Gold King Mine spill

Animas River Basin - Southwest Colorado - August 2015

COLORADO
Water Quality Control Division
Department of Public Health & Environment

Report compiled January 2016



On August 5, 2015, an EPA team was working to investigate on-going water releases from the mine and assessing the feasibility of further mine remediation. During the excavation, 3 million gallons of mine waste water was unexpectedly released into Cement Creek. The contaminated water traveled for a week down the Animas River, joined the San Juan River in New Mexico and finally the Colorado River and Lake Powell in Utah.

Gold King Mine
Background

The Gold King Mine is located north of Silverton, Colorado on Cement Creek in the Upper Animas River Basin. The Upper Animas River Basin is a heavily mineralized area that was extensively mined for metals, predominately gold and silver, from the 1870s to the mid-1990s. The historic mining activities significantly increased the exposure of the mineralized rock to atmospheric conditions. This exposure increased the amount of heavy metals and acidity reaching surface water and sediments, known as acid mine drainage. The most common heavy metals associated with acid mine drainage in the basin are zinc, copper, lead, aluminum, iron, and manganese, with lesser amounts of other metals.

Following the release, the Colorado Department of Public Health and Environment's Water Quality Control Division immediately notified and directed downstream drinking water users to take appropriate steps and shut off water intakes until the contaminated water passed. Subsequently, staff remained in constant contact with water users to ensure water systems were informed about the consequences of the spill. In addition, several staff traveled to Durango, Silverton and the mine site to respond and evaluate water quality impacts from this release.

Water quality staff and Hazardous Materials Waste Management Division staff took surface water and sediment samples to determine the extent of impacts from the release. Samples were taken daily (or more frequently) over an 11-day period from upstream of Silverton to the New Mexico border. Samples were sent to the state lab where staff expedited analysis for publication. In most cases, the state turned samples around in 24-36 hours so decision makers had the most current information to respond to public concerns.

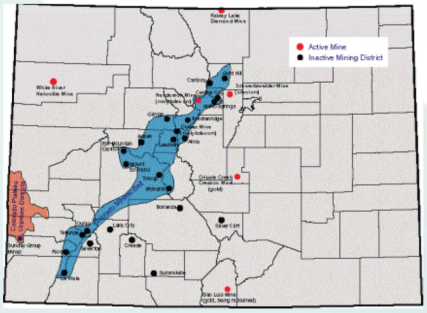
Initial sampling indicated levels of copper, lead, manganese and zinc were higher than when previously tested in June 2015. By August 11, however, the levels of monitored metals in the Animas River had returned to pre-spill levels. In Cement Creek, cadmium, copper and zinc continue to be above the historic range for these metals. Water quality staff also worked with the Division of Parks and Wildlife of the Colorado Department of Natural Resources and with veterinarians from the Department of Agriculture to monitor the effects from the spill on aquatic life, wildlife and livestock. CDPHE was in communication with local public health agencies, water users and the EPA very early on and continues to provide support on this issue.

Mining and Water Quality

Colorado Mineral Belt

The Colorado mineral belt runs diagonally across the state from Durango to Boulder.

Hard rock mining is a broad term for underground mining techniques used to excavate hard minerals usually metals like gold, silver, lead, iron, copper, zinc and nickel.



23,000
abandoned mine features in Colorado

1,645
miles of stream potentially impacted by mining

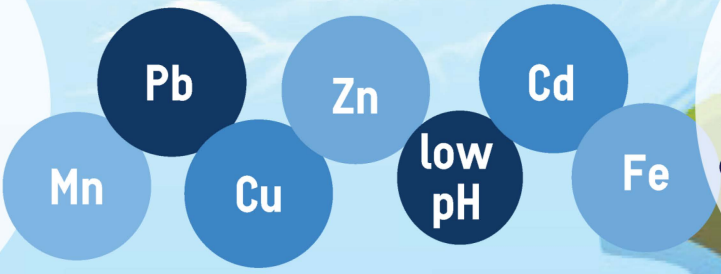
Acid Mine Drainage

Acid mine drainage is caused by a chemical reaction when oxygen and water flow over or through rock containing metallic minerals. The reaction causes the release of hydrogen atoms, which lowers the pH of water, making it more acidic and dissolving metals from rock into the water. Dissolved metals can remain in the water, or eventually settle as sediment when the pH of the water rebounds.

This natural reaction is generally caused when oxygen from the air is introduced into areas it normally wouldn't be found. This includes activities such as drilling, excavating or mining tunnels.

Common Elements

Cu = Copper
Cd = Cadmium
Fe = Iron
Mn = Manganese
Pb = Lead
Zn = Zinc



What are the Impacts?

High levels of these elements can harm plants, fish and the bugs they eat. It can also be a concern in raw drinking and irrigation water supplies.

What's Next

We are working with Colorado Geological Survey to build a complete inventory of abandoned mine features.

Division of Natural Resources and our agency will visit and evaluate draining mines that currently do not have treatment during summer of 2016.

Gold King Mine spill timeline

August 5

- Morning - Gold King Mine release occurs.
- WQCD notification process, calling Town of Silverton, Town of Durango, San Juan Basin Health, The Glacier Club, Animas Water Company, Southern Ute Tribe, and Colorado Rural Water Association.

August 6

- EPA issues statement regarding contaminated water and precautions.
- La Plata County Sheriff Issues order restricting river use.
- First local health advisory issued to the public.
- Evening - Mine wastewater arrives in Durango.
- Joint Information Center opens, WQCD begins working with EPA and local agencies regarding drinking water and other resident concerns.

August 7

- WQCD staff dispatched to Durango - sample from Cement Creek, Gold King Mine effluent and Animas River.
- First water quality samples are sent overnight to state lab.
- EPA Public meeting.

August 8

- Gov .Hickenlooper issues disaster declaration.
- WQCD sampling data shows pH and metal concentrations decreasing to pre -event conditions.
- Mine wastewater reaches confluence with San Juan River near Farmington, NM.
- EPA citizen meeting.

August 9

- City, county and local public health agencies declare disaster.
- WQCD interfaces with congressional staff.
- Public meeting organized by San Juan Basin Health and La Plata County.

August 10

- Press release - Gov. Hickenlooper to hold state briefing for communities impacted by Gold King Mine release.
- CDPHE Animas River spill website live.
- WQCD publishes water sample data.
- EPA establishes incident response center - Durango.

August 11

- Gov. Hickenlooper visits Durango.
- Press release - Contamination in Animas River continues to decrease.
- CDPHE, EPA and Southern Ute tribe tour mine site and hold meeting with tribal members.

August 12

- EPA Administrator Gina McCarthy visits Durango area.
- WQCD assists with monitoring and flushing irrigation ditches.

August 13

- Additional WQCD staff arrive to assist with monitoring and field work from mine site above Silverton down to New Mexico state line.

August 14

- La Plata County Sheriff reopens river to recreational use with health advisories.
- WQCD staff survey temporary mine wastewater treatment plant with EPA remediation team.
- City of Durango resumes using Animas River as raw water supply.

August 20

- WQCD Dir. Pat Pfaltzgraff presents at public meeting and hosts Q&A session.
- WQCD staff participates in community meeting.
- WQCD requires public water systems to sample water for two months to determine possible impacts on drinking water from Animas River.

September 2

- Press release - Trout in Animas safe to eat.

September 9

- Staff continues to support local water companies and water treatment plants with sampling.
- Additional water sampling required for Animas Water Company due to temporary elevated lead levels in one well.

Photo series showing the daily progression of wastewater from the Gold King mine spill moving downstream via the Animas River as viewed from Trimble Bridge in Durango, Colorado (August 6 – August 20, 2016). Photos courtesy of the Joint Information Center.

August 6, 2015

August 8, 2015

August 13, 2015

August 18, 2015

THE SPILL BY THE NUMBERS

Response & Support

15 minutes between initial notification and division calls to public water systems.

25% staff involved in incident response

engineers, statisticians, field services, physical scientists, communications and management

Focus areas:

- Drinking water
- Private wells
- Recreation
- Agriculture & livestock
- Fish & aquatic insects

3,446 total hours working on incident related tasks.

905 onsite hours

Samples/Data

>100 = factors analyzed

Stream miles sampled

83

from the mine to the state line

36 drinking water
61 surface water
36 sediment
+ 2 fish tissue
135 samples

Communications

Can I go fishing?
What are the longterm effects?
Can we swim in the water?
What about my well?
Can I water my crops?

WQCD created

22 OUTREACH DOCUMENTS

Map, FAQ's, definitions, press releases, visual aids, and health information

11,057

webpage visits in 6 months

(twice as many as our main page)

Lessons Learned

- [x] Identify key roles and responsibilities in the Denver office and at the incident site.
- [x] A visual hierarchy or other organizational chart with contact information for key roles and responsibilities in the Denver office and at the incident site is critical for efficient coordination.
- [x] Determine expectations of WQCD role and associated resource needs.
- [x] Develop sampling and data analysis protocols for different types of possible incidents - fire, flood, spills, etc.
- [x] Create deployment box that can be immediately sent to an incident for water quality monitoring and sampling. Develop plan for replenishing materials for longer term incidents.
- [x] State agencies need to collaborate on who establishes health recommendations for water-use related questions such as water restrictions for topics such as recreation (swimming, boating), wildlife (fish), agricultural use (livestock, irrigation) and drinking water (public water systems, private wells).

Next steps

Support local public health agencies

CDPHE continues to work with local public health on support items including communications as requested.

Draft notification/call-down list

CDPHE developed a draft call down listed based on the Eagle Mine call down list. We have been working with other agencies to develop a notification stakeholder group. CDPHE will be a stakeholder but not the managing entity.

Long-term water quality monitoring

CDPHE has a routine monitoring station on the upper Animas River near Silverton below Mineral Creek that is sampled every other month. In response to the spill, CDPHE added another site to be collected on the same date as the Animas station.

The second site is located on Cement Creek above the confluence with the Animas River. Testing includes field parameters, nutrients and a suite of metals. In addition, CDPHE is coordinating with EPA, other state and local agencies regarding a long term monitoring plan for the entire watershed affected by the spill.

Mining impacted streams task force

Per the direction of Governor Hickenlooper, we are working to update the inventory of mine features throughout the state including abandoned mines. Several inventories were conducted on federal lands in the 1990s; however, that data wasn't compiled into a single database making research on the inventory of mine features more difficult.

A large part of this effort will be to collate existing data into one database. This will be accomplished through interagency cooperation between the Water Quality Control Division, Hazardous Materials Waste Management Division, Division of Reclamation, Mining and Safety, Colorado Geological Survey, federal agencies and others.

COLORADO
Water Quality Control Division
Department of Public Health & Environment

www.colorado.gov/cdphe/animas-river-spill

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303-692-3500

Community partners

- **San Juan Basin Health Department**
  sjbhd.org/public-health-news/gold-king-mine-incident/
- **Town of Silverton**
  www.colorado.gov/townofsilverton
- **City of Durango**
  www.durangogov.org/
- **La Plata County**
  www.co.laplata.co.us/emergency
- **San Juan County**
  www.sanjuancountycolorado.us/
- **New Mexico Environment Department**
  www.env.nm.gov/riverwatersafety/
- **Environmental Protection Agency**
  www.epa.gov/goldkingmine

Photos contained in this report courtesy Gold King Mine Joint Information Center