Testimony by Mayor Dean Brookie, City of Durango, Colorado, Regarding "Holding the EPA Accountable for Polluting Western Waters", Committee on Science, Space & Technology, September 9, 2015

Summary

I am Dean Brookie, Mayor of Durango, Colorado, a city of 18,000 residents at the base of the San Juan Mountains along the Animas River. I have lived, worked, and recreated in these mountains since 1980. Since our founding, our community has been dependent on the virtues of the natural environment as its lifeblood. Our mining heritage is important, but our current economy is not depending upon mining, rather our mining history, outdoor recreation, the arts, and other natural and cultural amenities.

The August 5th mine waste release into the Animas River put a Technicolor spotlight on a massive and complex century-old problem that our communities have lacked the resources to address. The fact is that 3 million gallons of mine water were released out of the Gold King mine that day; however, this is not just a one-time incident. According to the EPA' Internal Review of the August 5, 2015 Gold King Mine Blowout about 3 million gallons of mine water drain out of the Gold King each week, and four mines in immediate vicinity drain 330 million gallons per year into Cement Creek, the Animas River, the San Juan River and eventually, the Colorado River. A review of Durango's newspaper archives reveals a long story of mine waste discharges dating to 1899 or before. That is the quiet but real catastrophe that has largely gone un-noticed by the public until now.

It is tempting in times of crisis to point fingers and place blame. Over 130 years, thousands of mines, millions of individual actors, and literally billions of gallons of polluted water that have run through our community – attempts to blame single agencies or individuals are pointless, and ignore the scale and complexity of the problem that needs to be addressed. We must continue to work together at the local, state and federal level – and do so much more, quickly and with greater resolve – to comprehensively address the water quality threats to our region before they result in far greater harm to our communities, as well as additional costs to government.

The EPA must be held accountable for this accident. Every indication we have received from them shows that they are taking the incident seriously. There is no denying they had their 'hand on the shovel' during this incident, but they did not cause this spill on purpose. The EPA was at the Gold King mine helping to address these long standing environmental issues. Without the EPA and the federal government more broadly, there is simply no option for addressing the risk to human health and the environment caused by the region's mining legacy. Yes, we can and should hold responsible parties in the mining industry responsible. Local, and state governments, not-for-profits, and businesses all also have a role to play. Fundamentally though, our community needs the scientific, technological and financial leadership of the EPA to guide a collaborative process for addressing this problem.

I hope that the Committee will join with us in supporting a comprehensive science-based solution to this problem, and will help ensure that the EPA and other Federal Agencies have the resources and the clear direction needed to ensure that the Gold King release is the last time we need to be reminded of this long-term problem before taking action. The City of Durango welcomes the Committee's support and commitment to helping to address the risks and vulnerabilities posed by water pollution in the Animas River, including supporting our request to the EPA for over $50 million dollars to build a new water treatment plant at Lake Nighthorse and create an important redundancy to our City's water supply. Additionally, I would urge Congress to look favorably upon a future proposal to fund a water treatment facility at the source. Responding to this event, a bipartisan coalition of four US Senators and two Congressman has asked the administration to look at funding a water treatment plant in Silverton. I also encourage Congress to look at reforming the 1872 mining law to take us from the 19th into the 21st century and consider some kind of royalty on mining companies (the same royalties currently paid by all other extractive industries) that we could tap into to pay for clean up. Lastly, the bi-partisan Congressmen Udall, Tipton, and Bennet Good Samaritan legislation from the last Congress could be an additional tool used towards a long-term solution for cleaning up abandoned mines.

With support from EPA and Congress, I am certain we have the capacity to work together to develop an efficient, equitable and scientifically sound approach to ensure the legacy we leave to our children is not one of accusation and rancor, but one built of collaborative deliberation and action. Inaction by Congress will only allow this contamination to continue and result in continued impacts to our rivers, communities, and all taxpayers.

Testimony by
Mayor Dean Brookie, City of Durango, Colorado
Regarding
"Holding the EPA Accountable for Polluting Western Waters"
Committee on Science, Space & Technology
September 9, 2015

Thank you Chairman Smith, Ranking Member Johnson and honorable members of the Committee for the opportunity to testify today.

I am the Mayor of Durango, Colorado, a city of 18,000 residents at the base of the San Juan Mountains along the Animas River. I have lived, worked, and recreated in these mountains since 1980. Since our founding, our community has been dependent on the virtues of the natural environment as its lifeblood. Durango, like other cities of our region, was founded as a mining town and celebrates this rich history each and every day. Millions of tourists now visit our community, in part due to the natural beauty and unparalleled recreation opportunities, but equally to experience and learn about our history and to sneak a glimpse into the past – whether it is through visits to Ancestral Puebloan sites at Mesa Verde National Park, to ride the Durango-Silverton Narrow Gauge Railroad, or explore mining relics in the steep and unforgiving San Juan Mountains.

Durango, Colorado - looking north from Smelter Mountain, Animas River to the West

The Ongoing Environmental Impact of Mining

The August 5th mine waste release into the Animas River put a Technicolor spotlight on a massive and complex century-old problem that our communities have lacked the resources to address.

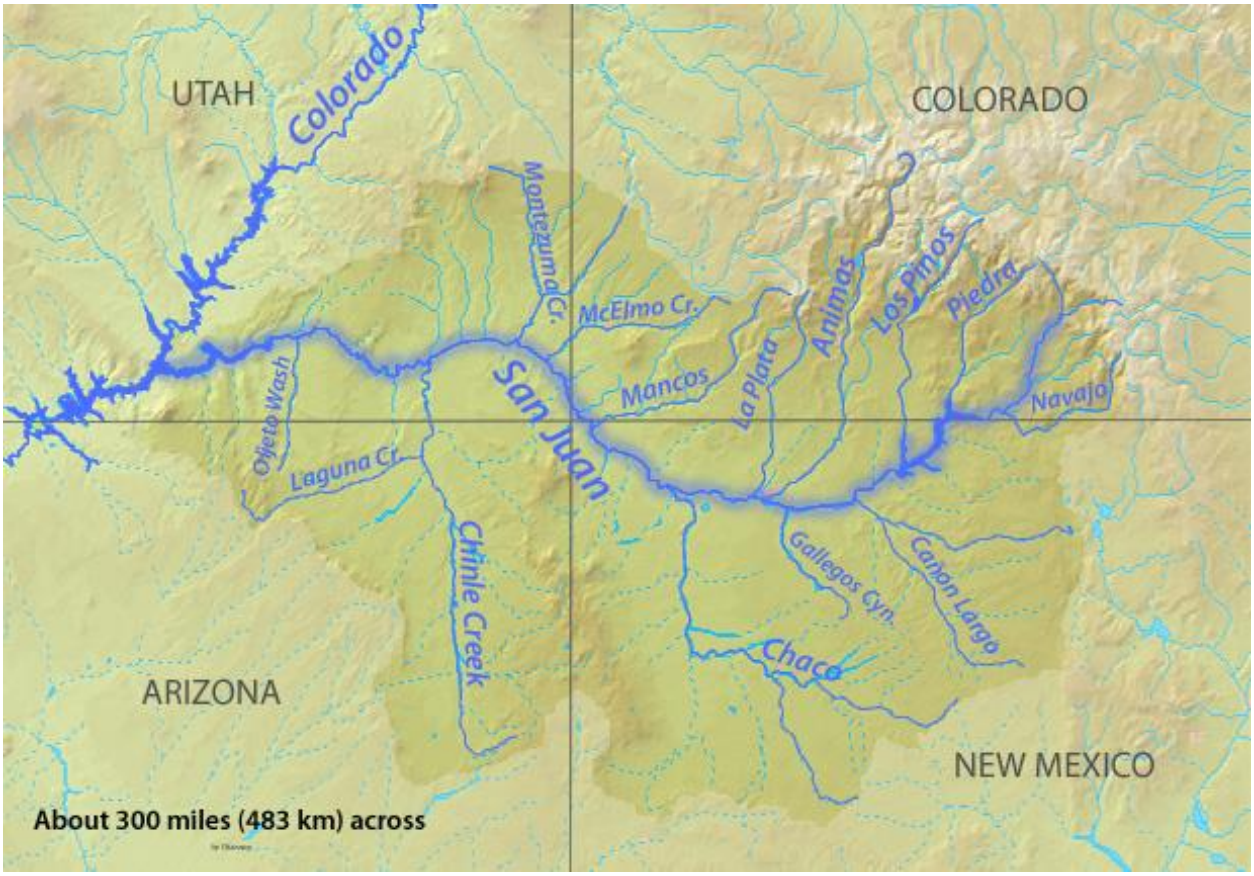
The fact is that 3 million gallons of mine water were released out of the Gold King mine that day; however, this is not just a one-time incident. According to the EPA's Internal Review of the August 5, 2015 Gold King Mine Blowout about 3 million gallons of mine water drain out of the Gold King each week, and four mines in immediate vicinity drain 6.3 million gallons per week (330 million gallons per year) into Cement Creek, the Animas River, the San Juan River and eventually, the Colorado River. That is the quiet but real catastrophe that has largely gone un-noticed by the public until now.

Even less noticeable to most casual observers of the Animas has been the persistent and diffuse drainage of the draining mines that speckle the watershed. The Gold King, for example, was draining anywhere from 200 to 500 gallons per minute prior to the blowout. Thus the August 5th release of 3 million gallons was equivalent to roughly a week's worth of "normal" discharge from just this mine (2% of the annual discharge). Other sites contribute even greater volumes and more concentrated pollution.

Silverton, Colorado - Looking north, Cement Creek flowing under the clouds into the Animas River, bottom right corner.

The veins of the Animas River flow into other aquatic arteries of the West – the San Juan River, and the Colorado River. The San Juan is so important that adjacent counties in Colorado, Utah, and New Mexico are named for it. Our rivers are what bind us together as communities. Throughout the Southwest, we are all a part of the Animas River Watershed. The San Juan River flows through the Ute Mountain and Navajo Reservations before reaching Lake Powell. From there it joins the Colorado River that flows through the Grand Canyon into Lake Mead, a water source for Phoenix, Las Vegas, Los Angeles and San Diego.

While the national and international media spotlight lasted only one week, the heavy metal contamination that emanates from hundreds of separate mine sites in the mountains upstream of Durango has been impacting our community since the late 19th Century. It is a constant – if often invisible – threat to our community's public health and economic well-being, and has thus far resisted thoughtful and well-intended efforts to mitigate this risk.



Cement Creek in Silverton flows into the Animas River through Durango and into the San Juan River and, eventually, the Colorado River.

It is tempting in times of crisis to point fingers and place blame. Over 130 years, thousands of mines, millions of individual actors, and literally billions of gallons of polluted water – attempts to blame single agencies or individuals are pointless, and ignore the scale and complexity of the problem that needs to be addressed. We must continue to work together at the local, state and federal level – and do so much more quickly and with greater resolve – to comprehensively address the water quality threats to our region before they result in far greater harm to our communities, as well as additional costs to government.

The Gold King release is the latest in a long legacy of specific events that have raised awareness about threats posed by historic mining in the San Juan Mountains. Fortunately, thanks to the efforts of many individuals and organizations from the federal, state, and local levels our community came together to respond to this disaster in a truly admirable way. While our initial response was focused on understanding and eliminating the risks of the increased pollution coming from the Gold King release on public health, the environment and our economy, we have quickly progressed to focus on the need for long-term solutions built on scientific information and a robust collaboration amongst the region's diverse communities up and down the watershed.

History of Minerals, Mining and Impacts in the San Juan Mountains

Miners first came to the San Juan Mountains around 1870 due to a long list of valuable minerals that are found in them. The Upper Animas River follows the edge of the collapsed crater of an ancient volcano—called a caldera—that was naturally enriched by mineral-laden water which followed the faults of the crater and deposited metals, such as gold, silver, lead, zinc and copper along the fissures in the mountains. Our beloved Red Mountain is red because of the naturally high levels of iron oxides and other minerals deposited about 27 million years ago.

Water follows these same faults, as natural cracks and fissures, eventually emerging as fresh water springs or combining with groundwater. These tight cracks in the mountain are usually free of oxygen.

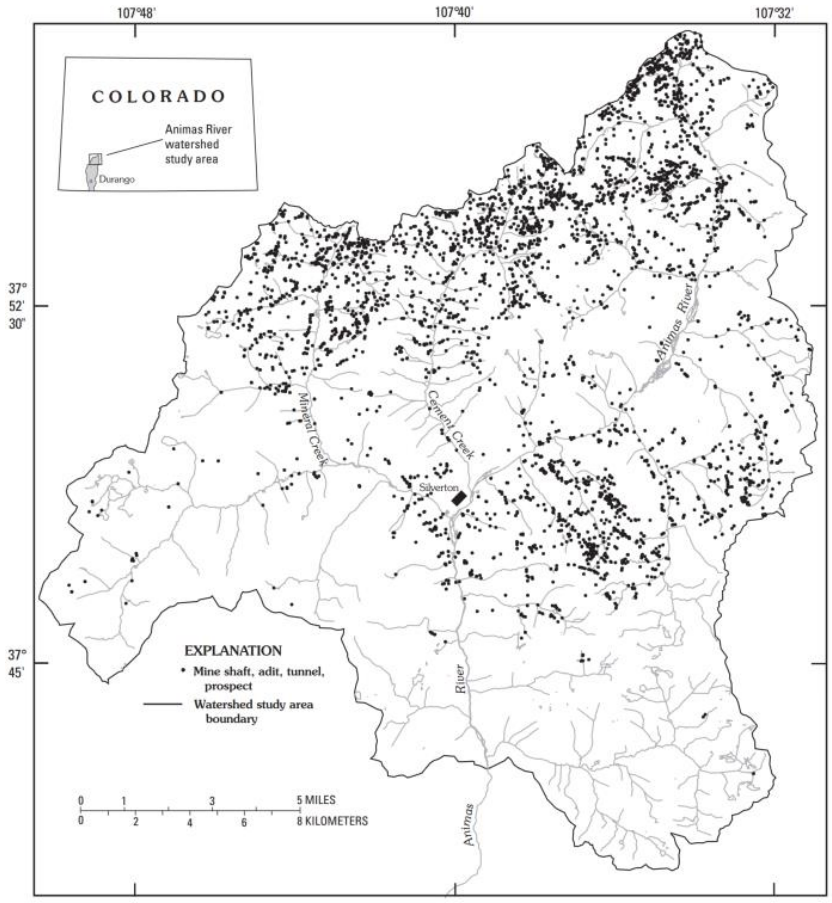


Figure 1. Locations of 5,397 mine shafts, adits, tunnels, and prospects from U.S. Geological Survey 1:24,000 scale topographic maps (Handies Peak, 1955; Howardsville, 1955; Ironton, 1955; Ophir, 1955; Silverton, 1955) and 373 AMLI_MINE_ID locations in Animas River watershed study area.

Source: USGS Professional Paper, USGS, Vol 1 Chapter E5 Environmental Effects of Historical Mining, Animas River Watershed, Colorado p. 260. "Acid mine drainage from historical mines represents a long-term source of contamination that affects water quality in the Animas River." In all, there are over 5000 mine shafts, adits, tunnels, and prospects in the Upper Animas drainage, of which at least 110 have been identified as draining water just like the Gold King. Mining creates shafts and tunnels to access the mineralized veins in the mountains- the same faults as originally followed by groundwater. With the addition of the mine, the water follows the path of least resistance – the new tunnels. The tunnels also provide a pathway for oxygen to enter, changing the nature of the chemical reactions occurring within the mountains.

When water and oxygen mix with pyrite, a chain reaction occurs resulting in sulfuric acid, also known as acid mine drainage, which causes the water draining from the mine to have a pH level between 2 (lemon juice) and 5 (black coffee). The acidic water running through the mine dissolves more metals into the solution, such as zinc, cadmium, silver, copper, manganese, lead, aluminum and arsenic.

As acidic water exits a mountain (often via a mine portal) it may drain through even more metal-rich waste rock piled outside, picking up more metals before eventually reaching a stream. The result is concentrated slurry called ("acid mine drainage") that is laden with heavy metals and highly acidic.

This chemical process occurs naturally, and some streams in the San Juan Mountains were acidic and did not support aquatic life even before mining began. With the initiation of mining in the 1880s in the Animas River drainage, the impacts became widespread almost immediately.

Historical Context of the Environmental Impact of Animas River Mining Pollution

The environmental impact of mining is not a new phenomenon to our community. *"The question that is crowding upon Durango thick and fast is one of water. The mill slimes from Silverton are now reaching us."* This statement appeared in the Durango newspaper, not in August 2015, but in 1899, a testament to the long history of mining-related pollution in the Animas River. A review of Durango's newspaper archives reveals a long story of mine waste discharges dating to 1899 or before. At this time, most mine tailings and wastewater drained directly into the river, and thus were an ever-present danger.

Indeed, as the putrid orange plume of acidic, heavy-metal laden water and silt made its way down the Animas River toward Durango on August 5 and 6 of this year, the City of Durango, like other river users up and down stream, shut off its Animas River water intakes. Even so, by instituting immediate voluntary water conservation measures, Durango was able to manage resulting potable water shortages. That's because in 1902, the town fathers switched the main drinking water source away from the abundant Animas, which runs right through town, in favor of the Florida River, which carries less water and is separated from the city by a series of ridges.

The town made this decision because the Animas River at the time was deeply polluted by mining activities some 50 miles upstream and as a result, it ran "gray and turbid" all summer long. From the beginning of heavy mining activity in the Silverton Caldera in the 1870s, the miners acted with little regard either for the environment or the folks living downstream. Their mines exposed water and metals to oxygen, thus setting up the chemical reaction that creates acid mine drainage, or heavy metal-loaded, acidic water that is toxic to aquatic life and, in high enough concentrations, to humans. Nearly every mine adit discharges this tainted water, and it was acid mine drainage that came spewing out of the Gold King on the morning of Aug. 5.

In addition, for the first six decades of mining activity in the Silverton region, the miners simply dumped their waste right into the streams. During the early days, for example, the Greene & Co. Smelter sat along the banks of Cement Creek. It emitted acid- and metal-bearing flue dusts directly into the air, and its operators didn't think twice about letting mercury, used to recover gold, leak out onto the ground or into the stream. Tailings, a toxic sludge leftover from milling ore, was dumped directly into floodplains or streams, polluting and turning the river a terrible color for more than 100 miles downstream. Miners haphazardly dumped an estimated 8 to 9 million tons of tailings before, in the 1930s, downstream farmers finally pressured them to stop, because the silt was clogging their ditches.

Still, the pollution continued. Over one hundred mines, including the Gold King, continued to discharge acid mine drainage, without any hint of mitigation. And poorly constructed tailings piles continued to fail. In the 1960s, the state went after Standard Metals because its mill was leaking cyanide into the Animas, and probably had been for months or even years, unnoticed. By the 1970s, the Colorado Division of Wildlife declared the upper reaches of the Animas "essentially dead" as a result, and devoid of any fish.

In 1975, the Standard Metals tailings dam just northeast of Silverton was breached, sending some 50,000 tons of tailings into the Animas, turning the entire reach of the river the "color of aluminum paint" as one observer put it. Of the dozens of fish in cages deposited in the river in Durango, only four survived. Just three years later, almost to the day, the workings of the Sunnyside Mine got too close to the bottom of an alpine lake. The lake's bottom blew out into the mine, sending tens of millions of gallons of water through the mine, carrying thousands of tons of sludge, tailings, and equipment with it, all of which shot out of the tunnel directly into Cement Creek. This time the Animas River turned black all the way to Farmington. These were just the catastrophic spills. It wasn't at all uncommon for tailings to discharge into the river during big thunderstorms or snow melt.

Over the past two decades, a great deal of cleanup has occurred: Tailings have been scraped out of flood plains and consolidated in huge piles and capped; draining mine adits have been plugged, or water diverted around metal-loaded waste piles; in some cases, water was diverted before it could get in the mine and become tainted. But the pollution has continued. Since 2005, the Gold King Mine had been discharging between 200-500 gallons per minute of acid mine drainage. It only slowed over the past year or so because roof collapses had impounded the water in the mine. Other nearby mines discharge tainted water at similar rates. And blowouts like the one at the Gold King are hardly uncommon: In spring of 2014, the Bagley Tunnel near Animas Forks blew out on its own (it did the same in the 1990s). The sediment in the river as a result of spring runoff obscured the plume. One time Bill Simon of the Animas River Stakeholders Group was working on a mine when it blew out and wrecked his backhoe.

Summary of Historical Points:

1. Since at least the 1880s, downstream users have grappled with mining-related pollution on the Animas, both as a result of acid mine drainage and because the mines dumped tailings directly into the river.
2. By the 1890s, the Animas River through Durango ran "grey and turbid" nearly every day thanks to mill tailings being dumped into the river near Silverton
3. In 1902, Durango shifted its primary water source from the Animas to the Florida River because of the tailings.
4. Farmers in the Animas Valley took legal action against the mines because the tailings were clogging their ditches; they finally succeeded in the 1930s in getting the mines to contain their tailings.
5. In 1975, a huge tailings pond dam busted, sending 50,000 tons of tailings into the Animas, turning it the color of "aluminum paint" down to Farmington.
6. In 1978, Lake Emma burst into the Sunnyside mine, sending tens of millions of gallons of water and sludge down the river. This time the Animas was black all the way to Farmington.
7. Mine blowouts like that at the Gold King are not uncommon. One happened in a mine near Animas Forks in spring 2014 — it wasn't noticed downstream because it was during runoff, when the river's turbid and brown, anyway.
8. The Gold King was draining anywhere from 200 to 500 gallons per minute prior to the blowout prior to the roof collapse that impounded those 3 million gallons of water in the mine), and will continue to do so. Those 3 million gallons and much more would have reached the Animas at some point anyway, either by a blowout, or slowly through daily discharge.

History of Efforts towards Cleanup: Investigation and Actions in the Upper Animas

While we have lacked the resources to deal with this issue, we have not lacked resolve. There has been a dedicated collective of agencies, mine owners, individual citizens, and nonprofit partners that over the past two decades have initiated a great deal of cleanup. But the pollution has continued.

Starting in the 1990s, the Colorado Water Quality Control Division (WQCD) and EPA began to investigate the water quality in the Animas basin to inform water quality standards for the basin. The investigation determined severe impacts to aquatic life in the Upper Animas and its tributaries from naturally occurring and mining-related heavy metals. The two agencies also acknowledged that a community-based effort, the Animas River Stakeholders Group, had formed to address reclamation. The EPA agreed at that time to postpone adding all or a portion of the watershed to the Superfund National Priorities List (NPL) as long as progress was made to improve the water quality. Since then, the EPA has been a partner to the collaborative efforts contributing resources for sampling, risk assessments, and data analysis. Additionally, EPA has supported cleanup efforts through grants to the collaborative and the state agencies.

Also in 1991, the last big mine in the region, Sunnyside Gold Corporation, closed and undertook a series of actions to reduce pollution including plugging its own mine and installing a water treatment facility for several draining mines in Cement Creek (near the Gold King). The treatment plant was to treat Cement Creek until theirs and others' extensive efforts demonstrated the potential for action to reap results. By the early 2000s, zinc, cadmium and lead levels in Mineral Creek had dropped by 50 to 75 percent, and water quality in the Upper Animas had improved significantly. Fish appeared just below Silverton, where they hadn't been seen in probably a century.

The Gold King, Red & Bonita, and Mogul mines began draining more water directly into Cement Creek and the headwaters of the Animas. The source of the additional water is attributed by some (in whole or in part) to the bulkheads that Sunnyside had installed in its nearby mine following its closure.

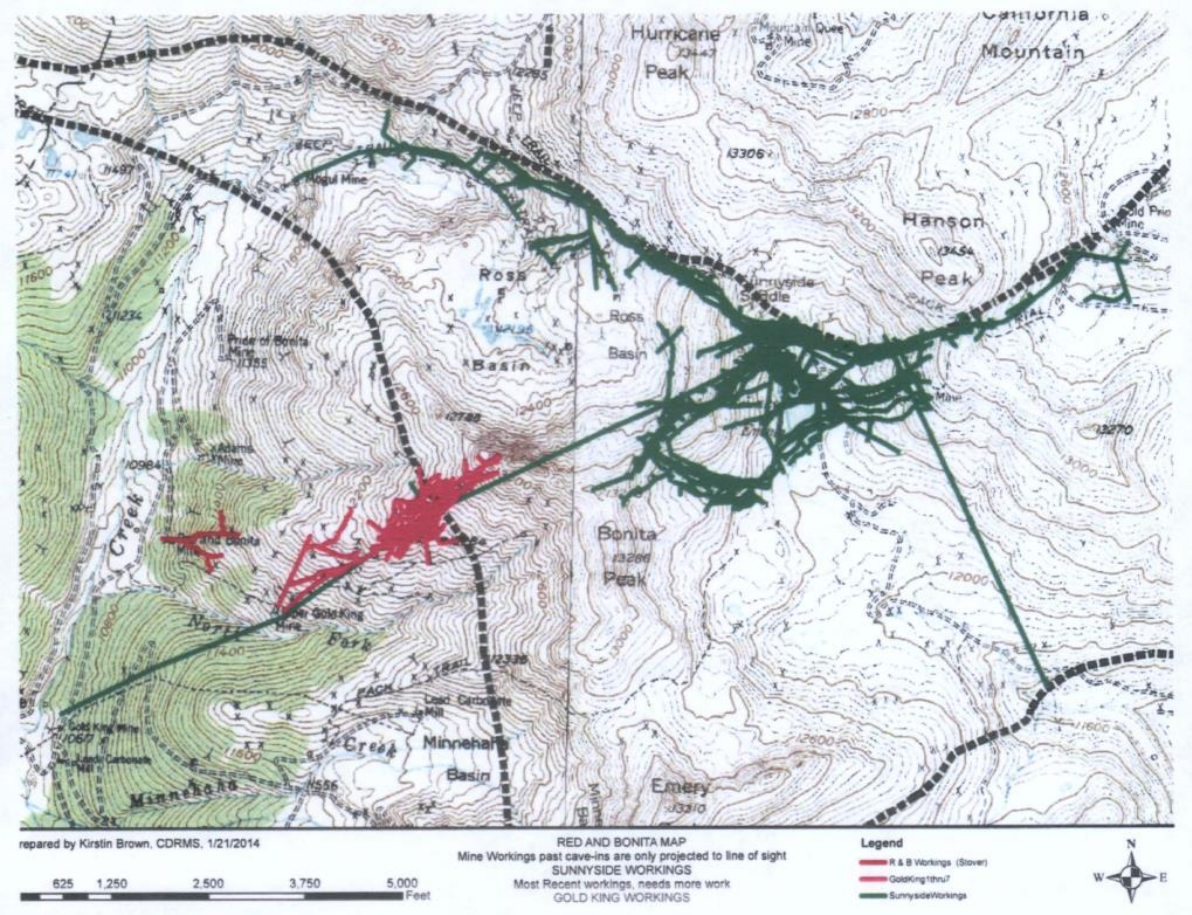
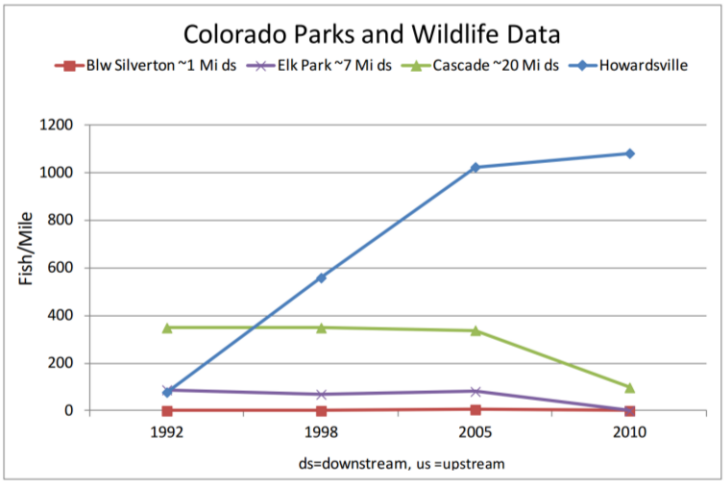


Figure: Location of Gold King Mine, Red and Bonita Mine, American Tunnel and Sunnyside Mine Works.Source: US EPA Action Memorandum for Red and Bonita Removal Action, September 24, 2014

Additionally, the treatment plant was transferred to another owner who unfortunately ran into technical, financial and legal troubles. The treatment plant stopped operating around 2004. By 2010 water quality for miles downstream once again deteriorated. The fish that had returned to the Animas below Silverton were lost.

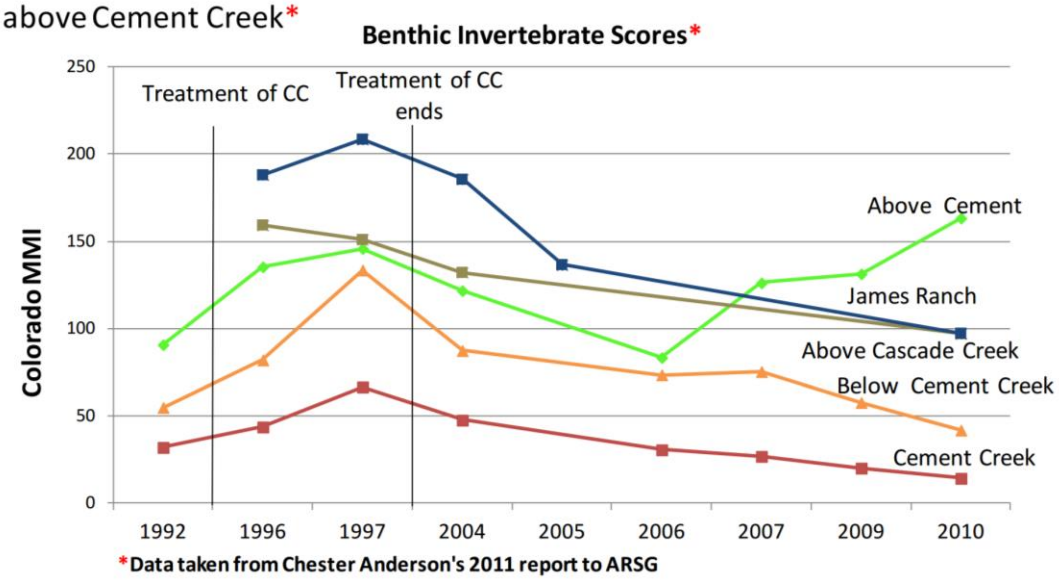
Brook trout populations in the Animas River canyon have declined significantly from 2005-2010 and increased above town at Howardsville.*



*Colorado Parks and Wildlife, 2010 Animas River Report

Results to date indicate benthic communities are impaired

3. Aquatic insect communities have declined significantly in all Animas River locations below Cement Creek since water treatment ceased. This pattern is not observed above Cement Creek*



*Data taken from Chester Anderson's 2011 report to ARSG

In 2013 in combination with other local and state stakeholders, EPA conducted initial assessment work to better understand the causes of the increasing pollution and identify next steps for the improving Cement Creek, including evaluating the Red & Bonita, Gold King and other sources of pollution.

The August 5th Gold King Release, Response and Impact

The Colorado Department of Public Health & the Environment (CDPHE) notified the City of Durango of the Gold King release at 1:39 pm on Wednesday, August 5th, 2015. Our City immediately responded by halting intake of water from the Animas River to ensure protection of our community's drinking water. La Plata County Sheriff also closed public access to the Animas River the afternoon of Thursday, August 6th to protect human health, resulting ultimately in closing businesses and keeping residents and tourists away from the river. The river remained closed for 9 days until the Sheriff re-opened it at noon on Friday, August 16th.

Durango suffered a swift negative impact on the environment and the economy, particularly business tied to tourism. Durango's eight rafting businesses, which thrive in the summer months, took the biggest hit with the river closed for eight days during peak season. Mild to Wild, a rafting company 22 years in operation, typically peaks at 85 employees during the season, with 50 people of those jobs tied directly to the Animas River. 30 people stopped working because of the spill, and the company had to lay off seasonal employees 2-3 weeks early. Four Corners Whitewater had to give back $15,000 in refunds to customers during the vital end-of-season weeks. Early estimates show hundreds of thousands of dollars in direct trip loss. Rafting companies were serving 500-600 customers each day prior to the accident. Based on historical averages, tourist travel slowed significantly and jeep and other excursion tours were hurt too. Recent events continue to serve as a reminder of how strong our ties to our past continue to be. Our mining heritage is important, but our current economy is not dependent upon mining, rather our mining history, outdoor recreation, the arts, and other natural and cultural amenities.

The City of Durango incurred approximately $270,000 in direct costs related to the mine spill mostly in staff time. La Plata County spent $178,000 post spill. August sales and lodger tax receipts are not yet available to compare to prior years, however County sales tax provides revenue to the towns of Bayfield and Ignacio and may result in an impact to these neighboring towns as well.

The biggest impact we are worried about is the future, the stigma damage of the media coverage and images that can ruin the reputation of a beautiful town and a mountain stream. The constant media coverage was the equivalent of a multi-million dollar advertising campaign to tell people it's not safe to visit Durango. CNN ran a headline 'Durango is closed for the season' and Conan O'Brien ran a 3-minute video titled 'The Animas River is trying to kill you'. One family submitted a letter to the editor in the Durango Herald that said they had planned to purchase a home in Durango, but because of the mine spill was no longer interested. Local realtors reported numerous aborted closings due to buyers concerns related to property values.

The Path Forward and Focusing on Solutions

I hope that the Committee will join with us in supporting a comprehensive science-based solution to this problem, and will help ensure that the EPA and other Federal Agencies have the resources and the clear direction needed to ensure that the Gold King release is the last time we need to be reminded of this long-term problem before taking action.

The events of August 5th remind us of the constant risks we face, and the significant challenges we must overcome to reduce the risk to human health, the environment and our economic

security. Similar, or far more tragic releases could happen at any time from any of these draining mines without warning and without any witness or cause. We do not want to be considered victims. We want to empower our community to be responsible for the resources we use and manage. We consider ourselves fortunate that the impacts of this particular event were relatively short in duration and the risks associated appear to have been within our collective abilities to mitigate. We should not take this for granted. We need to learn from this event, share our experience with other extractive industry-impacted communities, and take action to reduce the likelihood that something similar happens again, for our own and future generations.

Durango and our neighbors throughout the Animas River watershed are seeking to resolve an environmental problem that is three times as old as the Environmental Protection Agency itself. Few parties remain who had a hand in causing this situation, but we all have a role in making sure it is addressed. It is a technological problem, a legal problem and most of all, a problem of limited resources. The only proven solution to dealing with acid mine drainage is to treat the water that drains out of the mines. Evidence from the Animas River and from dozens of other sites demonstrates that it can be done effectively, but it is costly, and requires investment indefinitely.

The EPA must be held accountable for this accident. Every indication we have received from them shows that they are taking the incident seriously. There is no denying they had their hand on the shovel during this incident, but they did not cause this spill on purpose. The EPA was at the Gold King mine helping to address these long standing environmental issues. Without the EPA and the federal government more broadly, there is simply no option for addressing the risk to human health and the environment caused by the region's mining legacy. Yes, we can and should hold responsible parties in the mining industry responsible. Local, and state governments, not-for-profits, and businesses all also have a role to play. Fundamentally though, our community needs the scientific, technological and financial leadership of the EPA to guide a collaborative process for addressing this problem.

EPA began a detailed assessment process in 2013 and must continue – and accelerate – their effort with other stakeholders to characterize the full scope of the problem and assess a full range of options for mitigation. While that assessment is being completed, the City of Durango and other stakeholders agree that water treatment facilities can and should be constructed to treat wastewater from the most polluting mines including the Gold King. Over the long-term, other strategies alongside water treatment will need to be identified and implemented. Still other barriers to action may need to be addressed by Congress.

The City of Durango welcomes the Committee's support and commitment to helping to address the risks and vulnerabilities posed by water pollution in the Animas River, including supporting our request to the EPA for over $50 million dollars to build a new water treatment plant at Lake Nighthorse and create an important redundancy to our City's water supply. Additionally, I would urge Congress to look favorably upon a future proposal to fund a water treatment facility at the source. Responding to this event, a bipartisan coalition of four US Senators and two Congressman has asked the administration to look at funding a water treatment plant in Silverton. I also encourage Congress to look at reforming the 1872 mining law to take us from the 19th into the 21st century and consider some kind of royalty on mining companies (the same royalties currently paid by all other extractive industries) that we could tap into to pay for clean up. Lastly, the bi-partisan Congressmen Udall, Tipton, and Bennet Good Samaritan legislation

from the last Congress could be an additional tool used towards a long-term solution for cleaning up abandoned mines.

The Gold King release has invigorated the kind of collaboration that will be required in a sustained manner over many years to address a problem of the scope and complexity that we face. EPA's continued leadership is essential to develop a science-based strategy for addressing the root causes of the water pollution problems in the Animas River watershed, and should not be undercut or frankly distracted by unfounded claims that they are somehow to blame for century-old problems. With support from EPA and Congress, I am certain we have the capacity to work together to develop an efficient, equitable and scientifically sound approach to ensure the legacy we leave to our children is not one of accusation and rancor, but one built of collaborative deliberation and action. Inaction by Congress will only allow this contamination to continue and result in continued impacts to our rivers, communities, and all taxpayers.

Resources

Animas River Stakeholders Group website and documents:

- Division of Wildlife's 2010 Animas River Report. Table 5 on Page 15 and Table 6 on Page 16 give a pretty clear look at the drastic change in fish population below Silverton between 2005-2010. Water quality deteriorated, almost certainly because water treatment at the American Tunnel and upper Cement Creek stopped (During Sunnyside's reclamation period, from about 1997 until 2002, its water treatment plant not only treated water coming from the American Tunnel, but also water in upper Cement Creek. After Sunnyside left, it turned over the water treatment plant to Steve Fearn, whose mining venture went bankrupt by 2004, so treatment stopped).
- Graphs that show the dramatic difference water treatment makes. http://www.animasriverstakeholdersgroup.org/attachments/File/EPA%20Assessment%20Status%20and%20Results%202014.pdf
- Bagley Mine Blowout referenced in ARSG meeting minutes from July 22, 2014

High Country News

- Why Silverton Still Doesn't Want a Superfund Site, By Krista Langlois, September 3, 2015 (web exclusive)
- Gold King Mine Water Was Headed for the Animas Anyway: The Nuts and Bolts of Acid Mine Drainage, By Jonathan Thompson, August 28, 2015
- Five Western waterways worse than the orange Animas, Colorado's Animas River has gotten the most attention – but it's hardly alone, By Krista Langlois, August 24, 2015 (web exclusive)
- Animas dispatch: Hundreds celebrate the river's reopening, Durango may be moving on, but wider fears about the toxic spill still reverberate. By Krista Langlois, August 19, 2015
- Animas River spill: only the latest in 150 years of pollution, Mapping the other threats to the Animas and San Juan Rivers. By Jonathan Thompson, August 17, 2015
- When Our River Turned Orange, By Jonathan Thompson, August 9, 2015
- A Radical Approach to Mine Reclamation, By Ray Ring, January 19, 1998

New York Times

- When a River Runs Orange, by Gwen Lachelt, August 20, 2015

Orion Magazine/Blog/Letters from the Field

- Letter from Colorado: On the Dirty, Deep-seated Origins of the Animas River Spill, By Jeff Snowbarger, August 2015

Professional Papers

- Integrated Investigations of Environmental Effects of Historical Mining in the Animas River Watershed, San Juan County, Colorado
  Edited by Stanley E. Church, Paul von Guerard, and Susan E. Finger - Historical pollution Chapter C and D. - http://pubs.usgs.gov/pp/1651/
- http://co.water.usgs.gov/projects/index_md.html
- Multi-Discipline Projects in Colorado

The USGS Colorado Water Science Center conducts hydrologic projects that address a wide variety of water-resources issues, including water supply, ground-water contamination, nutrient loading in streams, effects of land use on water quality, and basic hydrologic data collection. This page lists the multi-discipline projects currently underway.

Abandoned-Mine-Land Initiative · Effects of mining · Alpine/subalpine watersheds · Irrigation · Modeling · Multi-Discipline

Abandoned-Mine-Land Initiative

- Upper Animas River Basin Abandoned Mine Lands Initiative

Effects of mining

- Relationship of Turquoise Lake Levels to Mine Tunnel Flow in the Sugarloaf Mining District 2003-2005
- Watershed Contamination from Hard Rock Mining
- Sources of Metal Loading to the Lake Fork from Turquoise Lake to the confluence with the Arkansas River

Alpine/subalpine watersheds

- Effects of Energy Production Emissions on Colorado Lakes
- Water, Energy, and Biogeochemical budgets in alpine/subalpine watersheds
- Amphibian Research and Monitoring Initiative: Rocky Mountain region
- Water-Quality Sampling at Five Hydrologic Benchmark Stations in the Western United States
- Rocky Mountain Regional Snowpack Chemistry Monitoring Study Area: High-elevation sites near the Continental Divide in Montana, Wyoming, Idaho, Colorado, New Mexico, and Utah
- Snowpack Sublimation: Measurements and Modeling in the Colorado River Basin

Irrigation

- Measurements of Irrigation Canal Seepage Losses Below Trinidad Dam, Las Animas County, Colorado, 2000-2003

Modeling

- Simulated Effects of Proposed Southern Delivery System Alternatives on Hydrodynamics and Water Quality of Pueblo Reservoir Using a Two-Dimensional Hydrodynamic and Water-Quality Model, Pueblo, Colorado
- One-Dimensional Transport with Inflow and Storage (OTIS): A Solute Transport Model for Streams and Rivers
- MODFLOW/MODFLOWP Integration
- Modifications to the Fountain Creek transit-loss accounting program to account for Fryingpan-Arkansas water return flows
- Development of methods to determine transit losses for return flows of imported water in Monument and Fountain Creeks, and revision of an existing transit-loss accounting program for Fountain Creek, El Paso and Pueblo Counties, Colorado

Multi-Discipline

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