The Gold King Mine: Past, Present, and Future

By

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ABSTRACT
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The Gold King Mine, a previously insignificant site, came to the nation's attention on August 5, 2015, when toxic material from the mine poured into a tributary of Colorado's Animas River, severely damaging the ecosystem for miles downstream. Although the EPA has been blamed and has accepted responsibility for the spill it is not entirely at fault. The complete list of causes for this environmental disaster extends back to the Nineteenth century and continues into the Twenty-First Century.

The General Mining Law of 1872 was written for the purpose of making it easier for Americans to populate the West and to stimulate the economy. This law did exactly that. Many, like Olaf Nelson, the founder of the Gold King Mine, came to the West with a get-rich-quick mentality. Some were able to strike it rich, others were employed by those lucky few, and the nation was provided with a steady source of natural resources. All of this was done with little to no regulation for over one hundred years, and for that reason, the nation is now paying for the success of the mining industry.

The precedence of hardrock mining claims and weak regulations for the industry were established by the General Mining Law of 1872 and these faults have yet to be corrected. Human avarice, along with the vicissitudes of the natural and economic climates, compounded the unforeseen consequences of the mining law. The maze of subsequent environmental legislation has not provided an adequate remedy. In order to prevent future disasters and pollution, the laws and standards for this industry will need to change. Bills to replace the General Mining Law of 1872 have been proposed by Congress in the wake of the Gold King Mine Spill. Although the outcome is still unknown, it might finally be time to impose meaningful regulation on the hardrock mining industry.

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Chapter 1: History

Gold was discovered in the San Juan Mountains in the 1860s.[1] The small town of Gladstone, founded in 1878, was built in order to accommodate the influx of eager miners and support staff.[2] Gladstone, and the surrounding mining towns, struggled to retain a population for several decades due to the extreme isolation of the San Juan region.

One of the hardy men to make the journey west to Gladstone was Olaf Nelson, who was of Swedish decent. In order to learn the trade and make a decent living, he found work at the Sampson Mine along Cement Creek. Like most of the men who moved West, Nelson wanted to get rich quickly, but he could not achieve that goal as a wage earning miner. For this reason, Nelson spent his free time scouring the area for unclaimed riches. And even then, his quest for wealth proved dangerous. Once, while on the hunt for lucrative veins, Nelson was entombed by a powerful rockslide for 11 hours. Fortunately, a fellow miner, Jonathan Peterson, was nearby and was able to free Nelson from the rubble with the help of a straight razor.[3] Although shaken, Nelson was undeterred and continued his search for gold.[4]

He was met with another near fatal accident when an avalanche "wrecked the Sampson boarding house."[5] Once again he showed his resilience when he dug himself, his wife, and two kids out using a stove pipe. By some miracle, none of his family was harmed by this avalanche.[6]

One day in 1887, while performing his regular duties for the Sampson Mine, Nelson noticed a promising vein that extended past the Sampson claim. Although Nelson

did not have the necessary funds to develop the site, he filed for the claim. Within a few years, Nelson saved enough to build a shaft into his newly acquired Gold King Mine.[7]

By the time Nelson had bought and developed his claim, William Jackson Palmer's Denver and Rio Grande Railroad had reached Silverton. With this extension, Silverton now had the means to easily transport ore to the smelter in Durango. Before 1882, when the railroad was extended, the Silverton area mines had trouble staying open because they had few means of selling their goods.[8] The struggle to retain a population and to continue operations often overcame the region. Gladstone, the supporting town for the future Gold King Mine, was no exception. Gladstone had its post office closed down by the government on three different occasions due to its isolation and increasingly declining population.[9]

Palmer's railroad extension created more stability for the Silverton area which led to an increase in wealth for the San Juan region. The roughly thirty mile railroad extension led to a ten-fold increase in production which allowed the individual Silverton mines to jump from selling 1,000 tons of ore a year to selling 10,000 tons of ore a year. Fortunately for Nelson, he staked his claim after the railroad had been extended and therefore was able enjoy the increase in profits.[10]

In 1890, death cut short Nelson's time as owner of the Gold King Mine. He died at the age of 35 from an accumulation of fluid in the lungs.[11] In 1894, Cyrus Davis and Henry Soule, owners of the adjacent mines, finalized the purchase of the Gold King Mine. They bought the Gold King from Nelson's widow for $15,000.[12] Shortly after purchasing the mine, the new owners expanded Nelson's original shaft and found a vein that greatly exceeded their expectations.

In 1897, the Sampson Mine filed suit against the Gold King Mine. The Cement Creek Gold Mining Co., owners of the Sampson Mine, claimed that Davis and Soule had encroached on their vein. The judge ruled in favor of the Gold King Mine, citing the lack of evidence presented by the plaintiff.[13]

With visual confirmation that their purchase would be profitable and with their legal ordeals behind them, Davis and Soule quickly patented their claim. This action converted the area from public land to private, a change that was made legal by the General Mining Law of 1872. Now that they owned the land outright, the new owners began pouring money into developing the promising vein. They built a large mill, at the cost of $350,000, and bought twenty stamps, a machine used to pulverize ore, in order to increase production.[14] This rise in production created a demand for a railroad extension for the Cement Creek area.

By this time, four different railroads serve Silverton, significantly enhancing the ability of entrepreneur and miners to exploit its mineral riches. One of the railroads that served Silverton was the Denver and Rio Grande and the remaining three were short extensions built to reach the mines in the mountains outside of Silverton, but none of the existing lines connected to the Cement Creek mining district which housed the Gold King Mine. With high hopes of connecting to the Denver and Rio Grande railroad, the owners of the Gold King Mine, Davis and Soule, first asked William Jackson Palmer to build a connecting line up Cement Creek to Gladstone. After being rejected by Palmer, Davis and Soule consulted with Otto Mears, the "Pathfinder of the San Juans."[15]

Davis and Soule were impressed by Mears' ability to find routes through the rugged San Juans. Mears had already built two small railroads and several roads in the

Silverton and Ouray area.[16] Therefore the owners of the Gold King Mine thought that Mears would be the perfect candidate to build another railroad in the region. Unfortunately for Davis and Soule, Mears had already moved to Philadelphia and did not have the desire to move to Colorado to take on another project.

With this second rejection, Davis and Soule took matters into their own hands. In 1899, the owners of the Gold King Mine made the decision to build the railroad along Cement Creek themselves.[17] Davis and Soule hired Chase E. Bibber of Boston to be the contractor for the Silverton Gladstone and Northerly Railroad.[18]

The Silverton Gladstone and Northerly Railroad branched off from the existing Denver and Rio Grande Railroad in Silverton, then traveled eight miles following Cement Creek to end in the town of Gladstone. From Gladstone, the railroad was supposed to reach Lake City, Colorado, but this section of tracks was never built due to unpassable steep grades.[19] Once completed, the owners of the Gold King Mine bought a narrow gauge engine, twenty freight cars, and two passenger cars from William Jackson Palmer's company. In total, the Silverton Gladstone and Northerly Railroad cost $250,000 to build, but this large investment paid off quickly.[20]

The Gold King Mine's profits increased greatly after the extension was built. The Silverton Gladstone and Northerly Railroad allowed the Gold King Mine to transport far more of their product to market for a cheaper price. By the early 1900s, the Gold King Mine was transporting over 300 tons of ore a day to the smelter in Durango, a far greater amount than they were able to ship before the railroad was built.[21] The management of the Gold King Mine invested the revenue back into the mine. The mill was enlarged and

an additional twenty stamps were purchased in order to increase production and profits further.[22]

Figure 1: The Gold King Mine in 1899, Data from Colorado Public Radio, accessed June 15, 2016, http://www.cpr.org/news/story/gold-king-mine-1887-claim-private-profits-and-social-costs

The Gold King Mine's early success was interrupted by a hostile, but brief labor dispute. In 1901, Fred C. Grebles attempted to assume charge over the Gold King Mine boarding house. He and his assistants were met by an angry crew of miners who did not approve of this change. This group of miners walked out in protest of the change of management. Soon after the walkout, a vote was cast to determine whether the Gold King Mine company should retain the management of the boarding house or to allow Grebles to assume management. Fifty-seven men voted to keep the current management and seventeen voted to hand management of the boarding house over to Grebles.[23]

Grebles, understanding that he had lost the fight, chose to leave peacefully with his men. Tensions were high, but Grebles and his assistants made it onto the tram heading to Silverton without violence breaking out. They had pulled away on the tram roughly 200 feet when Hafner, a baker and supporter of Grebles, shot four shots into the crowd of

peaceful miners. Hafner, acting against the will of his crew, had his gun forcibly taken away from him by a member of his own group. Fortunately, no one was hurt, but Hafner came close to being hung.[24]

In reaction to the unprovoked shots, the miners grabbed a rope and began to make their way towards Hafner. It was clear that they had every intention of hanging him on the spot. Fortunately, a member of the Gold King Mine management stepped in quickly, holding back the miners and allowing Hafner to flee back to Silverton.[25]

Despite the dispute that took place in 1901, production remained high. As a result of its seemingly infinite reserves, the Gold King Mine was gaining attention on an international scale. In 1902, a group of British investors offered to buy the Gold King Mine for $4 million, but the owners declined this generous offer.[26] Within months of turning down the bid, the meteoric rise of the Gold King Mine began to waver.

In an attempt to further their success, the Gold King Mine management announced that the "transportation of liquors to the mine," was no longer allowed. The management attempted to enforce prohibition in response to some accidents and quarrels that occurred on the mine site. No employee was allowed to personally bring alcohol to the Gold King and shipments to the mine were checked to ensure no one attempted to smuggle in alcohol.[27]

The Gold King Mine had made it through the nineteenth century without experiencing a major strike, but in 1903 the Gold King Mine fell victim to its first significant labor dispute, which interrupted the extraction processes. The ten day long strike took place throughout the mines surrounding Silverton, including the Gold King Mine. The dispute was between the Mine Owners Association and the Miners' Union

over the need for more staff in the boarding houses. A compromise was reached between the two parties and it was agreed that there would be one boarding house staff member for every twenty mine employees. No violence erupted at any of the participating mines at any time during the strike and all mines were peacefully reopened within a few days of the compromise.[28]

A year after this short lived strike, some of the Gold King buildings caught fire in July of 1904. While the owners held an insurance policy for the above ground buildings, they did not take out a policy for the tramway that had been destroyed by the fire. Instead of rebuilding in this location again, which was not an option due to budgetary constraints; they began using the nearby American Boarding house to accommodate their employees, a move they had already planned to take.[29]

A few weeks prior to the fire, the Gold King Mine baseball team, comprised mostly of employees from the mine, faced off with the Silver Lake Mine team. They had narrowly lost this game and were raring at a chance to face off with their rivals once again. Despite the fire that had taken place just a month before, the Gold Kings kept to the schedule and played the Silver Lakes in August. During the game, Willis Z. Kinney, the Superintendent and general manager of the Gold King, livened up the large crowd and placed bets on his team. The total of the bets placed on that one game was estimated to be $3600. Although they were predicted to win, the Gold Kings lost 5 to 10 to the Silver Lakes.[30] The Silverton area mining baseball league was active for at least a decade, so the Gold Kings had many chances to redeem themselves.

Although the 1903 dispute was settled amicably, new issues arose in 1905. There had been tension between the Gold King Mine management and the union workers for

weeks, but the situation remained calm. The catalyst for the new strike was the list of instructions left by the Gold King Mine's manager, Willis Z. Kinney, for his subordinates. Kinney, who is often credited for the massive success and high productivity of the Gold King, left strict orders to keep all Union officials off the Gold King Mine property while he was away on business in California. Kinney claimed that the Union officials distracted and riled up the on duty miners.[31]

Upon hearing these orders, miners at the Gold King believed Kinney, who was already very unpopular before this incident, had crossed a line. The 200 miners employed by the Gold King construed this act as an insult. The miners stopped work and "came down the hill in a peaceful but determined manner.[32] The executive board of the Gold King Mine, located on the East coast, began mediation immediately.[33]

Unfortunately for the Silverton area mine owners, the immediate actions taken by the board could not stop the shockwaves of the 1905 Gold King Mine strike. Miners employed by the Sunnyside Mine, an adjacent mine, threatened to walk out in solidarity with the Gold King Mine miners and the Miners' Union. Soon after, the owners of the Esmeralda Mine, in an attempt to avoid a possible strike, violence, and scandal, closed early for the winter.[34]

The Gold King Mine's troubles continued through the early months of 1906. All railroads in San Juan County were closed for several days due to persistent snow slides and snow drifts. The Silverton Gladstone and Northerly Railroad was no exception and was therefore unable to transport necessary supplies to the Gold King Mine. Due to the lack of coal and food caused by the train closures, the Gold King was forced to close until they were resupplied.[35]

The harsh winter conditions of the San Juan Mountains often delayed shipments which made the Gold King Mine's dependence on coal a liability. The Gold King Mine, like most other isolated mines, depended on coal powered steam engine generators to generate energy for their mountain camps. This source of energy was unreliable and expensive which forced the Gold King owners to look for a new source of electricity.[36]

Animas Power & Water, later referred to as Animas Power Co., was the solution to the Gold King Mine's energy crisis. This new energy company built its first generating station in Rockwood, Colorado, along the line of the Durango & Silverton Narrow Gauge Railroad. The plant, which cost a total of $1,300,000 to build, used the water from the Electra Lake Reservoir to run its 3,000 horsepower General Electric pelton type turbines. Electricity sent by Animas Power & Water was received at the Gold King Mine for the first time on April 15, 1906. This new source of electricity cut the cost of power by half and made electricity available year round.[37]

Unfortunately, the Animas Power & Water generating station was also susceptible to the unpredictable and severe San Juan Mountain weather. In September of 1906, the Animas Power Company's pipeline broke due to heavy rains. This broken pipeline took two months to repair. Due to the fact that the Gold King Mine had become fully reliant on Animas Power in April of the same year, they were forced to shut down the mine until the Animas Power Co. was able to repair the pipeline.[38]

Although the Gold King Mine had new problems to overcome, they were forced to address a persistent issue. Mines are notorious for being dangerous work environments and the Gold King Mine fit this description. Several miners and supporting staff were injured or killed at the Gold King Mine. In December of 1901, a timberman at the Gold

King Mine, named Erric Hagg, "had both bones of his right leg broken between the knee and ankle."[39] Hagg's accident took place his first day back on the job after recovering from a skull fracture he sustained from a thief in Silverton.[40] Louis Bouer was killed by a wooden plank which fell and broke his neck in April of 1903. Later that year, Joe L. Selias, a native of Switzerland, was killed when a large rock fell and crushed him.[41] In December of 1904, an Italian man was rushed to Mercy hospital in Durango by train after falling into a hole in the Gold King Mine. Fortunately, he was able to survive his severe injuries.[42] A few months later, Peter Gastro sustained a serious injury to his left eye when a rock fell on his head.[43] Charles Peterson, in September of 1906, was killed instantly when struck by a falling rock.[44] The next year, John McElroy was injured in a premature explosion.[45] In 1907, J. Bindvitch had a similar experience when he received injuries to his hands and arms in separate premature explosion.[46] Many miners turned to Unions for protection from the everyday dangers of working at a mine.

By 1907, all of the miners employed by the Gold King Mine belonged to the Union. Their allegiance to the Union was so strong that when a non-union, or scab, cook was employed, 180 miners walked off the job in protest. Many surrounding mines, like the Mogul Mine, used the same walk out tactic to protest scab hires at their own mines.[47]

Although Silverton was "a strong Union camp," and was considered "an unhealthy place for non-unionists to visit," the region had very peaceful labor disputes, especially when compared to other mining regions in Colorado.[48] The mines in the mountains surrounding Silverton simply staged non-violent walk outs. Telluride's mines, on the other hand, had been the scene of violence for several years. Telluride miners staged a violent strike involving gunfire and dynamite starting in 1901, their mine

manager was assassinated in 1902, and National Guard troops were brought in to quell the violence in 1903 and again in 1904. [49] These violent tactics had also been used in the 1894 in Cripple Creek, Colorado where members of the Western Federation of Miners faced off with the Mine Owner's Association over a higher minimum daily wage, an eight hour day, and the right to union membership.[50]

Silverton miners gave aid to striking miners in other cities on occasion, but often favored the "law-abiding" miners who did not use "mob" tactics.[51] The Silverton newspaper and business owners, on the other hand, sided with the mine owners, especially in the case of Cripple Creek.[52] This was in part due to the violent nature of the strikes, persistent anti-immigrant sentiment, and general distrust for the miners themselves.

The Gold King Mine owners had good reason to not trust all of their employees. In 1908, Manager Kinney found evidence that $40,000 worth of gold had been stolen from the Gold King Mine in less than one month's time.[53] Seventy five to eighty men were discharged from the mine for being suspected of a connection to the crime and Kinney ordered the arrest of the suspected thieves, a group of Austrian and Italian men.[54]

As these men were escorted off the premises of the Gold King Mine, their belongings were inspected by the police. $5,000 in gold was redeemed from these searches and more ore was found later hidden away in the bunkhouse.[55] Cena Lodovica and Matt Williams, "whose real name [was too] unpronounceable" for the Silverton Standard, were convicted of stealing. They were sentenced to a year in prison at Canon City, Colorado.[56]

Although already in place, the Gold King Mine reiterated its promise to pay a reward of $550 to employees who could provide evidence that would lead to the conviction of thieves.[57] Despite their best efforts, the Gold King Mine continued to lose gold. For this reason and due to negative stereotypes of immigrants, Kinney ordered the arrest of all of immigrant employees at the Gold King for stealing high grade ore.[58] In response to this discriminatory act, an anonymous group sent the Gold King Mine management a threatening letter which bore a cross-bone illustration. In the letter, the group stated that Kinney would be killed if he did not "let up on the prosecution of high graders."[59]

Other mines in the area had problems with theft as well. A loss of $40,000 in a month due to theft was typical for a mine in this region, especially for one so lucrative.[60] The Gold King Mine vein averaged 9 feet wide, but spread to thirty feet in some sections.[61] This large deposit allowed the Gold King Mine to extract $40,000,000 in gold from between 1895-1919.[62] It is estimated that during that time frame a total of $5 million was stolen by employees and thieves.[63]

The issues of theft and discrimination were quickly forgotten when the Gold King Mine caught fire again in June of 1908. According to a miner, the "conditions at the Gold King mine [were] appalling."[64] It was these poor conditions and lack of safety equipment that made the fire fatal. The fire started at 8:00 pm in the terminal building.[65] Arson was suspected as the cause of the fire because no stove fires had been recorded four days prior to the event.[66]

The mine did not have enough water or any equipment available to put out the fire. As a result, all of the other buildings at the Gold King Mine caught fire. The

boarding house where many off-duty miners were relaxing quickly went up in flames, but fortunately they were able to evacuate the building without incident.[67] The night shift miners were not as lucky.

The mine itself caught fire. Following protocol, the shift bosses called all miners out of the tunnel. They received an incorrect count from subordinates and therefore reported all miners accounted for. They soon realized that three miners, Otto Johnson, John Finnstrom, and Victor Erickson, remained trapped in the mine.[68]

The three trapped men were in a tunnel that remained untouched by the fire. These men did not heed the fire alarm because they believed staying put would be safer than evacuating through tunnels they did not know the condition of.[69] Although not directly in the path of the fire, the miners suffered adverse effects from the gasses and smoke produced by the fire. Fortunately, they were able to communicate their location to the miners outside through an exposed pipe. [70]

Although alive, Otto Johnson, John Finnstrom, and Victor Erickson, could not escape to safety on their own due to their weakened state. Thirty-four men were sent to rescue the three miners. The likelihood of the rescuers dying themselves was high, but all appointed men attempted the rescue. This first group of thirty-four rescuers, equipped with no safety gear, was so overcome by the smoke and gas that most returned.[71]

After the first rescue attempt failed, a second rescue mission was organized. A party of 150 men was sent to the Gold King Mine. In addition to the men received to help in the rescue, the Gold King Mine was also sent all of the doctors in the region.[72]

Although the fire was traumatic for all involved, there was a silver lining for Manager Kinney. Kinney, the same man whose actions started a strike in 1905 and

arrested all foreigners a few months earlier, was manager when the fire devoured the mine and was therefore made the leader of the rescue mission. The miners and the manger often butted heads before the fire, but Kinney's "untiring...efforts to care for those overcome by foul air," gained him the respect of his subordinates.[73]

Despite his best efforts, Kinney's rescue missions ended with six fatalities. Victor Erickson, one of the original three who were trapped in the mine, died due to smoke inhalation before he could be rescued. Roy Coburn, Gus Olson, Pete McEnany, Alex Johnson, and A.W. Burns, all members of the first rescue mission, also fell victim to smoke inhalation in their attempt to rescue the three miners.[74]

In addition to killing six miners, the fire of 1908 did irreparable economic damage to the mine owners and the surviving miners. All of the Gold King Mine buildings were destroyed, which amounted to a property loss of $150,000. All 200 miners had to be laid off during the several month period it took to repair the mine to its former glory.[75]

The Gold King Mine was fully operational within a few months and hired on a full crew in 1909. The day after pay day in May of 1909, some miners were celebrating their wealth with several drinks. The carelessness that comes with intoxication allowed these men to leave their room without blowing out their candle. This unattended candle left to burn by the drunk miners caught the Gold King bunkhouse on fire.[76]

There were 136 men employed at the Gold King Mine when this third fire broke out in 1909. Roughly one third were on duty in the mines and the rest were in the bunk house. Precautions, like fire alarms and fire doors, were put in place within the mine after the 1908 fire. For this reason, none of the on-duty men were killed or injured during this fire.[77]

Unfortunately, safety measures were not taken with the rest of the buildings at the Gold King Mine. Like in 1908, there was no water available to put out the fire in 1909. As a result, the boarding house burned quickly. Sadly, Arthur Stokes, nicknamed the "Prince of Wales," was unable to make it out in time and was burned to death in the bunkhouse.[78] A rescue train was sent soon after the alarm rang, but it was too late for Stokes.[79]

The fire in 1909 was largely contained to the above ground buildings which resulted in $40,000 of property damage. Although this third fire was not as tragic as the 1908 fire, in terms of loss of life and property, this catastrophe was the last straw. The Gold King Mine owners were forced to shut down indefinitely in order to rebuild, yet again, and to find someone who was willing to take this troublesome mine off their hands.[80]

Otto Mears, one of the men originally approached to build the Silverton Gladstone and Northerly Railroad, took advantage of this opportunity. In 1910, Mears, along with his son-in-law James Pitcher and Jack Slattery, the owner of the Hub Saloon in Silverton, began leasing the Gold King properties. This lease included control of the Silverton Gladstone and Northerly Railroad. After five years of leasing the railroad, Mears and his associates were able to buy it when the railroad came up for auction in a foreclosure sale in 1915.[81]

As leaseholder of the Gold King Mine, Mears continued the multi-shift schedule the mine had been using for the past decade. Mears knew that there was plenty of gold left to mine and was hopeful that his risky investment would pay off if he had his men work around the clock. Unfortunately, even under Mears' management the mine was

never able to remain open consistently. Like previous owners, Mears had to close the mine as a result of severe weather.[82]

In March of 1911, the Gold King Mine was hit by a fatal avalanche. The Durango Morning Democrat reported that a Mrs. Lewis and her granddaughter, a watchman, and another woman were killed by the wave of snow and ice. The young girl's father, an employee of the mine, narrowly missed the same fate as his mother and daughter. Fortunately, he had stepped out to meet his wife in a different building just a few minutes before impact.[83]

Mears was also not immune to the issue of miner's safety. He, like most mine owners of the time, had several miners become injured or die while under his management. The first major incident occurred in January of 1910 when Kope Johnson died from being crushed in a cave in.[84] The following year, Lee Olen, 25 at the time of the incident, died instantly when he was caught in a landslide.[85] In 1912, Frank Slatery, a 23 year old law student at the University of Colorado, fractured four ribs after he lost control of his tramway car and fell 30 feet to land on a boulder below.[86] And John Ruane died from the injuries he sustained from falling down an 80 foot chute in 1914.[87]

The dangers of the mine never subsided. In February of 1916, a snowslide destroyed mining equipment, the compressor house, and the blacksmith shop. Fortunately, the snowslide missed the boarding house by a mere twenty feet. If the snowslide had hit the boarding house, the 84 miners present at the time would have either been killed or seriously injured. Although the snowslide did not cause any fatalities or injuries, it destroyed the Silverton Gladstone and Northerly Railroad bridge, forcing Mears to shut down production until repairs were made.[88] A few months later, production

was halted again when a landslide destroyed a different section of the Silverton Gladstone and Northerly Railroad. Repairs were made and the Gold King Mine continued production.[89]

After numerous setbacks, Mears sold the Gold King Mine properties in 1918. The new owners tapped into previously undiscovered high-grade platinum deposits and began focusing their production on this new metal.[90] Unfortunately, soon after they purchased the mine, they were saddled with a lawsuit. Fred Goble, Inc. won the lawsuit and was awarded $7471 by the court. The new owners of the Gold King, without cash on hand after their purchase, were unable to pay this fine. In order to redeem the $7471, the Sheriff auctioned off some of the Gold King's equipment and claims.[91] Although the new owners had access to massive reserves of precious metals, they were unable to overcome the many obstacles that presented themselves and were forced to close and sell the Gold King Mine in 1922.[92]

The Gold King Extension Mines Company, financed by companies based out of Chicago, Pittsburgh, and New York City, bought the property. The new owners speculated that thousands of tons of ore still lay undiscovered in the several hundreds of acres that remained untouched on the property. For this reason, they planned to hire 300-500 men to work in the mine and as support staff.[93] Unfortunately, these dreams did not come to pass. 1923 was the last year that the Gold King Mine was continuously mined. After 1923, mining at the Gold King Mine became sporadic and small-scale.[94]

In the desperate years of the Depression, attempts were made by the residents of Silverton to reopen the Gold King Mine, and many other abandoned mines, on a permanent basis in order to create much needed jobs for the region. Before the 1930s,

low grade ore was simply thrown away because the profits were deemed too low. But during the Depression, when nothing was taken for granted, miners began seeking all ore, no matter the quality. The Gold King Mine did receive some new investments during this time, but they did little to boost the economy of the San Juan Region and were not enough to keep the Gold King Mine open permanently.[95]

With mining production grinding to a halt at the Gold King Mine, there was little use for the Silverton Gladstone and Northerly Railroad. Although reopened later for tourism, the extension railroad closed in 1939.[96] Shortly after the Gladstone railroad was closed, Bradley Mining Company, an Alaskan company, bought the abandoned Gold King Mine.[97] This company did some exploratory work and small-scale mining, but the Gold King Mine remained relatively inactive from the 1940s-1970s.[98]

In 1986, Gerber Energy bought the Gold King Mine.[99] In order to obtain the mining permit for this property, the owners had to comply with new standards and accept the responsibility to build necessary improvements for the site. Gerber energy agreed to close all four mine portals on the property and to continue to treat the acid drainage flowing from the tunnels they owned when they were done mining.[100]

While mining the property, Gerber Energy did follow through on treating the contaminated wastewater they produced. Gerber Energy stayed compliant with the terms of the permit until they ran into financial troubles. Although this company was relatively successful in its first quarter, making $154,087, their success did not last. For this reason, they filed for bankruptcy.[101] As a result, they discontinued the treatment of the acid drainage, did not close the four portals they were required to plug, and the unimproved mine laid abandoned for years.[102]

In the 1990s, the EPA began to take an interest in the site. It was during this time that the EPA started their Superfund site assessment for the Upper Animas River Basin, where the Gold King Mine is located. If the Superfund site where approved, the EPA would have the authority to "clean up the area and identify potentially responsible parties to pay for it."[103] Unfortunately, the residents of Silverton refused the designation in order to avoid the "stigma" attached to Superfund status.[104] Their fear was that the EPA's involvement in the area would scare away tourists and deter potential mining investors.

In order to avoid a Superfund designation, Silverton created its own monitoring organization. The Animas River Stakeholders Group, or ARSG, was created in 1994 to monitor the water quality of the Upper Animas River Basin. This volunteer organization, made up of many Silverton residents, felt that the EPA's presence in the region would "lead to lots of litigation, reduced property values, distrust, and resources going to attorneys and consultants as opposed to on the ground projects that might improve water quality."[105] For this reason, it tried to take on the immense responsibility of locating the sources of water contamination and creating plans for improvement in order to keep the federal government from interfering.[106] The ARSG's job became more difficult when poor methods of mine reclamation were used in the area.

Many of the mines in the Upper Animas River Basin, including the Gold King Mine, are connected. After closing in 1991, Sunnyside Gold, the last large Silverton mining company, made dramatic changes to this network of interconnected tunnels.[107] Unfortunately, the "improvements" they made to their tunnels negatively affected the higher elevation tunnels connected to their network.

Although they closed their doors in 1991, Sunnyside Gold was still obligated to treat the acid drainage flowing from their tunnels. If their portals remained open, Sunnyside Gold would have to continue this expensive treatment method indefinitely. This company began negotiating with state entities for a compromise which would allow them to implement a more permanent and less expensive method of dealing with their waste water. In 1996, Sunnyside Gold and the Water Quality Control Division, a division of Colorado's Department of Public Health & Environment, signed a contract which allowed Sunnyside to "turn off its treatment plant in Gladstone in return for remediating a number of historic mine sites."[108]

Sunnyside Gold spent $10 million on closing several of the tunnels on their property. They began by placing hydraulic bulkheads, or plugs, in the American Tunnel in order to dramatically reduce the amount of acid drainage that spilled from this portal.[109] Before the bulkhead was put in place, the American Tunnel was dumping acid drainage into the Upper Animas River Basin at the rate of over 1600 gallons per minute, but after the bulkhead was built, drainage from this portal dropped to 100 gpm.[110] With the supposed success of the American Tunnel bulkhead, Sunnyside Gold closed other portals, like the Gold Prince.[111] Unfortunately, the closing of Sunnyside's portals had the "unintended effect" of building up water pressure behind the bulkheads and "increasing the flow of water to the Gold King Mine."[112]

In 1999, after the bulkheads were built, Steve Fearn bought the Gold King Mine.[113] It was not until 2002 that the Gold King Mine began producing a noticeable increase of acid drainage as a result of the adjacent portal closures of the mid-1990s.[114]

By 2005, Steve Fearn was unable to keep up with his mortgage payments and was forced to sell the Gold King Mine.[115]

It was at this point that Todd Hennis, the creator of the San Juan Mining Corps. and current owner of the Gold King Mine, acquired the Gold King and a "few other scatterings of claims throughout the district."[116] Hennis had been doing business in the Silverton area since 1995 when he bought the Mogul Mine in a back-taxes sale. Although he has bought several abandoned mines in the area, he claimed in a Durango Herald interview that he "never mined the Gold King," and never had any intention of mining the property.[117]

Even though Hennis did not mine the site, the conditions of his mine became steadily worse. In 2007, a landslide blocked the portal of the Gold King Mine.[118] This unintentional closure of the mine increased the pressure and water levels of the interconnected network of mines, which then created a high risk for a blowout in this area.[119]

The damage done by the cave in was made worse in 2009 when the Colorado Division of Reclamation, Mining, and Safety, or DRMS, closed all four of the Gold King Mine portals. Although built to keep the contaminated water contained and out of the watershed, these man-made closures created an even higher risk for a potential blowout. With most of the portals in the Gladstone area closed, the Gold King Mine became one of the "worst draining mines in the state of Colorado."[120] The drainage problems created by the poor reclamation practices created the perfect opportunity for disaster.

After the bulkheads were built for the surrounding mines and the portals of the Gold King, the mine released acid drainage at a rate of 150-300 gpm.[121] This rate is much

higher than the historic flow of less than ten gallons per minute which was recorded before Sunnyside Gold halted treatment of the contaminated water and began the process of building bulkheads throughout the region.[122] With the increase in contamination, many agencies and entities were contracted to monitor the water quality of the Gold King Mine. Those who were tasked with monitoring the conditions of the Gold King Mine were Todd Hennis, ARSG, the Department of Reclamation Mining and Safety, and the EPA.[123]

The EPA announced in 2011 that the Upper Animas Basin "could meet listing criteria for Superfund." Shortly after this announcement was made, Sunnyside Gold volunteered to donate $6.5 million, later changed to $10 million, for future reclamation projects in the region. One of the offers Sunnyside made was to use their donated money to reopen the acid drainage treatment plant. This was the same treatment plant they had closed in a previous deal made with Water Quality Control Division which had allowed them to halt the treatment of the contaminated water in return for building hydraulic bulkheads. This donation and the promise of reopening the treatment plant came with strings attached. Sunnyside Gold was only willing to donate if they were guaranteed that they would not be found liable for any past or future contamination caused by their mines or the poor reclamation practices.[124] This offer was again put on the table after the Gold King Mine spill occurred in 2015.

With the Superfund status on the horizon, the EPA began taking a more active role in the area. In 2011, the EPA began treating the acid drainage instead of simply testing the water quality of the basin. They began the reclamation process for the Gladstone region at the Red and Bonita Mine.[125]

The contracted workers began the project by drilling into the well in order to determine the real-time water levels that had built up behind the bulkhead. Their measurements proved that the water levels within the Red and Bonita Mine were higher than expected. The original plans made with old data were adjusted to accommodate for the more accurate water levels in order to avoid creating conditions for a blowout.[126]

A stinger, or steel pipe, was then inserted into the top of the mine above the water table and the EPA began pumping the contaminated water to treatment ponds. In addition to treating the water, the EPA let the bulkhead valve remain open in an attempt to reduce the amount of pressure that had built up in the Gold King Mine.[127] Unfortunately, the measures taken to decrease water levels and pressure within the Gold King Mine were too little and too late.

Chapter 2: The Spill

The Gold King Mine spill occurred on August 5, 2015. Acid drainage cascaded from Gold King portal located 11,400 feet above sea level in the San Juan Mountains north of Silverton, Colorado.[1] According to the official reports, this uncontrolled release at Gold King Mine was due to a "series of events spanning several decades."[2] Most notably, the blowout conditions were created by the lack of standardization for mine reclamation, past reclamation projects in the area, and insufficient testing.[3]

Although the water quality of the Upper Animas Basin was tested on a regular basis, the water levels of the Gold King Mine were never continuously tracked.[4] For this reason, the exact water levels were unknown when a crew, comprised of employees from the Environmental Restoration LLC, was sent by the EPA to treat the groundwater spilling from the site.[5] When they arrived on site, they believed that the water levels were lower than they actually were.

The initial statistics they were given for the work that would be conducted in August of 2015 were based on tests taken in 2014 and early spring of 2015.[6] The several month old data was, unfortunately, incorrect for the job scheduled for the summer of 2015 due to seasonal variations that cause the amount of groundwater to fluctuate within the mine.[7] In addition to the out of date data, a separate test and an inspection allowed for the Gold King Mine to be opened with incorrect plans.

The EPA crew assumed incorrectly that there was only 6 feet of water held behind the debris blocking the portal, which would mean that the mine was only partially full. They created this estimate by measuring the amount of water that had been released into the seepage pond outside of the mine.[8] The water levels inside the mine should have been

at a similar elevation as the water in the seepage pond. Due to a blockage in the flow of contaminated water between the mine and the seepage pond, the acid drainage was unable to settle correctly. Therefore, an incorrect reading was recorded.[9]

To avoid a possible blowout, other entities were called in to give a second opinion on the Gold King Mine site. On July 23, 2015, the EPA's on site coordinator called the Bureau of Reclamations to schedule an inspection for August 14, 2015.[10] This meeting, scheduled for nine days after the blowout, never took place. Before the Bureau of Reclamations could inspect the site, a different group visited the site and found evidence to support the EPA's incorrect data. Two representatives from the Colorado Division of Reclamation, Mining and Safety, or DRMS, conducted the seepage pond test for the second time. The inspectors came to the same conclusion as the EPA that the water levels were not at capacity. This was the approval the EPA needed to move on with their plans to open the Gold King Mine's portal.[11]

But some contradict this account of the events that led to the August 5th blowout. Mike King, the executive director of Colorado's DRMS, claims that his employees "did not have any authority to manage, assess, or approve any work at the Gold King Mine."[12] Although he admits that representatives from his department were on site the morning of the spill, he insists that his employees "did not determine or advise that excavation of the adit should be continued."[13] The report conducted by the Bureau of Reclamation (BOR) from which the original story was obtained, remains the official account of the incident. These contradictions, presented by a department in Colorado's state government, have not swayed the federal government to change its story. In fact, the EPA is stressing the state's involvement even more since their report was disputed.[14]

Disputes notwithstanding, mistakes were made on several fronts. Despite the fact that the EPA had already successfully treated the acid drainage from an adjacent mine, the Red and Bonita, the crew at the Gold King Mine did not explicitly follow the plans used for the previous reclamation project. The EPA did plan on reproducing the pumping and treatment plan at the Gold King site, but there was one blatant difference between the two methods of treatment: the Red and Bonita crew drilled into the mine in 2011 to determine the real-time water levels and the Gold King Mine crew did not.[15]

The contracted EPA workers at the Gold King Mine did not drill for accurate water levels because false readings from a reputable test, out-of-date data, and a knowledgeable second opinion led them to believe that the mine was only partially full. Although drilling to find the real-time water levels is a recommended practice for mine reclamation, it is not required. If the initial drilling did take place, the spill would not have occurred.[16]

Griswold, a contractor for the Gold King Mine reclamation project, contradicts this point. He claims that he and his crew were also misrepresented in the official report created by the BOR. His account states that he did not drill to find the accurate water level because he had already created plans to open the mine with the assumption that the mine would be full.[17]

No matter the case, the reclamation project went terribly wrong. The EPA began drilling a hole above the estimated water line in order to begin pumping the contaminated groundwater to the treatment ponds. In the process, debris integral to the structural integrity of the site was cleared and the portal became weak. Soon after drilling, a high pressure stream of groundwater erupted two feet into the air.[18]

Although the initial outpouring of water was benign, this stream became unmanageable in a matter of minutes. The "pressurized flow" shooting out of the Gold King portal "had sufficient velocity to initiate internal erosion of the soil" which "rapidly enlarged the flow pathway, resulting in the uncontrolled release of mine water."[19] The EPA did have contingency plans in place for a possible blowout, but not for the amount of water gushing out of the Gold King Mine. The contingency plan, like the plans for reclamation, were prepared for a partially full mine, not a mine that was full to capacity.[20]

The groundwater leak was first noticed at 10:51am. The resulting stream took the EPA crew by surprise as it began to surround the men, trucks, and equipment. The workers' first reactions were to run to the high ground for safety or save the trucks.[21] According to accounts of those on site, the area around "the mine was largely destroyed just 20 minutes after the spill began, with the rust-colored water also washing out the sole access road and submerging a Chevrolet Suburban used by the workers."[22]

The newly destroyed road connecting the Gold King Mine to Silverton, Colorado was the EPA's only means of communication with off-site departments that would have been able to help with this crisis had they been informed of it immediately. A simple phone call would not have sufficed because the Gold King site did not receive cell reception and none of the workers were equipped with satellite phones. For this reason, it took the EPA workers over 90 minutes to reach a location in which they could notify the proper authorities. Once other off-site workers and departments were informed, they still had to wait to provide aid and instruction because it took work crews over five hours to rebuild the road that had been swept away by the blowout.[23]

The Gold King Mine blowout initially released three million gallons of acid drainage into the Upper Animas Basin, which is part of the larger Colorado River Basin. Yellow sediments flowed down Cement Creek, into the Animas River, then the San Juan River, and eventually made their way it to the Colorado River. Due to its reach, the Gold King Mine spill contaminated the water for Colorado, New Mexico, Utah, Arizona, and the tribal lands of the Southern Ute, Navajo, Ute Mountain Ute, and the Jicarilla Apache.[24]

Figure 2: Rivers and Cities Affected by the Gold King Mine Spill, Data from *The LA Times*, accessed June 15, 2016, http://www.latimes.com/visuals/graphics/la-na-g-gold-king-mine-river-spill-20150814-htmlstory.html

The plume of acid drainage took on a bright yellow hue which drew crowds to the banks of the Animas River. The combination of contaminants, like iron, copper, lead, and mining chemicals, reacted with the air and fresh water to make this brilliant color.[25] This yellow tint was seen so often by "old-time miners" that they nicknamed the color "yellow boy."[26] Although it was a surprisingly beautiful phenomenon, it was also incredibly destructive for many aspects of life along the river due to the fact that the plume carried dangerously high levels of toxic minerals, like lead, arsenic, mercury, and cadmium.[27]

Figure 3: The Animas River During the Plume at Bakers Bridge in Durango, Data from KNAU Arizona Public Radio, accessed June 15, 2016, http://knau.org/post/epa-says-gold-king-mine-spill-dumped-880000-pounds-metals-river

Although originally estimated to be roughly 1 million gallons, later calculations found the plume consisted of 3,043,067 million gallons of acid drainage. This volume is the equivalent of "9 football fields spread out at one foot deep".[28] Fortunately, the health effects of this spill were made less severe through dilution.

Cement Creek is naturally biologically dead at its origin due to the high concentration of minerals in the area which were deposited in the region as a result of its volcanic past. Cement Creek flows through the Silverton Caldera, which was active during the Tertiary Period 25 million years ago. This long dormant volcanic site is highly fractured, allowing for the naturally occurring Ferricrete, "deposits of soil and rock particles cemented by iron-oxyhydroxide," to seep from the mountains and into the surrounding watershed.[29]

Although some of the damage to our nation's watersheds is naturally occurring, the volume of minerals found in the water increased substantially with the introduction of mining. As mining increased, so did the reach of the biologically dead area. The rivers of

the Colorado Basin have been continuously polluted by hundreds of mines for over a century, but few serious side effects have been seen because the contaminants have been released at lower levels over a long period of time. The Gold King spill, on the other hand, released a massive amount of contaminants into the basin all at once. The plume was unable to dissolve as quickly because of the high concentration of acid drainage.[30]

By the time the plume had reached the Durango, Colorado, 60 miles south of the Gold King Mine, it remained an astonishing shade of yellow. Although the plume still contained high concentrations of acid drainage as it left Cement Creek and flowed into the Animas River, it had been diluted to half of its potency. As the plume was carried through Durango on the Animas River, tests show that it had been diluted to a factor of 1:150, or "one part acid mine drainage to 150 parts of river water.[31]

Although the plume was less concentrated in the Animas, it posed a greater threat to Durango than it had to Silverton. The Animas River, unlike Cement Creek in Silverton, is used for more than just recreation. In addition to recreation, Durango residents use the Animas as a source of drinking water and use the river for agriculture. Therefore, there were more people affected by the contamination of the Animas than the contamination of Cement Creek.[32]

From Durango, the next large town to witness the plume was Farmington, New Mexico. It was here that the plume carried by the Animas River was dumped into the San Juan River. By this time, the plume had been diluted to 1:550. From Farmington, the San Juan River flows west through the Four Corners and continues through southern Utah until it reaches the Colorado River. Like the Animas, the San Juan is used for recreation, drinking water, and agriculture. The Navajo, especially, felt the impact of this

environmental disaster because the San Juan is home to the "largest concentrated area of local Navajo farming."[33]

From its confluence with the San Juan River, the Colorado River flows through northern Arizona and comes to a standstill in Lake Powell, which was created by the Glen Canyon Dam. The plume had been so diluted by this point that the yellow tint was no longer visible. When the unseen plume entered Lake Powell, which contained 12 million acre-feet of water at the time, it became diluted by a factor of 1:1,200,000. Using the average retention time of Lake Powell, biologists calculated that the acid drainage particles could take 18 months to two years to pass through the Glen Canyon Dam and continue on to the Colorado River.[34]

Once the acid drainage passes through the Glen Canyon Dam, the already diluted plume would be diluted by an additional 1:4,000. From the dam, the Colorado River flows into Lake Mead, through the Hoover Dam, and continues to flow through Arizona until it reaches Mexico. Due to the heavy dilution that took place in Lake Powell, "no measurable impacts...are expected" from that point on.[35]

Chapter 3: The Effects

There were many organizations involved in testing the water quality and monitoring the mine before the spill, but there are far more now. Federal agencies, state departments, and nonprofits have been sampling the water and sediment of the affected rivers since the spill on August 5th. Although definitive information has been gathered from these tests, there are still a lot of unknowns.[1]

The tests conducted by the EPA immediately after the spill show "levels of lead almost 12,000 times higher than federal standards, arsenic levels that were 800 times higher, and mercury levels that were 10 times higher than federal standards."[2] Tests conducted by the Mountain Studies Institute, a local nonprofit, support the EPA's initial findings of mineral exceedances.

The Mountain Studies institute conducted their sampling 58 miles downstream from the Gold King Mine at Rotary Park in Durango, Colorado. They collected 130 water samples from this location on the Animas River from August 6th, the day after the spill, to October 26th. These samples were used to test for the concentration of twenty-four different minerals and metals. The tests found that during the plume several metals "increased in concentration by more than 500 percent."[3]

Not only did the concentrations increase, but the Mountain Studies Institute proved that five metals exceeded national water quality standards and screening levels. Between August 6th and 7th, "aluminum exceeded the Colorado Department of Public Health and the Environment (CDPHE) Aquatic Life Acute Standard" and arsenic, iron, lead, and thallium exceeded the EPA's Recreational Screening Level.[4] The dangerous

concentration of metals did not last long. From August 8th to October 26th, the last day they took samples, no exceedances of water quality standards were found.[5]

Table 1: Metals that Exceeded National Standards During the Plume

							
Metal	CDPHE Domestic Water Supply Standard	CDPHE Agriculture Chronic	CDPHE Aquatic Life Acute Standard	CDPHE Aquatic Life Chronic Standard	CDPHE Aquatic Life Chronic Trout-specific	EPA Recreational Screening Level	
	Plume *Storms*	*Plume* *Storms*	*Plume* *Storms*	*Plume* *Storms*	*Plume* *Storms*	*Plume* *Storms*	
Aluminum	- -	- -	Y n	Y* n	- -	n n	
Antimony	Y* n	- -	- -	- -	- -	n n	
Arsenic	Y* n	n n	n n	n n	- -	Y** n	
Barium	n n	- -	- -	- -	- -	n n	
Beryllium	n n	n n	- -	- -	- -	n n	
Cadmium	n n	n n	n n	Y* n	n n	n n	
Chromium (VI)	n n	n n	n n	n n	- -	n n	
Cobalt	- -	- -	- -	- -	- -	n n	
Copper	n n	Y* n	n n	n n	- -	n n	
Iron	n n	- -	- -	Y* Y*	- -	Y** n	
Lead	Y n	Y* n	n n	n n	- -	Y** n	
Manganese	Y* Y*	- -	n n	n n	- -	n n	
Mercury	n n	- -	- -	Y* Y*	- -	n n	
Molybdenum	n n	n n	- -	- -	- -	n n	
Nickel	n n	n n	n n	n n	- -	n n	
Selenium	n n	n n	n n	n n	- -	n n	
Silver	n n	- -	n n	n n	Y* n	n n	
Thallium	Y* n	- -	- -	n n	- -	Y** n	
Vanadium	- -	- -	- -	- -	- -	n n	
Zinc	n n	n n	n n	n n	- -	n n	

Source: Data from the Mountain Studies Institute

Although five metals exceeded water quality standards, people would have had to go out of their way to experience adverse or long-term effects. In order to become ill from overexposure to the exceeding metals, you would have had to drink two liters of water from the Animas River four days a week for four months. Very few people, if any, spend enough time in the Animas River to ingest the amount of water that would be toxic to a human.[6]

While the Mountain Studies Institute and EPA were testing for the concentration of toxic metals, Wright Water Engineering tested for nuclear particles. Instead of testing the water, like the EPA and Mountain Studies Institute were doing, the Engineering firm took samples of the contaminated sediment along the Animas River in order to test for

uranium-238 and radium. Uranium used to be mined in the area and is still commonly detected; therefore there was a chance that the Gold King spill had released radioactive material into the rivers. Fortunately, the Wright Water Engineering samples only detected uranium in a concentration of .149 pCI/g, which is well below the EPA's allowance of 155 pCi/g for residential exposure to uranium. The concentration of radium in the Animas also stayed below national standards.[7]

The acidity of the water at the height of the plume was another concern. Samples taken at the confluence of Cement Creek and Animas River show that the pH level reached 4.8, which is the equivalent of acid rain. Fortunately, the pH levels decreased as the plume became more diluted as it went down stream.[8]

Although the immediate health risks were later proven to be low, the use of the contaminated rivers was restricted until more could be known about the spill. The Animas River was closed to all recreation and agricultural water intakes were shut for several days. The San Juan and Colorado Rivers remained open for recreation, but also temporarily suspended the use of the contaminated water for agricultural purposes. The August 5th spill and the measures taken to limit exposure to the acid drainage negatively impacted the economy.[9]

In reaction to the negative news coverage, out of fear of exposure to toxic metals, and as a result of the cancellation of river activities, many tourists canceled their trips to Durango. In the days following the spill, hotels, private vacation rentals, and other tourist industries saw an increase in cancellations. One tourist even went so far as to file an EPA reimbursement form for the $1,221.60 he spent on three plane tickets to Durango for his

family. He believed that he was justified in doing so because he felt that his trip had been ruined by the "unsafe" conditions created by the Gold King Mine Spill.[10]

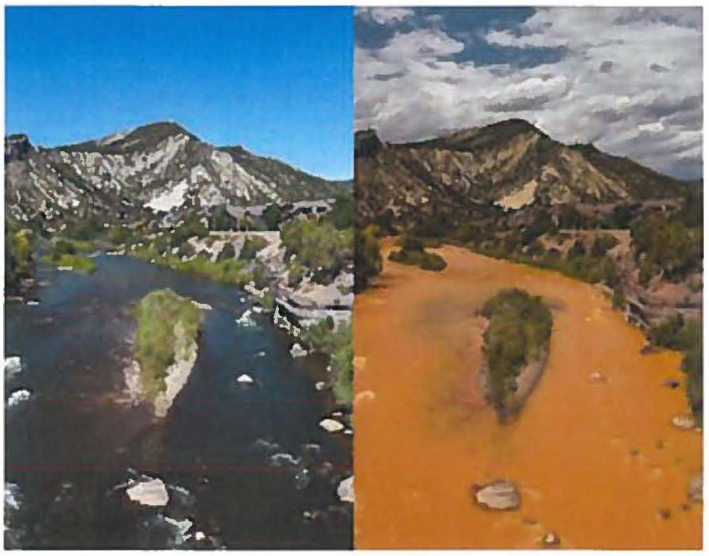

Figure 4: Before and After picture of the Animas River, data from Earthworks, accessed June 16, 2016, https://www.earthworksaction.org/earthblog/detail/house_committee_grills_secretary_jewell_on_gold_king_mine_spill#.V2IRYKI1pdw

While some Durango businesses suffered, the spill "doesn't appear to have hurt the overall tourism industry in Durango."[11] Even if businesses were hurting in August, most bounced back soon after the river was reopened and the news coverage died down. In fact, "Durango saw tax revenues from retail sales and lodging taxes go up this October compared to last October" according to "Tim Walsworth, who leads the Business Improvement District for the city."[12]

As further proof of the resilience of the Durango tourism industry, the Durango & Silverton Narrow Gauge Railroad saw an increase of 10.5 percent in ridership from the year before, despite the spill, which put their 2015 total around 132,000 passengers.[13] Although the spill did negatively affect some businesses in the tourism industry, it did not have a domino effect on the rest of the economy like some were predicting.

While parts of the tourism industry in Durango were resilient, La Plata County and the city of Durango are still trying to recoup their financial losses caused by the spill in August. La Plata County was granted $200,000 immediately after the spill by the EPA, but this amount did not come close to covering the costs associated with the spill. La Plata County officials estimated that the EPA still owes La Plata County an additional $249,224 for just the work done immediately after the spill.[14]

After months of pressing for reimbursement and compensation for future projects related to the Gold King Mine spill, La Plata County and the city of Durango drafted compromises. La Plata County submitted a proposal which asked the he EPA to pay $2.4 million to La Plata County over a 10 year period. The city of Durango created an independent but similar reimbursement plan for the EPA which would grant them $5.6 million over a 15 year period.[15]

In April 2016, the EPA rejected these deals. The EPA claims that its "emergency response activities" ended on October 31, 2015; therefore no work done by the local governments after that point can be reimbursed by their agency. The EPA will be funding the recently approved Superfund site for this region of the San Juans, but the local governments are on the hook for many expenses incurred after the spill. As a result, the local taxpayers will be footing the bill.[16]

To cope with the unforeseen expenditures associated with the Gold King Mine spill, local governments have had to increase their budgets. La Plata County, with Durango as its county seat, was forced to increase its budget by 33 percent from $78.8 million in 2015 to $104.7 million for 2016. $700,000 of the 2016 budget is specifically designated to cover the initial costs of the spill. An additional $8.7 million has been set

aside for future projects and emergencies associated with the spill. Although the allocation of funds was necessary to repair the damage of the spill and to prevent future blowouts, the spill took funds away from equally important endeavors, like "outreach and education efforts."[17]

In order to recoup some of the losses incurred as a result of the Gold King spill, state governments, local governments, and individuals are filing lawsuits and submitting reimbursement requests to the EPA. The government of New Mexico has already filed a notice to sue "the federal government and the owners of two Colorado mines that were the source of a massive spill."[18] From this lawsuit, New Mexico hopes to be granted $1.5 million in reparations from the EPA, San Juan Corp., and Sunnyside Mines.[19]

Utah Attorney General Sean Reyes is also filing a lawsuit. The government of Utah is suing the EPA not only for the way it mishandled the reclamation project that led to the spill, but also the EPA's reaction to the spill. According to representatives of the state, the government of Utah was never warned that contaminated water from the spill would enter into their state. The EPA claims that they followed protocol by posting the alert on their website, but Utah does not believe that this agency went far enough to alert the state of the plume. Although the information was posted, it was never sent specifically to the affected areas of Utah, so Utah did not know to take precautions until it was too late.[20]

Individuals who feel that they have been "financially damaged" by the Gold King Mine also have a means of seeking restitution. Those who were negatively impacted by the event have until August 5, 2017, exactly two years after the spill, to file a Form 95 with the EPA. As of November 2015, fifty-one individuals have filed claims totaling over

$5 million. The majority of this sum is requested by to industries: rafting and agriculture.[21]

Figure 5: River Closed Sign Posted on the Animas River During the Plume, Data from *The Daily Signal*, accessed June 16, 2016, http://dailysignal.com/2015/08/13/after-epa-spills-toxic-waste-in-colorado-river-nearby-residents-hope-for-recovery/

All rafting companies located on the Animas River were forced to close for nine days during the peak tourist season due to a recreation ban on the river. One rafting company is seeking $15,000 in damages as a result of the business lost due to the spill. Individual rafting guides are also filing the Form 95 for compensation ranging from $408 to $3,420 to in order to recoup their lost wages from those days.[22]

The largest individual claims, however, came not from the tourist industry but from "property owners whose wells were affected by the orange sludge and farmers [who were] forced to close [their] irrigation ditches." One farmer is sending in a claim for $550,000 in order to build a new well. He claims that the stigma associated with the Gold King Mine spill will cost him business as a result of suspected contamination of his products; therefore he needs to rid himself of his contaminated equipment.[23]

In addition to lost wages and business, the October and November real estate sales support the assumption that the Gold King Mine spill negatively affected the Durango real estate market. The negative impact of the spill was not seen immediately because

many homes were already under contract in August and September. This conclusion was made after comparing the residential real estate markets of La Plata County to that of Archuleta County, a county that has "a similar lifestyle, with a river running through town, mountains and skiing." While Archuleta County saw gains of 17.1 percent in October and 25.9 percent in November, La Plata County's real estate market fell by 33.3 percent in October and 9.7 percent in November. Although the Gold King Mine spill cannot be definitively blamed for the entire decline of the La Plata County real estate market, realtors believe that it is the most likely factor due to the incredible amount of negative press this region of Colorado received.[24]

Although La Plata County incurred much of the clean-up costs, lost business, and saw their previously thriving real estate market falter briefly, the Navajo Nation was emotionally and financially wounded by this event. On both the Animas River and the San Juan River, intakes for irrigation were turned off. The intakes on the Animas River and many on the San Juan River were then flushed of all contaminants and reopened within days of the spill. Experts attest that because the intakes were turned off during the plume and were flushed before use that the "crops grown by farmers using the Animas and San Juan during the spill are safe to consume."[25]

Not everyone trusted this assessment. The San Juan River is home to one of the largest population of Navajo farmers in the nation. Two Navajo chapters, or counties, that reside on the San Juan River unanimously voted to keep their irrigation canals closed for at least one year in order to avoid possible contamination.[26]

Despite assurances from the EPA, the Navajo Nation chapters stayed firm on their decision to keep the irrigation intakes turned off for up to a year. Because they admitted

responsibility for the Gold King Mine spill, the EPA is obligated to provide a source of water for those who were affected by the spill. As of September 9, 2015, just one month after the blowout, the EPA had already transported 418,000 gallons of water to the affected regions of the Navajo Nation.[27] This water, which is being sourced from the Navajo Tribal Utility Authority and Navajo Agricultural Products Industry's wells, is being used by the Navajo farmers to sustain their crops and livestock.[28]

The Navajo farmers located on the San Juan River have been adversely affected by the spill and the decision to keep the irrigation intake valves closed. The crop yield for these farmers was much lower than in previous years due to their shortage of water during the summer of 2015. One Navajo hay farmer was 500 bales short of his average. At $9 per bale, he lost out on $4,500 in profits. Other farmers were even more unfortunate and lost all of their vegetables. Like Durango residents who were financially hurt by the spill, the Navajo farmers are able to fill out a Form 95 in order to seek reimbursement for their lost profits, but compensation is not immediate.[29]

Despite their vow to keep the irrigation intake valves closed for a year, the economic consequences of forgoing the use of their canals was too much for the Navajo farmers. In early May of 2016, the last remaining closed irrigation canals, the Hogback and the Cudei, were flushed out and reopened. The decision to reopen the irrigation intakes was made after reviewing promising water and soil tests from April of 2016.[30]

In addition to financial strain, the spill may have contaminated the wildlife in the affected rivers. The tests conducted by the Mountain Studies Institute show that levels of aluminum were high enough during the plume to cause damage to the aquatic life. Fortunately, no fish were immediately endangered by the plume.[31]

No dead fish were observed in the Animas River during or directly after the spill, which is a good, but inconclusive sign for the health of the River. In order to guarantee a more accurate reading, the Colorado Department of Public Health and Environment conducted an experiment during and immediately after to plume. 108 fingerling trout, taken from the Durango Fish Hatchery, were put into cages then placed in the Animas River during the plume and for the following five days. Of the 108 exposed fish, only one died, but its death was not a result of the spill. The remaining 107 trout were taken out of the Animas River five days after the spill healthy and with no signs of stress.[32] The organs of the exposed fish were then sent to a lab and analyzed. These tests concluded that the toxic metals dumped into the Animas in high concentration by the spill were "either not detectable or within a range found in fish before the spill."[33]

Unfortunately, these tests do not definitively put all worries of wildlife contamination to rest. Although the tests taken immediately after the spill came back negative for contamination, the long-term effects remain unknown. There is a possibility that the fish could accumulate high levels of toxic metals as they continue to "feed in the contaminated river since some of the acid mine sediment settled on the bottom and the banks of the river."[34] These same troubling conclusions have been made about the ducks and mammals that rely on the Animas River. Despite the worries of the long-term effects, the Colorado Department of Health and Environment has "declared that trout from the Animas River are safe to eat."[35]

The health of the larger aquatic life depends largely on the well-being of the specimens who reside at the bottom of the food chain. Macroinvertebrates are good indicators of river health due to their lack of mobility. They, unlike fish and ducks,

cannot simply travel to another stream when a disaster occurs. They often cling to rocks or burrow into the riverbed sediments, and therefore are more restricted than the larger aquatic life. Fortunately, tests conducted by the Mountain Studies Institute have proven that the macroinvertebrate in the Animas River have so far been unaffected by the spill, but as with fish, they worry about the unknown long term effects of the exposure to the lingering deposits of toxic metals.[36]

It could take years to fully understand the long-term effects of the spill, but for now the Animas River has been deemed safe for all use. By August 10, 2015, just five days after the spill occurred, the levels of aluminum, arsenic, copper, iron, lead, manganese, selenium, and zinc had returned to pre-spill levels.[37] Although the Animas River no longer contained dangerously high concentrations of toxic metals in the water, many remained skeptical of Durango's water quality.

Although tests proved that the water flowing through the river was safe, it was difficult for Durango residents to believe this assessment because the thick yellow sediment deposited by the plume still coated the banks of the river. To put all fears to rest, Colorado Governor, John Hickenlooper, after first sterilizing the water with an iodine tablet, "drank a hearty gulp of the Animas River in an effort to highlight that the river has returned to pre-contamination conditions."[38] Although theatrical, the governor's point was clear, and the Animas was reopened shortly after this publicity stunt.

Although the initial water quality concerns have passed, the sediment is being tested on a regular basis in order to understand the long-term effects of the Gold King Mine spill. Most of the 880,000 pounds of heavy metals carried by the plume "settled to the bottom of the Animas before reaching the San Juan River in New Mexico."[39]

Although a threat to aquatic life in any state, the sediment that clings to the banks of the river it is not considered to be an immediate threat to the health of humans. It is when the accumulation of metals is disturbed and released into the water that the sediments become a concern.

For this reason, the Animas River and the sediments that continue to cling to its banks are primarily being tested during large storms events and the spring runoff season. Experts believe that if high levels of toxic metals were to appear again as a result of the deposits the plume left behind, these events would most likely take place when the sediments are being stirred up. The Mountain Studies Institute has detected increased levels of six metals, but has not detected any "exceedances of water quality standards or screening levels during storm events."[40]

Unfortunately, gauging the level of contamination is made more difficult by a lack of standardization; a problem which has plagued reclamation projects for decades. Sediment analysis, although helpful, is also inconclusive due to the fact that no definitive standards exist for experts to compare their samples. As of yet, data created from the study of the sediments has been disputed and varied, but also relatively positive.

Experts from Fort Lewis College are hopeful that most of the toxic metals will be washed down stream as a result of spring runoff flows upwards of 6,000 cubic feet per second without being dissolved first. If the metals remain undissolved as they are flushed down the Animas, San Juan, or Colorado Rivers, the contaminants will make it to the ocean where they will be too diluted to inflict damage on the aquatic life[41] This positive theory, unfortunately, only relates to the amount of sediments deposited by the plume, not

the continuous pollution created by the hundreds of abandoned mines in the Colorado River Basin.

Pollution is a constant for western rivers. Although concentrations of toxic metals usually stay below federal standards, acid drainage seeps into our nation's rivers every day. Continuous exposure to the toxic levels of metals can be harmful to human health.[42] Although rare and unlikely at the present levels, overexposure to aluminum, arsenic, iron, lead, and thallium can negatively affect liver function, the nervous system, brain development, and lead to death. [43]

CHAPTER 4: Actions taken after the Gold King Mine Spill

The Animas River's rapid descent to the San Juan River is uninterrupted by man-made dams. For this reason, stopping the plume immediately was an impossible task. The only option was "to allow the acid mine drainage to become naturally diluted as it flowed downstream."[1]

The August 5 blowout dumped 3 million gallons of acid drainage into the Upper Animas River Basin, but the pollution did not start or end there. The mines north of Silverton have been contaminating the watershed for over a century, and they continue to pollute the rivers now. The Gold King Mine alone continues to discharge an average of 550 gallons per minute of acid drainage.[2]

In response to the spill and the unabated contamination, water treatment systems were put in place at the Gold King Mine. Within two days of the blowout, the EPA had built settling ponds in order to "divert additional acid mine drainage away from Cement Creek" and to neutralize the acidic water.[3] This small scale and expensive treatment system was only ever a temporary fix. These treatment ponds were not equipped to run during the oncoming winter's freezing temperatures. For this reason, the temporary station closed just a few months after its creation, in the early winter of 2015.[4]

In addition to organizing a water treatment system, it was crucial for the washed out road to be cleared and repaired immediately in order to "reestablish access to the site."[5] The Gold King Mine itself also had to be stabilized in order to control the surge of waste water that continued to stream out. To stabilize the portal, a temporary steel structure was built roughly 60 feet inside of the mine.[6]

With improvements made, it was now possible to build a permanent water treatment plant. The plans for this permanent treatment facility were announced in September of 2015 and construction was completed in October of the same year. This facility, which is equipped to handle 1,200 gallons per minute, cost $1.5 million to build.[7]

The treatment process begins by rerouting the acid drainage through a "4,800-foot pipe that runs from the portal of the Gold King Mine down a steep slope into the treatment system at Gladstone."[8] It is in Gladstone that the contaminated water enters the settling ponds. At this stage, lime is injected into the acid drainage in order to raise the PH level from an acidic 3 to a neutral 7. Then, the water is "mixed with chemicals that cause clean water to rise and the metal-laden sludge to settle at the bottom of a tank."[9] With the contaminants separated, the top layer of clean water flows into Cement Creek while the "metal sludge is directed into filter bags adjacent to the treatment plant."[10] These filter bags have to be replaced every 18 months.[11]

Figure 6: Settling Ponds used to process the Gold King Mine Waste, Data from *The Albuquerque Journal*, accessed June 15, 2016, http://www.abqjournal.com/628976/gold-king-mine-spill-a-disaster-waiting-to-happen.html

Although the roads were cleared immediately after the spill, travel to and from the treatment plant remains difficult. The only road to the settling ponds is an unpaved mountain road which is only occasionally plowed.[12] With the average snowfall for the region at 15 feet, access is limited to the site during the winter months.[13] Unfortunately, the most difficult time to reach the Gold King Mine and its treatment site is also the most crucial. Snowpack and freezing temperatures hold the water in the mountains, which "means less running water, and less dilution in the waterway."[14]

Despite the worries, the new permanent water treatment facility is working well in the snow and cold. The ground water coming out of the Gold King Mine averages 50 degrees, which allows the water to be diverted into the settling ponds before freezing. Although the water treatment facility is running smoothly, other concerns have been raised.[15]

Lime treatment, while effective, is expensive. The initial building costs alone totaled $1.5 million, but the expenses do not end there. In addition to the construction costs, this facility costs $16,000 a week to operate. Lime treatment also results in hazardous solid waste. It is estimated that this facility alone will create 2,500 cubic yards of waste over the next year.[16] For these reasons, this is not a fully sustainable method.

Because it admitted fault, the EPA is on the hook for funding this treatment facility and handling the waste created by it. With so much at stake, the EPA requested an "independent technical evaluation" of the Gold King Mine blowout. The Gold King Mine spill was investigated by the Bureau of Reclamation who wrote a report on their findings. The U.S. Geological Survey and the U.S. Army Corps of Engineers reviewed and approved the report published by the BOR.[17] This report concluded that, although there

were other factors in play, the EPA was partially at fault for the Gold King Mine blowout.

For this reason, the EPA took precautions with their other ongoing projects. Work was suspended at ten polluted mines in four states because EPA officials believed conditions at those sites were "similar to those that led to a massive wastewater blowout" at the Gold King Mine.[18] In addition to reviewing the EPA's other reclamation projects, it also put forth an effort to streamline their safety procedures.

The EPA learned from its mistakes in Silverton. This federal agency took note of the risk and chaos created by a lack of communication with the reclamation crew. Since the blowout, the EPA has made sure that its other reclamation crews have a means of communicating with the closest town.[19]

Unfortunately, the precautions taken by the EPA did not prevent a second acid drainage spill. The second incident occurred in October of 2015 near Crested Butte at the Standard Mine. According to reports, 600 gallons of acid drainage was released from a holding pond and dumped into Elk Creek. Although this incident is minor when compared to the Gold King Mine spill, it is part of a much larger problem.[20]

Progress has been made in the area of water quality monitoring; something many people of the region began demanding after the Gold King Spill. New water gauges were installed April of 2016. The gauges were placed in three existing U.S. Geological Survey stations: "Cement Creek above Silverton; the Animas River just below Silverton; and the Animas River in Durango near the Powerhouse Science Center."[21] The Cement Creek station will show the water quality of "the worst part of the mining district," the first

gauge on the Animas River will "collect discharges out of the entire mining district," and the last gauge will "show how water quality has changed down the valley."[22]

The Upper Animas River Basin already had gauges in place that tested for stream flow, but the newly installed gauges also collect data on the temperature, pH level, conductance, and turbidity. The collected data is updated every 5-10 minutes and is posted on the USGS website. This information will not only help private land owners know when to close their irrigation intake valves, but it will also help agencies trend water quality for the region.[23] In addition to monitoring the water with the gauges, the San Juan Basin Health Department has been contracted to conduct weekly water quality tests for the Animas River. The funding for the weekly testing and the new gauges is being taken from a $2 million grant given to the affected regions by the EPA.[24]

CHAPTER 5: Why We Need Change

There are over "500,000 abandoned mines across the U.S."[1] Of these 500,000, the EPA has designated 156 to be "mega" hard rock mining sites. These large abandoned mines are leaching an estimated "50 billion tons of untreated" mine waste into our nation's rivers.[2] For this reason, over forty percent of the western states' headwaters are negatively affected by acid drainage.[3] Although the problem sites have been identified, the work to clean up and maintain these sites has barely begun due to a lack of funds. The cost of reclaiming these sites has been estimated to be over $24 billion dollars, which is "12 times the annual US EPA budget for remediation of large hazardous waste."[4]

Many of the "mega" hard rock mining sites are located in the western states. In Colorado alone, there are an estimated 23,000 abandoned mines. Research has proven that of these 23,000 abandoned mines, at least 5,105 are releasing contaminants into the rivers.[5] As a result, "1,645 miles of Colorado's streams are impaired by mining related impacts."[6]

Like the federal government, the state of Colorado has been able to identify the polluting sites, but has been unable to make much headway in reclaiming all of the problem mines. The Colorado Division of Reclamation, Mining and Safety has been "safeguarding" abandoned mines since 1980.[7] Due to budgetary constraints, they have only been able to build water treatment plants, the most effective form of reclamation, for 47 of the abandoned mines in Colorado.[8]

Experts claim that "it would cost up to $1 billion to properly address the 5,105 mines leaking acid mine drainage into national waterways, affecting water quality for aquatic habitats, recreation and in some cases, human health."[9] Unfortunately, the state of

Colorado does not have the amount of money it would take to clean up all of the abandoned mines. Colorado Division of Reclamation, Mining and Safety is only allocated $2 million a year for mine reclamation.[10]

Due to their insufficient budget, the DRMS, and other reclamation groups, often choose the cheapest approach to reclamation. On average it costs $5,000 to seal a leaking mine portal with a bulkhead. In comparison it costs over a million dollars to build and staff a water treatment facility to properly dispose of the waste created by the mines. The extreme difference in price forces the DRMS to build bulkheads, which merely contain the waste, at many sites instead of properly treating the acid drainage. As it can be seen in the case of the Gold King Mine spill, bulkheads only delay the problem; they do not fix it.[11]

Poor water quality is not the only problem associated by these abandoned mines. Although the Colorado Division of Reclamation, Mining and Safety has made 6,127 abandoned mining structures "safe," people have sustained physical injuries while around these abandoned structures.[12] Since 1955, eighteen people have lost their lives by falling into an abandoned mine in Colorado. Many others, both humans and animals, have had to be rescued from falling inside these abandoned mines every year in Colorado.[13]

The abandoned mines around Silverton are major contributors to the pollution of Colorado's rivers. Every day, 5.4 million gallons of mine waste flows from the San Juan Mountain mines and into the Upper Animas Basin.[14] The amount of acid drainage the Gold King Mine released during the blowout, 3 million, pales in comparison to the constant stream of contaminants the Upper Animas River Basin is injected with on a daily basis.

The Gold King Mine, with its continued discharge of 500 gallons per minute, is just one of the many mines contributing to the ongoing pollution of the watershed.[15] While the drainage from the Gold King Mine is being treated by the newly constructed water treatment facility, drainage from adjacent sites, like the Mogul Mine and the Red and Bonita, continue to dump over 500 gallons per minute of untreated water into the Upper Animas River Basin.

Acid drainage is the largest and most obvious pollutant from the mines, but the problem of abandoned mines is more complicated. Of the 5.4 million gallons of mine waste that leaches into the Upper Animas River Basin "approximately 85% of all metal loading comes from adits and 15% comes from mine waste piles."[16] It is estimated that from 1871-1991, 8.6 million tons of mine tailings have been discharged in to the Upper Animas Basin.[17] Unfortunately, the organizations that are tasked with cleaning up the abandoned mines on a shoestring budget cannot clean up all problematic sites at once; therefore they have found ways prioritize their work.

In 1997 the Department of Interior began studying the effects of abandoned mines on the environment around Silverton, Colorado. Their studies found that while thousands of mines were releasing contaminants into the rivers, roughly 80 of the 4,500 abandoned mines were contributing the bulk of the pollution. For this reason, organizations in charge of reclamation projects narrowed their focus on these 80 mines in an attempt to make the most difference with the least amount of money.[18]

In the late 1990s, the Gold King Mine was not considered a top priority; therefore no work was done for this site. The Gold King Mine did not begin discharging acid drainage until other mines in the network, owned by Sunnyside Gold, were closed. The

bulkheads built for Sunnyside's mines did nothing to treat the contaminated water; they merely contained and diverted it. The pressurized water found its way out through open portals in the network that sat at a higher elevation, like the Gold King Mine.[19]

Although the bulkheads did not solve the problem of mine waste, they gave the illusion of progress. For this reason, the Silverton area mines lost their prioritized position. The switch to bulkheads came about through a deal made between Sunnyside Gold Corp. and WQCD. This deal allowed Sunnyside to discontinue the use of its water treatment plant if they sealed their abandoned mine portals.[20] The treatment plant officially closed in 2004 and by 2005 water quality for the Upper Animas River Basin dramatically decreased.[21] Elevated levels of many heavy metals, like zinc and lead, were detected as a result of the treatment plant closure.[22]

The increasingly poor water quality caused by the water treatment plant closure has been blamed for disappearance of some aquatic wildlife species. Since 2005, three out of the four trout species in the Animas River have died off.[23] Although parts of Cement Creek are naturally biologically dead, the untreated mine waste pouring into the river has expanded the area which cannot sustain life. Therefore, some wildlife have either already disappeared from the region or are struggling to survive.

Other rivers in the region should serve as a cautionary tale for what could happen to the Animas River if the problem of mine waste goes unchecked. The Uncompahgre River, which flows through Ouray, Colorado, often runs yellow. This discoloration is a result of being downstream from Ironton, an abandoned mine complex located a couple miles south on highway 550. This section of the Uncompahgre River is deemed unfit to be used for drinking water because toxic metals, like lead, often rise to unsafe levels.

Unfortunately, the excess of metals and the discoloration are also accompanied by a "toxic odor that burns the eyes and nose."[24] Local ranchers say that even their horses know to steer clear of the Uncompahgre River. The mine waste that flows through their town not only threatens the health of the residents and wildlife, but also negatively affects the real estate market of Ouray.[25]

Past events in the area should also serve as a warning for mining districts. After researching the Gold King Mine spill, the BOR "found that the conditions and actions that led to the Gold King Mine incident are not isolated or unique, and in fact are surprisingly prevalent."[26] There have been several incidences in the Silverton area that should have already initiated a dedicated reclamation effort for the region, one of which is the Sunnyside Mine blowout in 1978.

The conditions for the Sunnyside Mine blowout began long before the actual event, much like at the Gold King Mine. Standard Metals Corporation bought the Sunnyside Mine, which is located on the Bonita Peak near Silverton, in 1959. To maximize production and profits, this company built the American Tunnel which allowed for access to untapped ore and "connected the underground workings of the two best producing mines in San Juan County."[27] Lake Emma was located directly above the American Tunnel they were building. By 1978, the Standard Metals Corporation had mined the new tunnel to the point where only 90 feet separate Lake Emma from the underground tunnels.[28]

The Lake Emma blowout was predicted by two Silverton miners. While on shift, they noticed water was seeping into the mine and decided it was unsafe for miners to move further into the tunnel that day.[29] These two miners were accurate in their

assessment. The American Tunnel had been mined too close to the Lake which caused the structure to become weak and unstable. The predicted blowout, for which no precautions were made, occurred the next day.[30]

Fortunately, the blowout occurred on a Sunday, the "one day that the Sunnyside mine was not in operation."[31] For this reason, there were no casualties, but the story would have been different had the blowout occurred any other day. If the Sunnyside Mine had been in operation that day, "a crew of 125 miners would have been killed by the violent inrush and subsequent blowout."[32]

The 1978 Sunnyside Mine blowout released 500 million tons of mud and contaminated water into Cement Creek.[33] The contaminated waste then flowed through the Animas River, San Juan River, and Colorado River, just like the acid drainage released by the Gold King Mine. The destruction and blowback was so great that the mine was forced to close immediately. It took two years of repair work to get the mine up and running again. Unfortunately, the disaster was so great that they were never able to stay open permanently. After several periodic closures, Sunnyside closed for good in 1991, laying off 150 miners in the process.[34]

The Sunnyside Mine and the Gold King Mine blowouts were by no means the only environmental disasters caused by a mine. Since 1893, there have been thirty-three reported large scale mine blowouts in the United States. All of these blowouts were concentrated in just nine states.[35]

One of the states that has reported mine blowouts is West Virginia. This state's history and economy is closely linked to its coal mines, but the economic gains could never overshadow the destruction brought about by poor mining practices. West Virginia

suffered from several catastrophic mining events, one of which was the 1972 Buffalo Creek blowout. 125 people were killed and 500 hundred homes were destroyed when 132 million gallons of liquefied coal mine waste was set loose in this disaster."[36]

Although West Virginia depended heavily on the mining industry, this event was the breaking point. They began coming down hard on the mining industry in the 1970s in response to the Buffalo Creek blowout.[37] The result was the passage of the 1977 Surface Mining Control and Reclamation Act, the first strict law created for abandoned coal mine reclamation.

Unfortunately, this movement was not adopted by Coloradans with the same zeal as in West Virginia, but it had an impact. In 1976, Colorado passed the Colorado Mined Land Reclamation Act. This law allowed the EPA and other government agencies to clean up abandoned mines in the state.[38] Although a step in the right direction, this measure was not strong enough to prevent the Lake Emma disaster two years later.

Colorado took the "watershed approach" to mine reclamation instead of tackling the myriad of issues surrounding the hardrock industry all at once. This method targets the mines that do the most damage to the water system first in order to "achieve the greatest improvement in watershed quality using limited funds."[39] Unfortunately, looking at one mine at a time can create a patchwork of solutions. This system can result in one mine getting fixed and another getting worse, like in the case of the Gold King Mine. One of the reasons for this is, unlike the coal mining industry which now has a standardized list of reclamation regulations, hard-rock mining still does not have a "comprehensive program...to deal with the long term care and maintenance."[40]

The "watershed approach" often led reclamation crews to use the cheapest and quickest reclamation methods available. Beginning in the 1970s, bulkheads became the method of choice for Colorado reclamation efforts. While effective in keeping the contaminated water from flowing from the closed portal, bulkheads often create a dangerous amount of pressure in the tunnels and divert the contaminated water to other portals. Instead of solving the problem outright, bulkheads simply move the problem to an adjacent open portal and increase the risk for blowouts.[41]

In addition to simply diverting the problem, hydraulic bulkheads, which litter the San Juan mining district, are not made to last forever. They need regular maintenance and monitoring, yet there are no requirements or standards for these tasks to date.[42] Inconsistent monitoring can lead to false data, which could mislead reclamation efforts, and increase the risk for blowout conditions. Both of these flaws associated with hydraulic bulkheads contributed to making the conditions ripe for a blowout at the Gold King Mine.

According to the BOR report, it was the combination of installing bulkheads in the adjacent mines, inaccurate and inconsistent water level readings, and a lack of written requirements that led to the Gold King Mine spill.[43] After studying the Gold King Mine blowout, it became apparent that the lack of standardization in mine reclamation has become a liability. It is now clear that there are few "actual written requirements that government agencies are required to follow when reopening an abandoned mine."[44] Of the standards that are written down "the standards of practice for reopening and remediating flooded inactive and abandoned mines are inconsistent from one agency to another."[45]

Current abandoned mine guidelines focus on environmental issues and water treatment instead of engineering and protocol for emergencies.[46] Although these issues deserve attention, other aspects are left out. For example, the protocol for blowouts are rarely mentioned in the EPA, BLM, or DRMS handbooks and none of these organizations have standardized and "specific requirements for opening an abandoned mine."[47] In order to safely reclaim abandoned mines, the training and standards for this task need to be more rigorous and uniform.

CHAPTER 6: The Current Legislation on Mine Reclamation

The first major United States law that addressed water pollution was the Federal Water Pollution Control Act of 1948.[1] The growing concern that mounted in later decades led to the creation of the Clean Water Act of 1972 which "made it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit was obtained."[2] The CWA can and has been used for abandoned mine sites to collect reclamation funds from those who are found liable for the damage.

The Comprehensive Environmental Response, Compensation, and Liability Act or otherwise known as Superfund, created in 1980, established a more focused approach to cleaning up contaminated sites. This act provides the federal government with a "Superfund" to "clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment."[3] In addition, Superfund status gives the EPA the power "seek out those parties responsible for any release and assure their cooperation in the cleanup."[4] When no liable party can be identified, the EPA cleans up the abandoned mine sites with federal funds.[5]

The EPA enforces the Superfund Act in all 50 states. When a site is given the Superfund status, the EPA, along with the help of the affected state, implement "identification, monitoring, and response activities."[6] By 1996, the work done by the EPA at these sites was so successful that they recovered over $2 billion in Superfund cost recovery settlements from liable parties.[7] Since then, they have continued to seek out funds for mitigating polluting sites and have continued their work reclaiming abandoned mines.

The EPA has 1,829 sites that are currently on or have been on the national priority list for Superfunds. Some sites have already been dealt with, some have been deleted from the list because they dropped in priority, some are waiting to get approval to start work, and others are currently being worked on.[8] The Gold King Mine and the other abandoned mines in the Upper Animas Basin have just been added to this list.

Many states are hoping to get their polluting mines on the national priority list. To date, state authorities have recorded "tens of thousands" of abandoned mines that are actively leaking toxic metals into the rivers.[9] The estimated cost of cleaning up all of America's mines is upwards of $70 billion.[10] The Western states, with their long mining history, are suffering disproportionately. The following table shows the number of mines in need of work just on public lands in thirteen western states and the estimated cost of cleaning these sites up.

Table 2: Costs of cleaning up abandoned mines on public lands in 13 western states

Costs of cleaning up abandoned mines on public lands in 13 western states

State	Number of abandoned mines on BLM and USFS lands	Low end of cleanup costs	High end of cleanup costs
Alaska	6,830	$659,261,812	$1,411,789,147
Arizona	24,183	$2,334,250,131	$5,104,946,845
California	17,748	$1,713,115,466	$3,746,540,818
Colorado	5,105	$492,757,181	$1,077,647,672
Idaho	5,035	$486,000,472	$1,062,870,916
Montana	4,915	$474,417,541	$1,037,539,335
Nevada	10,613	$1,024,413,705	$2,240,367,236
New Mexico	3,989	$385,035,925	$842,063,969
Oregon	5,827	$562,447,815	$1,207,841,218
South Dakota	503	$48,551,785	$106,181,543
Utah	10,697	$1,032,521,757	$2,258,099,343
Washington	1,956	$188,801,772	$412,904,769
Wyoming	2,336	$225,481,053	$493,121,442
Total	99,737	$9,627,056,415	$21,031,914,253

Source: CWP calculations using Government Accountability Office and Mineral Policy Center data, adjusted for inflation

Source: Data From "The Mining Burden: States Would Shoulder Significant Costs of Cleaning Up Abandoned Mines if They Take Over American Lands," Center for Western Priorities, http://westernpriorities.org/wp-content/uploads/2015/12/The-Mining-Burden.pdf.

Colorado alone has only been able to budget $2 million annually for mine reclamation. This amount is able to clean up roughly three to four sites a year, which does not come close to meeting their needs.[11] With reclamation efforts how they are today, this goal is impossible, but if reclamation fees were created and current laws were strictly enforced, the task of cleaning up polluting sites would become achievable.

By November 2016, the actions taken after the Gold King Mine spill totaled $17 million and the cost only continues to rise.[12] It is estimated that it will cost roughly $100,000 per day to adequately respond to the spill.[13] The new permanent water treatment facility will cost $16,000 per week to run and other expenditures, like testing water quality, continue to add up.

All together, "the Sunnyside mine group, which includes the Gold King Mine, produced $150,000,000 over its lifetime."[14] It is estimated that full reclamation projects for these mines will cost more than what these mines profited.[15] Had there been reclamation fees for hardrock mining, the federal government and the states would have the money to clean up all of these abandoned mines. Unfortunately, reclamation fee laws for hardrock mining have never been passed and have little chance of passing in the future. For this reason, we have to rely on our current legislation.

Gaining Superfund status, while effective, takes time to approve and the litigation involved does not immediately secure funds for the cleaning up the abandoned sites. To add to its ineffectiveness, the Superfund deals with problems after the fact. Funding for reclamation projects is only sought after when a disaster or massive pollution have already taken place. For this reason, much of the reclamation costs fall on the taxpayers in the meantime.

Despite the added costs for the taxpayers, Silverton residents initially declined Superfund status when it was first suggested in the early 2000s. They rejected the Superfund status out of fear for their already crumbling economy. Silverton, in San Juan County, was hit hard by the decline of the mining industry. Although Silverton's economy had been slowly declining since the 1920s, the crash came in the 1990s when the last operating mine, Sunnyside Mine, closed for good.[16] When the mines closed, many residents lost their jobs which set off a ripple effect for the town.

While the state of Colorado has 12.5 percent of its residents living in poverty, 25 percent of San Juan County residents live below the poverty line.[17] With Silverton's mines closing and its local economy in shambles, residents had no other choice but to move in order to find jobs that paid a livable wage. When Silverton's economy began its downward spiral, "San Juan County's population fell 43 percent between 1984 and 1994, dropping from 951 residents to 554."[18] As a result, school enrollment dropped from over 200 to a mere 43 students and one-third of the county's tax revenue was lost, which led to further losses in jobs for the region.[19]

With the mines closed, the tourism industry took over in Silverton. With the influx of new jobs, Silverton's population grew to 690 by 2012. Although the tourism industry brought jobs to Silverton, the majority pay minimum wage. While appreciated, these jobs are not enough to keep this town afloat. For this reason, Silverton is trying to lure mining companies back to the area in order to bring back high paying jobs with benefits.[20]

Silverton residents feared that a Superfund status would interfere with their plans of bringing mining companies back to the region. They believed that if the federal

government began suing former Silverton mining companies for funding to clean up their abandoned mines that any mining company interested in the area would feel too threatened to make any investments in Silverton. For this reason, Silverton residents denied the Superfund designation and instead negotiated a deal with the EPA.

Silverton residents and the EPA came to an agreement on the Superfund status. It was decided that the abandoned mines surrounding Silverton would not be given Superfund status, but reclamation work had to take place. To start the reclamation process, the EPA provided $1.5 million to construct a hydraulic bulkhead for the Red and Bonita Mine, which was leaking acid drainage at a rate of 500 gpm.[21] In addition to the funding provided by the EPA, the government of San Juan County and private donors have provided an additional $20 million since 1991 to be spent on reclamation.[22]

One of those private donors was the Sunnyside Gold Corp., now owned by Canada based Kinross. Sunnyside donated $6.5 million for installing bulkheads at their mine's portals in exchange for immunity from any future liability for these sites.[23] These bulkheads, funded and installed by Sunnyside in the 1990s, are now being blamed for the Gold King Mine spill. Although it is widely believed that erecting these bulkheads created pressure and a massive buildup of ground water behind the Gold King portal, Kinross claims that their "plugs aren't to blame for the Gold King blowout"[24]

Kinross Gold Corp., which made $4 billion in revenue last year, is one of the mining companies that could be found liable now that the Superfund status has been approved.[25] In order to dissuade a Superfund approval, Kinross pledged an additional $10 million to build a water treatment plant similar to the one they were allowed to close down in 1996.[26] Had Sunnyside been forced to keep their original water treatment plant

running instead of being allowed to switch to using bulkheads, ground water never would have built up behind the collapsed Gold King portal and the spill could have been avoided.

Todd Hennis, the current owner of the Gold King Mine, is another person who could be held financially responsible for the spill. Like Kinross, Todd Hennis has always been against the Superfund. Although lacking evidence, Hennis has publicly voiced his suspicions that the EPA itself intentionally released the plume in order to fast track the designation of Superfund status in Silverton.[27] Since the spill, his hatred for the EPA has grown. He has gone so far as to say that the EPA should start paying him rent for the months they have been working to clean up the mines on his 56 acre property.[28]

In addition to blaming the EPA for setting off the spill, Hennis claims that Kinross is at fault for creating the conditions of the spill.[29] Hennis and Kinross have been disputing the cause of the contaminated groundwater buildup behind the caved in Gold King portal for years.[30] Now that the Superfund status has been approved, this dispute will end with the EPA's investigation of the site and whatever parties are found liable will be footing the bill.

Another organization in opposition to the Superfund designation is the Animas River Stakeholders Group. A deal made during the early Superfund talks postponed federal intervention by establishing the ARSG, a local organization, to monitor the "river's degrading water quality."[31] In 1994, this group was created to avoid the Superfund status, and this has been their goal ever since.

This group talked Silverton residents out of accepting the Superfund status as late as 2014, one year before the spill, and continues to mount resistance. The Sunnyside

Gold Corp., now Kinross, backed the ARSG in the early meetings and continues to support the decisions of this local organization because they believe that the "designation would give the EPA broad powers to force any parties it deems responsible for damage to pay for a cleanup."[32]

The debate over the Superfund status was reignited by the Gold King Spill on August 5, 2015. Again, as in earlier meetings, the plan to allow federal government intervention was met with apprehension. The San Juan County and Silverton officials were supposed to vote relatively soon after the spill, but the vote to "ask Hickenlooper to request Superfund designation" was delayed due to prolonged negotiations with the EPA.[33] The local and federal governments butted heads on three points of contention. The two entities disagreed on "the actual boundaries of the Superfund, a reimbursement for costs associated with the Gold King Mine blowout, and an assurance local entities will have a say in future decision-making."[34]

Despite their reservations, Silverton residents approved the request for Superfund status. One reason for this is that Silverton officials were feeling pressure to act. If they had missed the March 2016 deadline, they would have had to wait until September of 2016 to resubmit their approval.[35] Many surrounding cities and San Juan County residents had changed their stance on the Superfund status in light of new information and began pushing for the approval of federal government intervention.

In an attempt to gain accurate information about the process of gaining Superfund status and its effects an official visit to the Superfund site in Leadville, Colorado was scheduled after the spill. This visit disproved all of Silverton's original fears that had been associated with federal government intervention. Instead of hurting the town

economically, the Leadville Superfund site proves that the designation will actually "raise property values here, provide great jobs that people here can do, bring new people in and get more kids in the school."[36]

Leadville, the site of an enormous mining complex, has dealt with mining related contamination for over a century. This site west of Denver suffered from a blowout similar to that of the Gold King Mine. The Leadville spill caused a "die-off along the Arkansas River down to Pueblo," roughly 100 miles away."[37] As a result of this spill, "Leadville was placed on the EPA's Superfund list, just a few years after the program was signed into law by President Jimmy Carter."[38] Although the city of Leadville and the surrounding areas benefitted from this program, they were apprehensive at first, like the residents of Silverton are today.

After gaining approval, the EPA began reclamation projects and investigations for the newly created California Gulch Superfund site in Leadville. After years of litigation, the EPA reached a $138.5 million settlement with the mining companies, including Newmont USA Ltd. and Asarco LLC. The money given by the parties who were found liable have gone towards remediating the California Gulch site.[39]

One of the larger expenses for this project was the construction of the Yak water treatment plant. After it was built in 1992, the "water quality in the Arkansas River has substantially improved."[40] The Superfund reclamation projects have been credited for the restoration of the ecology of the basin. As a result, fish have returned to the river below the California Gulch Superfund site.[41] In addition to restoring the ecology, the Superfund designation did not scare tourists away from Leadville.[42] Silverton officials see the California Gulch site as a success and hope to bring that same progress to the San Juans.

After weighing the costs and sorting out details, Superfund status for the Gold King Mine and the surrounding mines was approved by the Silverton town trustees and the San Juan County commissioners. Soon after the request was sent, Colorado Governor John Hickenlooper approved the plan for a Superfund cleanup for the entire mining complex north of Silverton. The 48 mines recently made into a Superfund site have been named the Bonita Peak Mining District. Together, these mines excrete 5.4 million gallons of acid drainage per day. Now, with the approval of the local and state governments, the EPA can proceed with reclamation work and begin investigating to find the liable parties.[43]

Although the Superfund status was approved by the town of Silverton, not all Silverton residents support it. Even the San Juan County Commissioner, Ernie Kuhlman, was quoted as saying "I was not in favor of Superfund. I still don't like it, but if we don't do it, it will be done for us."[44] Not only was the federal government pressuring San Juan County to move quickly on Superfund approval, but surrounding towns and affected states were also pushing Silverton to act.

Normally, there is a set protocol for Superfund approval, but in the case of the Gold King Mine, protocol was ignored. The process is supposed to begin only with the town closest to the point of origin for contamination, in this case Silverton, Colorado. From there, local residents seek approval from the state's governor. Then, the governor, John Hickenlooper in this situation, communicates directly with the EPA. Instead of adhering to these rules, other cities, most notably Durango, sent their own letters requesting Superfund status to both Governor Hickenlooper and the EPA. The

surrounding communities skirted the set policies because they feel that Superfund status should be voted on by all affected areas, not solely the closest city.[45]

Rebecca Thomas was named "remedial project manager for the Bonita Mining District Superfund site," shortly after the designation was requested.[46] Her experience includes "remedial work on Superfund sites in Libby, Montana, which endured asbestos contamination, and the California Gulch and Kennecott Copper Mine projects, which were both affected by mine pollution similar to the Bonita Peak site."[47] She will be working with a team of experts from federal agencies, San Juan County, La Plata County, Ute Mountain Ute Tribe, and the Southern Ute Tribe.[48]

Thomas's first priorities are water sampling and public outreach. These plans have already been put into motion with regular water monitoring and testing beginning in April of 2016.[49] The tests conducted in April are just the beginning. A yearlong investigation will be conducted to study the "water and sediment quality, biological communities, and fish tissue at 30 locations under a variety of flow and seasonal river conditions along the Animas and San Juan rivers.[50] Although the Superfund status has been approved and projects are already underway, remedial action is a long way off. On average, the EPA spends six years conducting preliminary research before they begin on reclamation projects.[51]

In order to appeal to the local residents, a public comment period for the newly created Bonita Peak Mining District Superfund Site was established. Residents were given the chance to voice their concerns on the subject from late April to June 13, 2016. The comments could either be submitted online or given directly at one of the public forums. Despite Durango's apparent lingering distaste for the Gold King Spill, only 34

comments were submitted. The topics of the comments include recommendations for the number of mines that should fall under the jurisdiction of the EPA, words of approval for the Superfund designation, corrections on the information provided by the EPA, and the possible strain the EPA crew could put on the Silverton hospitality industry during the region's peak tourism season. The EPA was expecting an outcry of anger and distrust, but instead they received a faint whimper of disapproval.[52]

Although the EPA sought comments from local residents, the Superfund status could mean the end of local initiatives for mine reclamation in the area. The ARSG, which has already drafted a 20-year action plan to address the "34 mine waste piles and 33 discharging portals...identified as accounting for 90 percent of the metal loading in the basin," has voiced this concern as one of the reasons for opposing the Superfund status.[53] Although the ARSG already had a plan written up, their ability to act cannot compare to that of a federal government agency.

The current laws have forced the ARSG to focus on water quality monitoring instead of reclamation projects. The deterrent for reclamation projects is the potential for being found liable for projects conducted on the site. Without sufficient funding and lacking adequate protection against lawsuits, the ARSG was always at a disadvantage. Because of their limited reach, the initial plans created by the EPA for the Bonita Peak Mining District Superfund site "severely limit, if not completely eliminate, where the stakeholders group could perform cleanups."[54]

Chapter 7: Possible Future legislation on Mine Reclamation

Citizens should not expect abandoned mines, like the Gold King, to be cleaned up solely with a Superfund designation. Despite all of the positive aspects of obtaining Superfund status, it has many shortfalls. The most difficult problem is collecting money from the mining companies who are found liable for the reclamation costs. The reason for this is that "mining companies often claim insolvency rather than paying cleanup costs."[1] This leaves the tax payers taking responsibility for funding reclamation projects.

More legislation needs to be put in place in order to adequately address the issue of hardrock mining. Preemptive and reactive laws need to be created in order to provide adequate funding for remediation projects, to allow for more groups to contribute to the effort, and to insist on the use of only the most efficient forms of reclamation possible. Some mining companies are disappointed by the efforts of the lawmakers who are tackling the issues associated with hard rock mining.

Miners, like Luke Popovich, spokesman for the National Mining Association, believe that new laws would be unfair due to the fact that "mining companies already have significant financial obligations."[2] He also believes that the existing requirements already "address environmental risks at mine and mineral processing sites...negating the need for a separate financial assurance program."[3]

Like the recurrent theme of environmentalism versus big business, the theme of federal versus local control continues to appear time and time again. The struggle for local input is the root of the proposed Good Samaritan laws. Non-profits, like ARSG, are

working to push this legislation through in order to allow local agencies to have control over local reclamation projects.

The proposed Good Samaritan legislation, titled the Good Samaritan Cleanup of Orphan Mines Act of 2016, has been drafted and is awaiting a vote. This bill being proposed the United States Senate "would allow groups to apply for permits to assist with environmental cleanup efforts at abandoned mines."[4] The bill was drafted by a bipartisan committee attended by Colorado's Democratic Senator Michael Bennet and Republican Senator Cory Gardner.[5] The draft released by this committee "exempts good Samaritans, described as those with no ties to orphan mine contamination, from Superfund and Clean Water Act liability related to past, present or future contamination in line with the terms of a cleanup permit. "[6] This section, contradicts previously passed national Good Samaritan laws.

The current Good Samaritan laws, drafted in 2005, holds all parties, even those dedicated to cleaning up the site, liable for any contamination that results from their work.[7] Despite this difference, the 2005 Good Samaritan law, titled the Cleanup of Inactive and Abandoned Mines Act, provides much of the foundation for the 2016 proposed bill.[8]

Although the proposed bill is attempting to release all "good samaritans" from the threat of being found liable, strict penalties still apply for any wrong doing. If any party "fails to comply with the terms of their permit," they can be found liable.[9] This liability clause, which enforces a $10,000 per day fine for damage caused by a breach in permit, was inserted in order to balance out the bill.[10] While reducing the barriers for willing

parties to clean up the over 500,000 abandoned mines in the nation, law-makers have inserted strict punishments in an attempt to deter corruption.[11]

Although some, like the ARSG, believe that removing liability will make it easier for local entities to clean up abandoned mines, which will in turn improve the water quality, some are afraid of the repercussions of taking away the threat of liability. Earthworks, an environmental non-profit organization, is one of the organizations that has taken issue with the Senate's possible changes to the rules on liability.[12]

Earthworks has condemned other aspect of the bill, including the lack of citizen enforcement and re-mining possibilities. In the proposed Senate Good Samaritan law, citizens would not have the right to sue if they were negatively affected by the actions of the cleanup, like in the case of the Gold King spill. Earthworks is pushing to reverse this clause in order to maintain liability for all at-fault parties and to increase the monitoring force. The proposed bill is also lacking restrictions on re-mining, which means that the "good samaritan" could legally mine and profit from the property while cleaning up the site. Earthworks takes issue with this omission. The non-profit feels that if someone is profiting from the site they should be able to be held liable for any damage caused by their work.[13]

Even if the 2016 draft of the Good Samaritan law passes, which does not seem likely, it will be set to expire in 10 years. The 10 year cap allows Congress to review the progress and contributions made by the "Good Samaritans," but the deadline could also mean the end of local initiates if the law is not reapproved in the next decade.[14] In order to make a lasting and permanent impact, other legislation will have to be passed in order to reclaim all of the abandoned mines in the U.S. Although local entities, like ARSG,

have done good work, it has been incomplete and small scale. Good Samaritan legislation will assist in cleaning up abandoned mines but it will not lead to the reclamation of all contaminating sites.

In order to enact meaningful change, out of date laws need to be revised. The General Mining Law of 1872, passed during the Grant presidency, has never been able to adequately address the issues associated with hardrock mining. This antiquated law is still in use today.

The 144 year old law, received most of it content from an even more antiquated law passed in 1866.[15] The 1866 Mining Law and the subsequent 1872 Mining Law were originally passed to encourage westward expansion and this strategy paid off. Miners flocked to the west with the hopes of striking rich. The first miners drawn to the west were small scale, and it was with this group of miners in mind that the 1872 Mining law was written. Over time, large corporations began to outpace the individual prospectors. The Congress of 1872 never anticipated and therefore was never prepared to regulate these larger companies.[16]

The 1872 Mining law regulated the booming mining industry in a non-intrusive way. This strategy would allow the economy of the west to grow and the population of the west to rise.[17] One way that they did this was by waving traditional royalty fees. For this reason, hardrock mining companies have not paid and do not pay federal royalties for mining on public lands.

Congress waved royalty fees for this industry in an attempt to make it easier for individual prospectors to lay a claim and make a profit. In this sense, the absence of royalty fees makes economic sense. Few prospectors would have been able to afford the

traditional fees and the lack of economic opportunity would have discouraged westward expansion. However, this same logic does not stand when considering the larger mining companies.[18]

In addition to waving the royalty fees for the use of public lands, the 1872 Congress never mention reclamation fees in their law. For this reason, there is no immediate funding made available to address the consequences of hard rock mining. Although the leniency displayed towards the hard rock mining industry boosted the economy and accelerated westward expansion, Americans are now suffering from the effects of their get-rich-quick mentality.[19]

Although the 1872 Mining Law was originally intended to regulate individual prospectors, in time large mining companies dominated the west due to the inclusive wording of the antiquated law. According to the 1872 Mining Law, "any person" is allowed to stake a claim on federal public lands and the law allows the claimant the "exclusive right to extract minerals" on that land. The land itself remains under the ownership of the federal government unless the claimant takes advantage of another aspect of the 1872 law. If the claim is ever abandoned, the property and minerals again come under the ownership of the federal government.[20]

If a claim is made, the land remains in the hands of the federal government unless a second step is taken. Under the 1872 Mining Law, miners are also given the option of buying the land.[21] This policy deviates from past mining laws which only allowed for the leasing of public lands for extraction purposes. Now, when the claim and land are purchased, the miner has the ability to privatize the public land.[22]

"Mineral bearing public land" could be sold for $2.50-$5.00 after the 1872 Mining Law came into effect. The law does impose limits which allows an individual to buy a total of 20 acres and a business of up to 8 people is allowed to buy up to 160 acres total.[23] This policy remains in effect, but has temporarily been blocked by a moratorium on new sales.[24]

In the amount of time that this buying option has been available, between 1872 and the 1990s, "$245 billion worth of mineral bearing lands" have been sold, which is "equivalent in size to the state of Connecticut."[25] If the moratorium on new sales were revoked in the future, 350 million acres of public land, which "constitutes more than 15% of all the land in the United States," would be available for purchase and privatization once again.[26] The issue of privatizing public lands becomes more controversial when priority of use is considered.

According to the 1872 Mining Law, hardrock mining claims take precedent over all other uses. This, like the ability to privatize public lands, contradicts previous mining laws. The 1866 Mining Law, for example, allowed other projects, like roads and canals, to take precedent over mining.[27] As a result of giving priority to the mining industry, the health of the environment has suffered and the peoples' access to public lands has grown increasingly limited.

In addition to decreasing the amount of public land available, the 1872 Mining law set few federal standards and was purposefully made to be vague in order to allow for interpretation. Instead of creating consistent national standards for hardrock mining, the bulk of the burden of regulation was given to the states. The last section of the 1872 law states that all miners are in compliance with the law if they adhere with the state

standards for mining. This policy put extra strain on the local and state governments who were forced to create specific laws to regulate the mining industry. The lack of funds and consistency on a state level makes the regulation of the hardrock mining industry less effective than it would have been if the federal government had set national standards.[28]

It was not until 1965 that the state of Colorado created legislation for hard rock mining reclamation. Although creating standards for reclamation was a step in the right direction, these new laws, unfortunately, did not have any teeth. In the 1960s, Colorado created a voluntary reclamation program in which mine operators and state government representatives negotiated and signed "site-specific reclamation criteria."[29] Despite these initial talks, this reclamation program was passed without funding for an administration to monitor progress, therefore this legislation proved to be ineffective.[30]

The purposefully vague nature of the wording in the 1872 Mining Law also created confusion in the courts. Until recently, with the passage of supplemental legislation like the Clean Water Act, judges lacked the ability to condemn a miner for the contamination of the environment because that issue was never mentioned in the 1872 law. Despite the new legislation passed to protect our nation's resources, condemning a hardrock mining company is difficult and reactionary due to the fact that we are still using the out of date law.[31]

The General Mining Law of 1872 did exactly what it was created to do: spur westward expansion. It was so successful, in fact, that mines are now operating on a scale never imaged by the law's authors. Unfortunately, this law was shortsighted and the economic gains were short lived. It has been estimated that the reclamation costs for all abandoned mines will cost more than what the mines reaped in profits while in operation.

In addition to growing cleanup costs, the burden on the states, and confusion in the courts, this law has negatively impacted the environment.

Despite additional legislation, 75% of the mines in operation today do not meet water quality standards at their discharge sites.[32] This fact is made worse by the fact that this country does not have a designated fund for reclaiming abandoned hardrock mining sites because reclamation and royalty fees were never mentioned in the 1872 law. Jared Diamond, the author of *Collapse: How Societies Choose to Fail and Succeed*, claims that the General Mining Law of 1872 has been a destructive force for the United States. He argues that the law "provides massive subsidies to mining companies, such as a billion dollars a year of royalty-free minerals from publicly owned lands...and other subsidies costing taxpayers a quarter of a billion dollars a year."[33] Diamond goes further to say that this law is among "the greatest failures of judgment in world history rivaling the Easter Island and Mayan collapse."[34]

Frustration with this nation's antiquated laws led some in the 1970s to begin challenging the legitimacy of mining legislation. This endeavor began with the coal industry after the Buffalo Creek blowout. In 1973, the U.S. Congress passed the Open Mining Land Reclamation Act which "established a permitting process, requiring limited bonding and more rigid reclamation performance timelines and standards for coal mines and sand and gravel operators."[35] Hardrock mining, however, was excluded from the list of industries required to "protect the hydrologic balance, establish suitable vegetation, or dispose of toxic materials in a safe manner."[36] For this reason, the hard rock mining industry remains largely unregulated in terms of reclamation.

Beginning in 1977, with the passage of the Surface Mining Control and Reclamation Act, coal mining companies were forced to comply with new royalty and reclamation fees. Other industries, like oil and natural gas, faced similar impositions. Coal, oil, and natural gas companies currently pay an "8% to 12.5% royalty for extracting resources from federal public lands.[37] It is from these fees that the coal mining industry alone has raised over $10 billion for reclamation.[38] With this fund, the coal mining industry has a stable and immediate source of money to fund both reactive and preemptive reclamation projects.

After seeing the positive changes made to the other mining industries, state, tribal, and federal law-makers have begun to push for changes to the hardrock mining industry which has gone without national standards for reclamation since the Nineteenth century.[39] Two new bills have been proposed in Congress, the Senate Bill 2254 Hardrock Mining and Reclamation Act of 2015 and the House of Representatives bill 963 Hardrock Mining Reform and Reclamation Act of 2015. Both bills have been introduced to Congress but have not come to a vote at this time.

The Senate Hardrock Mining and Reclamation Act was read on the Senate floor November 5, 2015 and sent to the Committee on Energy and Natural Resources, but no actions have been reported since that date. New Mexico's Senator Tom Udall, a Democrat and representative from a state affected by the Gold King Spill, introduced the bill to the Senate with several co-sponsors from the Democratic Party, including New Mexico's Senator Martin Heinrich, Colorado's Senator Michael Bennet, Oregon's Senator Ron Wyden, and Massachusetts' Senator Edward Markey. The goal of this

proposed bill, in their words, is to "modify the requirements applicable to locatable minerals on public domain land."[40]

The largest modifications they want to see made to the legislation on hardrock mining revolve around added fees, like the ones already imposed on the coal, oil, and natural gas industries. The fees these Senators want to see added are claim maintenance fees totally $150 annually, location fees totaling $50 for each claim annually, land use fees, royalty fees for use of public lands, and reclamation fees.[41]

In the Senate, the royalty fee for the hardrock mining industry has been recommended to be set at "not less than 2 percent, and not more than 5 percent, of the gross income from mining."[42] They have, however, proposed an exemption for this fee. The royalty fee may be decreased or waived if the person holding the claim can prove that the economic impact of the fee would be so detrimental as to deter any work on the claim.[43]

The proposed Senate bill also calls for standardized annual inspections for mines that produce a "significant quantity of locatable minerals" and for the mines that have neglected mining regulations in the past.[44] In addition to calling for more federal monitoring of mines, which was excluded from the 1872 Mining Law, the proposed bill has added some significant consequences for noncompliance. Failure to consent to a lawful inspection will result in "a penalty of up to $10,000 per violation for each day."[45] The Democratic Senators included harsher punishments for continual noncompliance. If a claim owner is found guilty of refusing to pay the outlined fees, like royalties, or continues to disallow an inspection, they could be sentenced with a fine of up to $50,000 and up to two years in prison.[46]

In addition to proposing fines on an industry where previously there had been none, the bill also includes restrictions on the land available for hardrock mining. The current mining law, passed in 1872, gives hardrock mining precedence over all else, but the Senators are proposing to change that. If the bill passes, lands of "critical environmental concern," wilderness study areas, and land "identified as suitable for wilderness designation" would be off limits to future hardrock mining claims.[47]

Reclamation requirements, along with reclamation fees, are outlined in this bill. Not only will the claim holder be required to pay reclamation fees that would be deposited into a fund for cleaning up abandoned mines, they will also be expected to execute their own reclamation projects if ever they were to close. Under this bill, the operator is required to "restore the land and water" to the condition the claim and surrounding areas were found before work had been carried out on the site.[48]

The reclamation fee would be set at 0.6 percent to 2.0 percent "of the value of the production from the hardrock minerals mining operation for each calendar year."[49] This small fee alone is expected to create a fund of at least $100 million annually for reclaiming abandoned mines and responding to disasters, like the Gold King Spill. Although any proposed reclamation fees would be better than the current system in place, in which no reclamation fees have been collected from the hardrock mining industry for over one hundred years, these percentages are far lower than other industry standards. If this nation is to mount a significant campaign to clean up all abandoned hardrock mines, the fees for this industry will need to be set closer to the coal mining fees, which are currently set at 12.5 percent of their annual profit. The 0.6 to 2.0 percent reclamation fees will be helpful and are a step in the right direction, but are not enough to take on the

much needed task of reclaiming all of the polluting hardrock mines in this country, including the Gold King.[50]

The Senate bill briefly and vaguely mentions the Good Samaritan initiative. If this bill passes, "good samaritans" would be allowed to clean up abandoned mine sites and would qualify for funding to do so. The specifics for the Good Samaritan legislation, however, are not included in this Senate bill. While it is necessary to allow all entities to help in cleaning up the abandoned mines, the rules and regulations for the "good samaritans" who step up will need to be clearly outlined in the future in order to prevent any corruption of this clause.[51]

The House of Representatives bill echoes much of what was included in the Senate bill. HR963 Hardrock Mining Reform and Reclamation Act was introduced to the House February 13, 2015 by the Democratic Representative from Arizona, Raul Grijalva. The bill was co-sponsored by over thirty other Representatives from the Democratic Party. Since it was introduced, it has been referred to several committees and is currently being reviewed by the Subcommittee on Energy and Mineral Resources.[52]

Like the Senate bill, the House is proposing maintenance, location, royalty, and reclamation fees. The House is proposing an annual maintenance fee of $200, $50 more than what the Senate is calling for. The House bill stipulates that this fee will be adjusted every five years in accordance with any changes in the Consumer Price Index. The location fees set by the House, $50 for each claim, are the same as in the Senate.[53]

The royalty fees set by the House are slightly higher than that of the proposed fees set by the Senate. In the House bill, a royalty fee of 8 percent of the gross income is requested, while the Senate only proposed 2 to 5 percent. An additional difference is that

the House is providing decreased royalty fees for all permits filed before this law is passed. For those who are grandfathered into this law, they will only be required to pay a 4 percent royalty fee. A second exemption was created by the House which exempts all hardrock claims that net less than $100,000 annually.[54] This exemption was created to alleviate the burden on the smaller mining operations.

As in the Senate bill, the House lays out land use restrictions for the hardrock mining industry. In the proposed bill, the House reserves the right to deny any claim. Furthermore, no claims will be granted on "Federal land that may cause a disturbance of surface resources, including but not limited to land, air, ground water and surface water, and fish and wildlife."[55] The House will also withhold permits from an "applicant if there is a demonstrated pattern of willful violations of the environmental protection requirements."[56]

The House is much more thorough in their description of the required reclamation miners would be forced to perform upon ending operations at the mine. The Representatives reiterate the Senate's opinion that operators should restore the land they used to the condition in which it was found before they began work. After giving this blanket statement, several specific points follow outlining the regulations for reclamation. Claim owners who chose to end operations for whatever reason would first be required to dispose of any contaminated soil and haul in replacement topsoil to take the place of the discarded soil. Next, all structures created for and equipment brought in for the purpose of mining must be removed from the site, including roads. Measures must be also taken to make all surfaces stable, to prevent future erosion, and to manage drainage from the mine. Once the earth has been made to look as it had before excavation began, the mine

operators are required to plant native vegetation on and around the site to further camouflage and stabilize the closed mine.[57]

As in the Senate bill, the House has proposed an additional reclamation fee. The amount called for by the House is "7 cents per ton of displaced material," as apposed the the 0.6 to 2% charge on production proposed by the Senate."[58] Like the Senate bill, the 7 cent charge would have positive effects, but it does not come close to raising the amount needed to adequately reclaim all mines currently leaching contaminants into the soil.

An issue passed over by the Senate was matter of civil suits. In the House's proposed bill, however, they would allow any person to "commence a civil action on his or her own behalf to compel compliance" from those involved in mining or reclamation. The bill states that a person can sue anyone up to the position of Secretary of Agriculture if they are found to be in "violation of any of the provisions of this Act."[59]

The topic of Good Samaritan legislation was also included in the House bill, but in greater detail than in the Senate bill. According to the House bill, those who qualify to apply for "good samaritan" status are individuals, corporations, nonprofit organizations, the Federal government, the State government, and Indian Tribes who have never played a role in the creation of the abandoned mine or its residual pollution.[60]

Once a non-profit, government entity, or corporation obtains the "good samaritan" status, their organization would be exempted from liability for any contamination that occurs as a result of their reclamation project. As an added incentive, these organizations qualify to receive grants created with money from the reclamation fund that can be used to pay for the costs associated with reclamation.[61] Both the House and Senate bills push for the exemption from liability for the "good samaritans." Although this tactic would

encourage organizations to take on the challenge of reclaiming abandoned mines, it forfeits the nation's ability for hold them accountable for their actions, whether good intentioned or not.

In addition, some organizations, like Earthworks, also condemn Congress's neglect of the re-mining issue. A ban on re-mining must be issued moving forward in order to prevent miners from taking advantage of a loop hole. The current wording in both the House and Senate bills are ripe for corruption. Under the proposed laws, a miner could potentially use the "good samaritan" status as a way to avoid paying fees, become exempted from being held liable for their actions, and to obtain grants, all while simultaneously mining and profiting from the site.[62]

Neither the Senate nor House bills have a solid chance of passing. This presumption is based on the fact that there is no precedent for such restrictions on the hardrock mining industry and the industry itself has a powerful lobby. There is one last option to modernize this nation's laws and standards surrounding the hardrock mining industry. The Bureau of Land Management and the U.S. Forest Service are allowed to change their mining regulations without congressional approval. Although this is a possibility, this is also unlikely because it has been thirty years since these entities have made any changes to their policies.[63]

CHAPTER 8: CONCLUSION

The Bureau of Reclamation was correct in the official report it conducted on the Gold King Spill. The cause of the spill "was the result of a series of events spanning several decades."[1] The EPA was by no means solely responsible for the spill. They, in collaboration with poor reclamation projects carried out by adjacent claim holders, a lack of national standards for mine reclamation, and antiquated laws caused the spill.

Although mounting inquiries to find the people at fault for the Gold King Mine spill is important, the investigation should be broader. The question that should be asked now is whether mining has been Colorado's blessing or downfall.

Despite the negative press the industry has received as a result of the Gold King Mine spill, the hardrock mining industry has helped this country dramatically. It did exactly what the United States government needed it to do: mining populated the west, it employed people, and it produced natural resources for the burgeoning manufacturing industry. For this reason, Congress passed the General Mining Law of 1872 in an attempt to enhance the positive effects of the hardrock mining industry.

The initial flood of miners to Colorado had positive effects on the economy and the industrial sector, but the flaws in the system quickly revealed themselves. With few regulations and limited federal involvement, the industry expanded into a colossus too strong to reign in. As a result, the mining industry became a strain on the environment, human health, and the economy.

Despite the negative effects of mining and its backbreaking nature, some towns, like Silverton, romanticize and long for the revival of the mining industry. The revitalization of the mining industry could be positive because it would create much

needed jobs in the region as it did in the past. At the same time, it would continue to put the environment and people's health at risk if the current laws remain in place.

New laws must be written to replace the antiquated 1872 Mining law. If new and strong legislation is created, we would be able to adequately react to disasters, like the Gold King Mine spill, and preempt any future disasters or pollution. There are several options on the table already, including the Good Samaritan Cleanup of Orphan Mines Act of 2016, the House of Representatives' Hardrock Mining Reform and Reclamation Act of 2015, and the Senate's Hardrock Mining and Reclamation Act of 2015. None of the current laws, such as the Superfund Act, or any of these pieces of proposed legislation can work on their own. Although there are flaws with both, either the House or Senate bill needs to be approved in order to take the place of the General Mining Law of 1872. Once that is done, the Superfund Act can continue to seek out liable parties to pay for current reclamation projects, while the reclamation fund builds for future reclamation projects, and "good Samaritans" clean up abandoned mines one by one. These independent pieces of legislation complement each other and it is through this collaboration that the nation can mount an aggressive campaign to reclaim all of the polluting abandoned mines. With over 100,000 abandoned mines in the West alone, the region needs all the help it can get.

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