Must be coming from something internal. Algae off the bottom, sediment release and assumes constant settling rate: not true. It actually changes and model does not like it. Does not make up for the difference. For it getting re-suspended makes perfect sense to Ken. Three different mechanisms: take some off the top, mixing system, the internal recycling process is the weak link.

Q: Use internal loading as background. Not part of a load. Would that happen to us?
A: I don't know. A lot is from pass point loading. Part of the load not a white source. It is real. Ken has kept it separate.

Q: Table 3.3 Slide: Platte valley canal – model results seem to be too high – did you try to reconcile the major difference there?
A: Yes – don't have an easy answer.

Q: Taken the values and using mean, mean is almost double of the estimates you are taking.
A: If you don't like the way the data looks not his place to take data away. Just want everyone to see all

data. Real answer is in the 40's.

Magic allocation: the numbers you want to pay attention to:

(Slide 12) If we would like to get a target in the summer these are the loads that we can have for each of these sources. These are assumptions. These are the values that would lead the concentration of phosphorus. For summer. (recorder 52.01) You can play with is on a mass prod

Q: How did you handle the loads, meaning Barr going… are there?
A: Once it is in Barr, we are tracking it all the way through from each thing. The internal load generated from Barr comes out and is considered to be part of non-point source to Milton. Everything else is tracked as contribution from treatment plant. All goes into Barr. This used for a TMDL purpose. There are only 3 permanent discharges that go into Barr.

Q: How did you account for contribution from Metro waste water?
a: Waste water is tracked, if there is a loss process it is tracked. Slide 9. Pump works to Milton. It is tracking it all through the system.

Q: Is there is a mechanism to separate contribution/ actual water from an unknown source?
A: Slide 8 – Ex. Sub-watersheds
Those were the target loads. Represent wasteload activity.

Q: What is the average period for the example given?
A: It is the design target; it does jump around but not widely.
Hardly see treatments plants it .5mlg/L
To get down to less than .5mlg/L you have to had an anticoagulant and let things settle.
In order to meet a PH target we need a 95 percent reduction of what is (recorder 1:02)

Q: What were the kilograms per loading?
A: Refer to slide 12 – have to reduce internal load (can get 90% reduction)

Q: Are you familiar with the Klamath Lake? Most of the water load happens in the spring: rational is spring conditions exacerbate… Recorder 1:05
A: Based on the current loading pattern. There is nutrient criteria -

Q: When you say they – what number are you saying?
A: .082 from warm water reservoirs. In general, numbers ken is coming up with it is the right ball park.

----------Break at 10:15----------

Margin of Safety: No slide made;

(recorder – folder 2) A proper TMDL- a load allocation – a margin of safety= what you do if you include measure of uncertainty. Can do implicitly or…. We have chosen to do it implicitly. We have picked the lower ones; ones that have made sense. We have not considered alkalinity. The prevention of algae blooms will… We have incorporated a lot of internal load into this. In long run we have to incorporate it. Have covered ourselves for our future load. This TMDL we be revisited before anyone gets near it. This is probably not the final number.

Idea of variability and how you get into a TMDL:
Feature of variation – if you have any set of biological data; when you down in the low range, numbers are tight, high range, numbers are spread out. The variability is best characterized by standard deviation over the mean value. If there is a big mean value there is more spread around it and if there is a small mean value there will be a tighter spread around it. In order to figure out what distribution is over time, we have to know what the variability is/characterize it. Not managing pH per se we are managing phosphorus. The best evaluation of variability to loading to these lakes is the flow through the canals and the flow is fairly constant. Slide 13. 1995-2005. What portion of the variability are we going to capture?

We are concerned for the high end (15%) of PH. Bell curve. What is the maximum load allowed?
It is based on variability of flow.

(Slide 14) What phosphorus looks like graphically. Humps are the refill periods. Slopes are in the Spring. Water comes in at different times of the year which may change the variability. Brought on by internal processes and flow of water.

(Slide 16) Actual existing load and target load. Three is also a seasonal split on TMDL. The flow in Platte Valley canal is 86% and Beebe is 14%. The load from Platte Valley is much higher and important than the load from Beebe.

Q: Are these flow rated measurements that you are doing with your phosphorus? Concentration based. P.20 of handout.
A: In is concentration. Barr gets filled up first and Milton slightly after that. They will be impacted by their refill. If filled at different times you will get different concentrations.

Q: Do you know if the … and would it make any difference?
A: I don't think it will make much of a difference.

Q: Would it be better to irrigate that water?
A: Strongly stratified. There is internal recycling going on.

Q: Contradict something: on the point sources those would have to be itemized. The TMDL will have to show reductions.

Q: Is that a state thing?
A: TMDL has to demonstrate how these reductions occur. Related to Carlotta decision. Practicable

Q: When will hear from EPA?
A: No deadline given. Have emailed document about a week ago. First impression was pretty good but a few things missing. Whatever happens in the TMDL is not be adopted right away.

Q: What is the process – do we provide questions and comments provided by a certain date?
A: look at the alkalinity, may not be able to make it with just the phosphorus reduction. If we knew what the treatment changes would be it would provide some ideas with how to treat the phosphorus/ph. Need to know discharge allocations what they would be.

Q: What about the ms4? Do I have to split them up individually?
A: Yes but know how to do that. This is a TMDL - does not establish allocation. There has to be implementation and assign various point sources but does not have to part of a TMDL.

Q: Do we have enough time?
A: We have 6 months.
Implementation was going to be done rather than someone outside as what those things are. Putting together an implementation group – talking about phasing and who is going to do what. Discussion about the process of what we are going to go through.
Changing a TMDL is redoing it. Legitimate to ask for a review on how to do it.

Q: What about a TMDL that is non-point sources?
A: You either figure out how to make it happen or you don't obtain these sources. Nonpoint does not have a driver/regulatory process. Gets wrapped up in a new AA.

Q: You mention phased TMDL. If phased TMDL is an option, what point should we be talking about it?
A: Now. We should start now. A phased TMDL is an option. Issues are going to deserve further discussion to break and manage. WE need the division input. Think about what is appropriate. EPA needs to be on board.
This is when it is going to happen, this is the point sources are going to happen: you have to have a plan and have to stick to it. Having a phase TMDL will not cut it. There will be phased implementation.

Everyone in the group concerned about implementation. If we are going to pursue a phased TMDL, the decision needs to made ASAP. (go back and talk about approach and next meeting cover, get first round of comments) how do we proceed forward, phasing a TMDL, implementation?

Assumptions you have, working on the models, can be covered here. Open lines of communications in reference to actual TMDL's, calculations and issues of how that is put together. Submit ideas, comments to Darcie (things we would like to see tried)
What alkalinity would we need to be at? Pick a target in alkalinity?

Discuss further comments/ ideas/ meeting in December? Two different kinds of conversations? Procedural meeting? Technical meeting? Implementation?

Q: TMDL Process – what is the difference between phased and adapted TMDL?
A: (Post difference between phase and adapted TMDL – Darcie) By 24th of November – comments to Darcie. Schedule meeting about phased vs. adaptive.

4. Meeting Follow-up Action Items

The following action items resulted from the meeting. Individuals should follow-up on these tasks.

1. Ask the State to come to the February Stakeholder meeting to discuss permitting following TMDL development.
2. If there are State or EPA questions about implementation and regulatory issues, keep track and ask Joni to inform us at a later date.
    - Q: What does this really mean regulatory-wise?
    - Q: What are the implications for the various parties?
3. For Ken Wagner: Change Slide 6 to a dash graphic
4. Mark Lorenzen needs to contact Ken personally to discuss the average alkalinity.

The meeting adjourned at approximately 12:00 p.m.