

Recycled Water Committee Meeting

Greenhouse, 2500 E. 23rd Ave.

April 26, 2016

Facilitator: Lisa Carlson

Members present: Scott Gilmore, Raeann Gagne, Liz Drogan, Steve Geist, Rob Davis, Thad Jacobs, Jay Rust, Russell Plakke, Brenley McKenna, Katie Knoll, Sonia John, David Matthews, Sonrisa Lucero, Damian Higham, Mark Cassalia, Deb Binard, Doug Woods, Al Polonsky

Agenda items are as follows:

- Lunch, Agenda Review, Introductions and Ground Rules
- Mitigation and remediation effort of P&R (Doug Woods)
- Water quality in the city ditch distribution system (Al Polonsky)
- Break
- Ideal Vision for this group
- Report out and organize by Strategic Goal Areas
- Next Steps and Action Items
- Adjourn

Lisa: (Introductions were made)

Ground rules were covered last time, but I thought they should be repeated. The ground rules for this meeting include one person speaking at a time, be concise and share the air so that everyone can participate, please speak up during the meeting and avoid the 'real' conversations that happen during the breaks, be hard on the issues and not the people. I've never seen it helpful to personalize things because it escalates conflict and doesn't help during deliberations. For decision making rules, though we won't be making any large decisions today, future decisions will be based on consensus. The goal is that everyone will understand the reasons for the decisions. The fall back to this, because this is an advisory committee, is that Denver Water and Parks & Rec are going to have to take what was said here on advisement. If we are on the border on everything we will want to work to see if we can reach consensus but if we can't because of the time elements then we will have to work off of the majority votes that are present. The last rule is that misery is optional, if you need to stand up because your back hurts then please do, please use the restroom if it is needed and feel free to let us know if more breaks are needed or the agenda isn't working for you. Please silent your cell phone before we get into the meeting. Feel free to record the meeting if needed or request it from Raeann but the recordings are for the meeting group only. Do these rules still make sense?

(Agreement from the group)

Doug: Presentation (**Parks management of Reuse Irrigation Site**)

David: Trying to understand the first bullet on slide #4.

Doug: I just poorly worded sorry. We haven't seen anything in the soil samples that would recommend us to use gypsum.

Sonia: I believe they have been using gypsum in Park Hill/City Park Golf Course. Is this under your direction?

Doug: Park Hill Golf Course is not a Denver Golf Course. City Park is under our golf side. I can't speak for Golf but I will have follow-up with Scott Rethlake and get back to you all.

Sonia: I think the Denver County Club uses as well.

Doug: We will find out from Denver Golf.

Scott: I will find out and get back to the group.

Sonia: There seems to be a lot of a conflict between using the sodium blocker (calcium sulfate) which I believe is gypsum being used in various parks you listed. On previous slides you mentioned you didn't see a problem in the soil so gypsum didn't need to be added. So what am I missing there?

Doug: That was the recommendation we received from the study using recycled water from the soil samples. It's cheaper for us to put down fertilizer, lower risk for us. We have many acres of athletic fields putting down nitrogen 5-6 times a year, it's easier for us to put down fertilizer instead.

Cindy: Just to clarify on the previous slide soil samples were for the trees & salinity but this is for athletic fields with high use right?

Doug: Yes. We have five locations with the fertigation injection system, at other locations we have to manually apply the application.

Lisa: The fertilization injection systems is for the high use athletic fields right?

Doug: Yes

David: These are not in the park parks but athletic fields?

Scott: The athletic fields are in our parks.

Sonia: Is this just by the trees and not the meadow area?

Lisa: It's not where kids play volleyball or soccer it's in the athletic fields area.

Scott: What he is saying is we're looking to add the fertilization system in City Park, Wash Park, and Central Park not just the athletic fields.

Doug: Wash Park and City Park are of a concern so why not put the system in there we already put down fertilizer and it does not affect the water supply.

Lisa: So you're looking into that now to see if anyone else has applied it.

David: This is going against what we have read/heard from other park people say to the extent of the SAR ratio and putting down calcium that's what I read and seems to be a problem.

Doug: We keep doing soil samples out there. It's a real small amount it's a mixture of fertilizer and sodium blocker it's all going in at the same time.

Jay: Doug you mentioned doing more research, on other areas using sodium blocker, will you bring back this information to us?

Doug: Yes, definitely.

Sonrisa: Can you talk about what the fertigation system is and how it works:

Doug: System fits into the irrigation pipeline there is a small injector to the tank it meters it, mixes it to distribute into the sprinklers in small amounts only as needed.

Sonia: The reading I have done suggested trees are more sensitive to the high sodium levels rather than turf grass for intense. Wouldn't you want to start with using the sodium sulfate in the urban forest area rather than the parks?

Doug: Again this is where we are and where we've been. I think what we want to do is have a framework of here is what we have tried out there. This is just a starting a point. Then they say you know this is not working stop using and try something else. What's good with the fertilizer injection system you can modify what you put in there. With this committee we need to get more clear recommendations and more research.

Mark: So Doug is the sodium blocker and fertilizer separate?

Sonrisa: If I understand correctly, due to a separate study, there was a recommendation that because of the use of recycled water, we should use calcium sulfate because it would be easy to use with the fertilization injection system which you have in specific turf areas. As for the trees, you don't have the fertilizer injection system that feeds the tree areas and the soil samples coming back from the studies in those areas are saying it's not the salinity of the soil and therefore not recommending to use calcium sulfate blocker.

Doug: You said that better than I did so thank you.

Sonrisa: The only other thing I would like to add from the last conversation. If I can remember correctly, the calcium sulfate treatment is most helpful with preventing compacting the soil and not necessarily with the uptake of the salts into the plants itself and for reason for calcium sulfate for the compaction of the dirt not to prevent the uptake of the salts into the trees. If I have that correct. From the last presentation was the calcium sulfate might be less effective in conifers and pines in uptake of salts into the system it probably not the solution were looking for because of the soil compaction has very little to do with the salts the plants are up taking we can look for another solution for that.

Doug: Minimize soil not break it down.

Lisa: So what you're saying it's most useful to use calcium sulfate application on athletic fields because you have more compaction, but you're still researching this.

Doug: Yes

Lisa: So you're still talking to people about this and will get us that information to us.

Doug: Yes

Sonia: Doug what has been your experience with potable water collection if you use it and where how would you evaluate the salts if any?

Scott: I will actually cover that. There is a few things I want to touch on first. As part of the forestry department we are looking at a wide variety of species that might be able to handle the salt content a little bit more. In Wash Park since 2011 we have removed a little over 200 trees not due to all that but do to recycled water, but a lot of our trees have aged closer to a hundred years old it's just part urban forest in Denver will continue to regenerate especially in Denver because our trees don't actually

regenerate we have to replant them. We have actually lost 270 trees in the park but planted over 500 trees. We're looking at those different species that might be able to handle this a little better. We have had serious drought issues in the City. The parks department even had to shut off the irrigation system for the Summer and let stuff get dormant (all the parks were brown and the trees), the trees actually the trees take it a little harder than the grasses. Evergreen hill in Wash Park lost irrigation for over a year as you know it really caused some issues. We just planted 250 in Wash Park on Friday, April 22nd. I was walking through the park from my personal view the conifers seem to do better on a flat surface rather than on the hill. It seems more logical that when you're watering on the hill the trees are taking up more of the sodium their not leaching so that play at big part in where having the challenges with the conifers. So one thing we did do is move forward with (like I don't you guys there are just some things I'm going to do I'm not going to sit around wait) we went out and bought a supplemental irrigation system. We worked with Denver Water to get access to a fire hydrant next to Evergreen Hill and doing supplemental watering. We are aerating pretty heavily. Evergreen Hill is one of our challenging areas, it's considered historic in our master plan very special part of Washington Park so we need to make sure we are taking take care of it to the best of our ability so we are doing supplemental watering on the hill.

Lisa: We are running a little behind and I know Al's here. Are there any other pressing questions? Sorry about the miss spelling of your last name Al.

Al: Presentation (Recycled Water & City Ditch Lakes)

David: Can I ask a question? Can you explain the logic you been analyzing on the chlorine but nothing for the sodium/calcium?

Al: I don't have a lot of sodium data. When we (City) sample we don't have all the resources. If sodium was an issue then we would address it.

David: How often do you analyze data lakes and when?

Al: Once a year in mid-Summer.

Russ: Do you have any other data back from before 2003?

Al: Yes we do I have them in the back I just didn't want to over-do it. Do you want me to show it to you?

Russ: The only reason I ask because in 2003 the city ditch was actually on potable water. So it actually doesn't talk about the raw water.

Al: In 2003 there was no water going into the lake at the time I sampled. The lakes were actually low at the time we were sampling.

Doug: So actually it's showing us that it's going down.

Al: Yes, it could be climate related in 2015.

Sonrisa: So is this for Wash Park?

Al: Yes, for Smith & Ferrell Lake and Grasmere.

Sonrisa: So the two in red are for irrigation.

Al: Yes

Demian: Do you know the percentage of the storm water vs city water?

AI: My understanding is there is very little storm water in the ditches since the transition to this system the recycled water come out of the plant near South HS (its underground).

Mark: In the lakes?

AI: In the lakes there are some storm input it's not as much as you would think. Smith has direct connection to the drain.

David: The maps that we have from Denver Water show several number of street drains from the eastside of Wash Park. It's dated 1991.

AI: I would like to take a closer look at the map.

Lisa: Storm water runoff into the lakes and ditches AI will follow-up.

Scott: When are you testing?

AI: July or August

Demian: Can you explain what solar bees are and how this affects chloride?

AI: I don't know if I can tell you the answer but I can tell you my theory right now the solar for those of you that don't know are those units that lake water with solar panels. Grasmere Lake has two of them, we use to have some in Duck Lake. Basically it's a hose that goes and sucks water down to the bottom then produces back up to the top to keep the water mixed.

Sonrisa: When were the solar bees installed?

AI: I think Denver Water put them in 2005.

Doug: Either 2004 or 2005

Sonrisa: It would be really interesting to test your theory.

AI: We will get to do it.

Brenley: Are the lakes lined?

AI: Grasmere is lined. I don't think Smith or Ferrell is.

Doug: We can check to see if Ferrell is.

Brenley: Ok I was just asking. If ground water even being introduced.

Doug: We can double check with Waste Water.

David: Smith Lake is where the irrigation water comes through in Washington Park. Has there been any analysis on what's in it?

AI: Environmental Health's list of parameters wasn't designed to address landscaping needs.

David: We don't know what the irrigation water is.

AI: We know what's the water, what bacteria it has, the nutrients, the PH levels, the oxygen, etc. We just don't address landscaping it's not part of our on-going list.

Doug: Denver Water has a dechlorination plant where the recycled water enters.

David: Dechlorination plant? You dechloride the water?

Russ: The state requires before you water or provide water that there be no chloride residual, in order to take the chloride residual out the simplest format is sodium by salt is the safest chemical we utilize 20 % sodium/salt, we use about 2/3 part of that to take out the chloride so about 1/2 or 3/4 of it be added to the water.

Lisa: All right move on with presentation.

Sonrisa: Grasmere has a sufficient variance than Smith Lake from 2012-2015. Do you know why that might be?

Al: I think it has something to do with the solar beams.

Sonrisa: In 2012, I'm wondering if something changed in the water sources.

Al: Yeah you would think so.

Demian: Wouldn't chloride be conservative it's not going anywhere.

Al: It's not going anywhere but the out flow.

Demian: Unless there is amazing amounts of evaporation at Grasmere rather than others there is something else going on there.

Lisa: Is this something we need to refer to our technical committee? Look at possible variations and what they should be.

Demian: Yeah

Lisa: Is it worthwhile or is a waste of time?

Russ: I don't think it has much value as far as landscape application. It's an interesting equation but not sure it has that much value.

Lisa: Where do you pull water out of?

Al: Smith

Sonrisa: So it really doesn't matter then.

Lisa: So it doesn't matter?

David: What he has been focused on is calcium, sodium, and magnesium that is what he has been sampling for. What we need is a structure sample program to identify what water is used at Washington Park.

Lisa: And that's why you are here.

David: That's right.

Rob: You got this data on mussels and clams, do you have any data on plants?

Al: No I haven't. It would be different. This stuff I'm taking about is living in the water. Plants is more landscape

Jay: Should that be explored further?

Rob: I would like to see it but I think it's a long-term process and complicated. It's just complicated how do chloride levels relate and H2O quality relate to landscaping species it's just a long-term process.

Lisa: I will put on the list for long-term data on chloride and how it relates to plant species.

Sonia: Water reuse foundation. There is some data on chloride and plant tissue. I have the information written down I can give it to Rob, it's the Salinity Management Guide do you remember that it's from the meeting last month CD for Bahman that he showed us it's on the website.

Lisa: So you will get me that information?

Sonia: Yes, I will email it to you.

Sonrisa: The chloride levels has decreased at Ferril.

Scott: What were the chloride levels at the plant before were they over 200?

Russ: Do you mean in our water?

Scott: Yes

Russ: They have been steadily increasing. Don't recall exactly where there at, it looks similar to the chloride levels in the water, I would have to get this data I don't know it off the top of my head. This is one the chemicals we are seeing concentrate up incoming water plant.

David: Someone help me with the logic here. There is a dechlorination station coming into Wash Park but yet were taking chloride reading in Wash Park and City Park and it continues to go up. What if we didn't have that dechlorination system? I'm trying to get the logic here.

Russ: Let me speak about what the dechlorination station is, it's just there to remove the chlorine not chloride. Chlorine will eventually react and part of it will turn into chloride. Chlorine cannot be put into any waters of the state otherwise to desist order and you can no longer do it and get charged a lot of money. Even with drinking water we have to remove the chlorine and discharge water of the state. So in essence we have about 1 or 1 ½ parts chlorine in the water for various reasons and before we can put it in the city ditch we to then take it out it takes about 1.2-1.5 in between there sodium by salt part chlorine in order to remove. We're destroying it.

Sonrisa: What about chloride?

Russ: There will always be chloride. We cannot take out chloride with the system. Just taking chlorine out.

Lisa: Did that help a little?

David: This just adds to the complexity here.

Lisa: It's very complex.

David: First we were talking about recycled water and what it is and now we've taken a whole other step once we get to city ditch, pond, and trees being watered. Let's see where we get.

Lisa: One of challenges with is process is were all not supposed to be scientist and won't understand all the complexities but certainly raising the issues and turning to those that have the expertise, and we can ask what's up with this or that? It's a little frustrating because we all won't understand but that's why we are all here around the table. With all the different minds I think we can all come up some great

public policies even though we all may not understand the science behind it. Sometime scientist don't even have all the answers.

Doug: The importance of what Al does for us. He works with us address algae on the lakes. It's really important that we have healthy lakes. One of the challenges with irrigation is getting it to plants.

Scott: I know I stepped out the beginning of the meeting my apologies. Al has been working real close with our park staff with Wash Park and City Park lakes on water quality and aeration. We have spent around \$100K on aeration.

Mark: Wash Park (Grasmere) right now we have two solar bees. The plan is to move one over to Smith. There an aeration unit made by the same company but the one thing different than the bee is it the number one thing is its electric, its aeration so it pumps up air. One of the problems at Grasmere Lake is that sometimes with the solar bees tend to vegetation but then you have to treat with chemicals, you have to treat it well or it will reflect the oxygen. Solar bees do not add oxygen it only mixes it up. Does that make sense? With moving one of the solar bees over to Smith I'm interested to see what happens after it gets mixed up.

David: Can you go back to slide on Chlorophyll-a? (slide 11) Are we looking at a 9-10 PH for those lakes?

Al: Yes

David: Woah

Brenley: I think copper-sulfate it can help with this. It has been used in other places where I have worked.

Al: We do treat it when we see the high levels. Once I see it I send an email over to Parks staff to let them know.

Lisa: So you test it then treat it to bring the levels down?

Al: Yes

David: So let me get this straight the high PH levels at Wash Park for irrigation PH level is a 9?

Lisa: Is this all the time?

Al: Mostly in the Summer when there is algae growth. When I see high PH levels I notify parks and they take action.

Lisa: So parks takes action once you tell them there is high PH levels?

Al: Yes

Lisa: Once you tell them that is when they put in the chemical to lower the levels and how often do you do this?

Al: Yes. I only sample once a year in the Summer. Sometimes I will get call from Park Superintendents asking to come check the levels.

Scott: I don't look at PH levels. My thing is when lakes over grow we try not to use chemicals as much as possible. Public opinion really matters and weighs heavily on some of our decisions we have to make. At City Park we have a vendor who runs paddle boats (but we have an issue with algae on the lake so that is a real challenge for us).

David: I see where we are headed here with the high PH levels and sodium absorption ratio is much related to the PH levels in the water. I think there is stuff we did didn't know about.

Lisa: That is why you we are having this presentation today. It's also why we want to have a discussion on what we need to be doing in terms of data collection in terms of short-term in particular and long-term as well.

Doug: The nature of Colorado we have high PH levels. In 2013 the levels were in the low 8's.

Al: Low 8's is a good starting point.

Steve: I just have a comment I hate to go back to soil samples. Comments came up to why Sports turf folks put gypsum in the soil. Other people might be doing so because sports turf manager's use different metrics to determine when they start putting gypsum down, they measure the percentage of calcium, sodium, potassium, and magnesium in the soil. When the sodium gets to a certain percentage that is when they add gypsum. When I see the percentage of the sodium against those others I see it causing damage to the trees.

Scott: As we start testing we will have a certain criteria (levels) then we can treat that area by adding gypsum. Golf adds gypsum for turf reasons. They have higher levels due to using recycled water so they it to counteract by adding gypsum because it's a golf course.

Lisa: I will add this to the list.

David: I appreciate your list up there, but one of things not being done is not running test on the irrigation water (City Park & Wash Park). It really affects the SAR and that when it gets into the trees.

Lisa: Add to list – Consider Sports Turf Test, related to tree (protocols), run more tests for ditch water in parks.

Lisa: Let's break into three small groups (Ideal Vision for this group).

Lisa: All the sticky notes will be reviewed the Advisory Committee then we will get back to all of you. We hope this will provide some better strategic goals. What I heard from walking around were so short-team goals for the summer. Hopefully these ideas will drive our agenda items. We only have two more meetings scheduled. Scott's team needs to know what they need to do this summer.

Scott: I will not be at the meeting in June I will be out of town.

Lisa: Scott I will need you or Deb at the next Steering Committee meeting we will need to do this week or next. Our next meeting is May 17th from 12:00-2:30 here at the Greenhouse, then the meeting on June 6th will be held at the VOC from 11:30-2:00. Any other feedback, what worked or what didn't?

Brenley: Maybe a little bit more time for Q&A if there is even any more presentations.

Lisa: It seems like we have a really good dialog on presentations.

Rob: Do we have any more presentations planned?

Lisa: Not yet.

Rob: Ok

Meeting adjourned.