ARSG MEETING SUMMARY
2/23/16

ATTENDEES: Peter Butler, Steve Fearn, Bill Simon, Chuck Wanner, John Ott, Darlene Marcus, Krista Wermerskirchen, Ray Miller, Rachel Hoffman, Buck Skillen, Sandy Young, Lisa Richardson, Neil Kinnebrew, Jen Beck, Vanessa McCowan, Mike Winter, John Whitney, William Tookey, Mark Esper, Tom Schillaci, Paul Nazaryk, Warren Rider, Bob Oswald, Gene Larson, Ann McCoy-Harold, Kirstin Brown, Bob Larson, Ray Ferguson, Larry Perino, John Wright, Samantha Wright, Melody Skinner, Fred Stuckey, Andy Evalds, plus numerous students and faculty from Minnesota State University.

1:00 – 2:00 Technical Presentation

Green Age Technologies has been working with some people with ARSG since the Gold King spill. Previously they had not had experience treating mine drainage, but they've proved to be quick studies. Their patented technology is quite unique in that it uses cavitation to separate dissolved ions from water. No chemicals are added, and it doesn't use high amounts of energy. The main use of energy is for operating pumps to maintain pressures around 50 psi. They have been testing batches of Gold King, Mogul and American Tunnel water this past fall while developing this process. The demonstration unit fits on a moderately-sized trailer.

The process uses cavitation to briefly separate ions from water. They are captured in filter media before they re-dissolve. There is also a clever polishing unit with a membrane for capturing additional ions. In addition, the unit separates hydrogen ions so that it raises pH. The output is essentially deionized water and sludge containing metals and cations. The sludge is a much lower volume than is typically seen with a lime treatment plant.

ARSG would like to see a multiday test of the unit somewhere in upper Cement Creek in the coming months. So far, Green Age has made multiple trips to Silverton and continually adapted its technology on its own dime. We'd like to raise some money to offset some of their expenses for a multiday trial for both us and any other interested entities to better under the process and what limitations may exist.

Fred Stuckey and Andy Evalds explained their technology through a powerpoint presentation. The presentation can be found on our website
http://animasriverstakeholdersgroup.org/blog/index.php/remediation-proposals/

2:15 – Regular ARSG Meeting

ANNOUNCEMENTS:

- Peter noted that there is lot of interest in the Denver area on the Gold King spill and abandoned mine issues in general. He is to give presentations to the Colorado Forum and the Rocky Mountain Land Use Conference in Denver in March. Bill Gardner, Liane Jollon and Mike Wireman are to be presenting at the Colorado Forum as well.

Briefs:

1. Good Samaritan Legislation – We had representatives of Senators Bennett and Gardner and Congressman Tipton attending the meeting. John Whitney described that a hearing on the

discussion draft legislation was to have occurred, but there was a snow day in DC. A hearing was rescheduled for March 2.

2. Update on Superfund Designation Discussions – Willy Tookey described the rational for the vote that San Juan County and Town of Silverton representatives had taken the day before. Some people wondered why the potential designation covered so many sites. Some sites are much bigger metal loaders than others. For example, some sites in upper Cement Creek emit 60 lbs/day of zinc, whereas other sites listed emit 1-2 lbs/day of zinc. It was noted that some previously remediated sites were listed potentially to do future maintenance.

   There was also much discussion on what a designation would mean for ARSG. A number of people stated that they want to see ARSG continue at the very least as an educational forum. They said they've learned a great deal through interactions with everyone in the group. Others said they felt it was important for ARSG to watch over the efforts of federal agencies for the good of the community.

   The group also discussed if ARSG should apply to be the Community Advisory Group (CAG) for the Superfund site. People weren't quite sure what the role of a CAG is, and it's something we will look into more closely.

   There are some sites not included in the designation that potentially ARSG could address, although the Good Samaritan liability issues remain. Peter also pointed out that obtaining funding for projects could be challenging because the perception of most potential funders will be that the Animas Basin has a plethora of resources through the Superfund designation.

Topics:

3. Metal loading from mine sites and at the gages. Last month, Peter described how water quality, through metal concentrations, has changed for better or worse at the gages around Silverton and at Bakers Bridge. This month, he focused on metal loading. Loading helps delineate were the majority of metals come from which can help define where remediation efforts should be directed.

   The analysis he did was pretty general, using readily available data. The analysis could certainly be more refined with more effort. The metal concentrations taken each month during 2012 – 2014 at the four gages were averaged and then multiplied by the average daily flow for the month during that three year time period. Not surprisingly, the loading is highest during runoff which, because of dilution, is generally when metal concentrations are the lowest.

   Zinc and cadmium load is highest in Cement Creek (CC48) during lower flow time periods, but slightly higher at A68 during high flow. Only about 10% – 15% of these metals come from Mineral Creek (M34).

   Aluminum and iron loading is much higher in Cement Creek and Mineral Creek than the Animas above Silverton. The majority of iron comes from Cement Creek. Mineral Creek contributes slightly more aluminum than Cement Creek during high flow.

   Zinc and cadmium appear to mostly come from mining-related sources in Cement and Mineral. In the Animas it is difficult to say because we don't have estimates as to if and what loading

may come from the Mayflower tailings pond, the Howardsville Mill and the Eureka flood plain. Most of the aluminum in Cement and Mineral appears to be natural.

Iron is a little puzzling, because estimates of mining-related sources make up less than half of the loading in Cement and Mineral, but not an inconsequential amount. Yet, remediation in Mineral Creek has reduced zinc, copper, and cadmium concentrations by as much as 70%, but iron concentrations haven't changed at all. Peter hypothesized that we generally underestimate how much iron enters the system. A lot of iron is deposited on the creek bottoms and can be mobilized by storms or runoff. Sampling at the gages may often miss those events.

The same type of underestimation may occur at A68 for aluminum. Mineral and Cement usually have pH's low enough to dissolve aluminum and keep it mobilized. The pH in the Animas is high enough that aluminum can drop out on the river bottom where it may be moved downriver later with storms or runoff.

The presentation is on the ARSG website.
http://animasriverstakeholdersgroup.org/blog/index.php/meeting-presentations/

4. Discussion: Goals of mine remediation. What changes would we like to see in the river? Since potentially millions of dollars will be spent under Superfund for remediation, the group had a discussion as to end results would people like to see. Here are some parameters used as part of the discussion.

   Currently, all aquatic life water quality standards are met at Trimble Lane, about 6.5 miles below Bakers Bridge. There are fish at the confluence of Cascade Creek, although the number of fish and number of species are substantially diminished from the early 2000's. There is enough natural metal loading from Cement Creek that developing a fish population directly below Silverton is unlikely. Likewise, Mineral Creek has high enough natural iron and aluminum loading and low pH to not support fish. (We do need to look more closely at water quality in Mineral Creek above the Middle Fork to see if it will support aquatic life.) How far up the Animas River can a fishery be developed? Cascade Creek, Needleton, Elk Park, A72?

   There is an improved brook trout fishery (we believe because of remediation) in the Animas above Cement Creek up to Minnie Gulch. Can that fishery be further improved or expanded upon, or will high, generally natural aluminum concentrations prove to be a prohibitive factor?

   No human health threat related to metals has been identified, although at some point a localized threat in soils at some mining-related sites might be found. Hopefully, removing those soils may be a relatively easy solution.

   How does one identify mine sites with the potential to blowout? Blockages can be either at the surface or underground. Multiple blockages are possible. Drilling behind the blockage to gage water pressure gives a sense of how much water is backed up, but it doesn't determine the risk of a blowout. If the risk is thought to be high, reducing it can very expensive. One might need to drill, pump, and treat water from behind the blockage, then open up the mine and install a bulkhead with a pipe to modulate the flow. That could cost well over a million dollars per mine.

The group drew no conclusions, but thought the discussion was useful in thinking about what the end result might be twenty years from now.

http://www.animasriverstakeholdersgroup.org/

http://goodsamaritaninfo.org/

http://www.sanjuancleanwater.org/

Possible Agenda Items for Next Meeting:
EPA Update on Remedial Investigation data collected in 2015
Sunnyside Update on Animas Investigations
Good Samaritan Legislation