

Meeting Summary
Bonita Peak Community Advisory Group
Oct. 27, 2022, 7:00—8:30 PM
Via Computer Conferencing and
In Person at Silverton Town Hall
1360 Greene St.

CAG members in attendance: Peter Butler, Chara Ragland, Parker Newby, and Helen Mary Johnson. Online: Susan Livenick, Anthony Edwards, Brian Devine, Charlie Smith, Terry Morris, Marcel Gaztambide, and Russ Anderson, Justin Elkins and Ty Churchwell.

Also in attendance: Rory Cowie, Jake Kurzweil, Sarah Birch, and Katie McCulloch. Online: Tom Schillaci, Al Basile, Christina Prograss, Megan Schutti, Athena Jones, Ryan Bennett, Taryn Chaya, Sarah Graves, James Hou, David Heinze, Rob Runkel, Mark Rudolph, and several other for whom we didn't get names.

Introductions and Announcements

Ben Martinez with USFS has retired. Currently, Regional Engineer, Alan Macaw, is the point of contact for the FS, but that may change in the future. Also, Kara Chadwick, the San Juan National Forest Supervisor, is leaving her position shortly.

Presentation and Discussion of the Conceptual Site Model of Operating Unit 3 (Hydrology of Gladstone Area-Sunnyside Mine Workings)

James Hou started off the discussion. The hydrogeologic site model will be presented by EPA's partners. Keep in mind that this is a living document. EPA hopes to publish it in the near future.

Rory Cowie and Jake Kurzweil made the presentation of the BPMD OU3 Conceptual Site Model, Version 1 (CSM). Rory began sampling work around Gladstone ten years ago.

The controls of the groundwater system include: geography and geology, geologic structures, hydrology, bulkheads and closures, mine workings and almost 30 years of remediation work. Operating Unit 3 (OU3) includes the area between Gladstone in Cement Creek to Eureka on the Animas River. The geologic setting was driven by the tertiary volcanism and caldera collapse 25-30million years ago and then the Red Mtn uplift which occurred about 10 million years ago. The Eureka Graben (a geologic block that has fallen relative to the area around it, leaving faults around the border) is where most of the really productive mines are located. The Red Mtn complex, with its high iron content, is more acidic than other areas.

Hydrologic setting

Diagrams were shown of how water can move in mountains with different mine workings and surficial structures, and then how it looks at with bulkheads. Bulkheads reduce oxygen and can reduce reactions that create acidic water. (Hoagland et al 2020: Mineral Creek and Cement Creek paper.) In Cement Creek, the ferricrete layer underneath the stream bottom reduces the amount of surface water circulation with groundwater.

There is not a lot of difference in data between locally installed weather stations, indicating that the data is reliable. Most precipitation comes as snow: 80% snow and 20% rain. From year to year, there is a lot of variation.

In the winter, 80% of the water in Cement Creek at Gladstone comes from draining mines with the Natalie/Occident as the largest contributor. The data shows how important it is to look at multiple time windows.

Long-term draining mine data shows the effects of the bulkheads around Gladstone. With all the data, one can see the responses among the various mines. Rory believes that the Red & Bonita and Gold King are back to steady state following the Gold King release. A number of CAG members ask questions related the draining mine data.

Background

Jake discussed pre-mining assumptions related to the CSM: steady state, variability in the ground water system due to native geology, particularly faults and fractures. Fens and ferrocrete deposits indicate historic seeps and springs because they take a long time to develop. If there is currently no water associated with these features, then something has changed

Mining and Remediation: The first part of the American Tunnel (AT) was driven in 1901. It was driven under the Gold King workings, but was never connected. Yet it still acted as a drain for that area. Around 1960, the tunnel was driven another mile to underneath the Sunnyside mine where it was connected to the workings.

The first bulkhead was installed in the AT in late 1994, about 8000 feet in from the surface. It backed up water into the Sunnyside mine and over several years, water rose 1200 vertical feet. The first bulkhead reduced the mine drainage at the entrance of the tunnel from 1600 – 2200 gallons per minute (gpm) down to 600 gpm. Most of the 600 gpm came from one fracture zone in the tunnel, almost 800 vertical feet directly below the entrance to the Gold King #7 level (the portal that released in 2015). The second bulkhead was placed just down tunnel of this fracture zone in 2001. It reduced the flow at the AT entrance to 160 gpm. The last bulkhead placed near the entrance in 2002 further reduced flow to 120 gpm.

Flow increased from the Mogul mine in the late 1990's. It was bulkheaded in 2002, but there is a lot leakage. Flows from the Red & Bonita and Gold King mines didn't greatly increase until after 2002. The R & B was bulkheaded in 2015, but the valve on the pipe through the bulkhead was not shut until EPA's test in 2020.

Supporting studies

Rory discussed data gaps. While there is good mapping of the surficial geology, much less is known about the faults and fractures below ground. One publication describes a hinge fault which is thought to be the source of the 600 gpm just up tunnel of the second bulkhead. This fault starts around Red Mtn, and water in it is thought to flow west to east.

There are a number of ways to try to fingerprint of groundwater source waters and flow paths using hydrologic markers and tracers. One can track natural tracers such as stable water isotopes, rare earth minerals, geochemical conservative tracers, radioactive water isotopes, (CFC, SF6, AR gas) from anthropogenic events. These are all ways to fingerprint the water. Some of these methods have been employed in OU3.

Discharge from the Gold King, Red & Bonita, and American Tunnel have similar signal so probably the same source. Other mines have different signals. There is an east to west signal trend that may relate to the hinge fault. To the west is Red Mountain which transfers acidity and iron. Tritium shows that the water is older, so it comes from deep inside the mountain as opposed to the surface. They are starting to see more and more similar groupings that indicate similar sources of water, but there are anomalies that indicate other ways the water is moving. Older waters tend to be along Cement Creek.

Geospatial analysis

Jake discussed the hinge fault. It is NW to SE trending. The question is how far does water get to the east? Also, there are probably radial faults in conjunction with the hinge fault. There isn't evidence that bulkheads of Sunnyside that are failing, but that is still under investigation.

CAG members and members of the public asked a number of questions.

Peter closed the meeting at 8:50. The next meeting will be December 1 in Durango with the Reclamation facility as a possible venue.

Administrative Items (not discussed due to time constraints)

- ✓ Meeting Summaries
- ✓ CAG Discussion Time
- ✓ Long-Range Schedule
- ✓ Future Agenda Items? *Macroinvertebrate Data, Prioritization of Mine Sites for Goals 2 & 3, Remedial Actions for Gladstone, etc.*

8:50 PM

Adjourn