

## **GOLD KING MINE – WATERSHED FACT SHEET**

**Site Names:** Upper Animas Watershed, Upper Cement Creek

**City:** Silverton

**County:** San Juan

**Location:** latitude: 37.8945° N; longitude: 107.6384° W; approximately 11,000 feet elevation

### **HISTORICAL BACKGROUND:**

The Gold King Mine (GKM) was discovered by Olaf Nelson in 1887, with operations continuing until 1907 when a fire destroyed the surface buildings of the mine. The mine was reopened in 1910 but closed shortly thereafter because of litigation and labor problems. In 1918 a new company bought the mine and operated it until the fall of 1922. The GKM shipped 711,144 tons of gold and silver ore while in operation. The mine has been inactive since then. It is currently owned by San Juan Corporation.

The GKM is located in the Upper Animas Watershed in southwestern Colorado. These watersheds within the volcanic terrain of the San Juan Mountains contain some 400 abandoned and inactive mine sites, which have been the focus of both large- and small-scale mining operations between 1871 and 1991. The watershed consists of three main streams, the Animas, Cement Creek and Mineral Creek all of which drain the Silverton Caldera. The Animas River and many of its tributaries are historically impacted by high concentrations of heavy metals from both acid rock/mine drainage at mine sites and from naturally occurring metal loading sources not impacted by mining.

Mining operations contributed to metals loading to alpine streams and creeks adding to the natural metal loading already occurring in the mineralized area. As a common practice, mine tailings were directly deposited into the creeks and rivers until the 1930's. Water draining from the mines occurs when mining operations in the mountainsides alter the hydrology of the area and combine with natural springs, pulling water into mine tunnels. The water reacts with iron disulfide (pyrite) and oxygen to form sulfuric acid (acid rock/mine drainage). The resulting acidic water dissolves naturally occurring heavy metals such as zinc, lead, cadmium, copper and aluminum and results in water containing these metals flowing out of the mine adits (a horizontal shaft into a mine, which is used for access or drainage).

By the end of mining operations, many of the mines were left discharging contaminated water into streams. In 1991, the last big mine in the region, the Sunnyside, stopped mining. Its owner, Sunnyside Gold Corp., agreed not only to bulkhead (mine plug) its mine, but also to clean up abandoned mines nearby, while continuing to run the metal-laden waters of upper Cement Creek through a water treatment facility.

Sunnyside also reached an agreement with the state and Gold King mining to turn over its water treatment operations to Gold King. At that time, the GKM, like the nearby Red and Bonita mine, had not discharged any water. However, after Sunnyside closed, water found natural fractures that allowed it to flow into the GKM and Red and Bonita mines. Initially, these waters were run through the treatment plant that Sunnyside built, but Gold King ran into technical, financial and legal troubles and the treatment plant stopped operating.

The GKM is one of an estimated 23,000 abandoned mines dotting the state of Colorado. Of these abandoned mines, 6,127 have been made safe by the Colorado Division of Reclamation, Mining and Safety.

### **PREVIOUS WATER RELEASE INCIDENTS IN THE AREA:**

1975 – A tailings pile on the banks of the Animas River northeast of Silverton was breached, dumping tens of thousands of gallons of water, along with 50,000 tons of heavy-metal-loaded tailings into the Animas.

1978 – Sunnyside Mine worker breached the floor of Lake Emma sending an estimated 500 million gallons of water through the mines, sweeping up huge machinery, tailings and sludge, and ultimately releasing through the American Tunnel to downstream waters.

## **SITE ASSESSMENT:**

EPA and the Colorado Department of Public Health and Environment (CDPHE) conducted a Superfund Site Assessment of the area in the 1990s. The assessment showed that water quality standards were not achieved in the Animas River near Silverton and identified the severe impacts to aquatic life in the Upper Animas and its tributaries from naturally occurring and mining-related heavy metals. In recognition of the community-based collaborative effort, EPA agreed to postpone adding all or a portion of the site to the Superfund NPL, as long as progress was being made to improve the water quality of the Animas River.

Until approximately 2005, water quality in the Animas River was improving. However, since 2005, water quality in the Animas River has not improved and, for at least 20 miles below the confluence with Cement Creek and the water quality has declined significantly. Impacts to aquatic life were also demonstrated by fish population surveys conducted by Colorado Parks and Wildlife, which found no fish in the Animas River below Cement Creek for approximately two miles and observed precipitous declines in fish populations as far as 20 miles downstream since 2005.

Because of this declining water quality in the Animas River, in 2008, EPA's Superfund Site Assessment program began investigations in Upper Cement Creek focused on evaluating whether the Upper Cement Creek area alone would qualify for inclusion on the NPL. This evaluation indicated that the area would qualify, although after receiving additional community input, EPA postponed efforts to include the area on the National Priorities List. Since that time, EPA has continued and broadened its investigations of conditions at the site in order to understand the major sources of heavy metal contamination in the Upper Animas.

## **SITE RISK:**

Mining operations have greatly disturbed the land, adding to existing highly mineralized conditions in many areas of the site. Mineralized waste rock exposed to air and water causes acidic conditions to mobilize the release of heavy metals to the surrounding environment. These heavy metals have found their way into the Animas River and its tributaries and have eventually traveled farther downstream.

<b>Media Affected</b>	<b>Contaminants</b>	<b>Source of Contamination</b>
surface water, subsurface water, surface soils and stream sediments	heavy metals – aluminum, lead, zinc, cadmium, copper, iron and manganese	historic mining activities and naturally occurring mineralization

## **CLEANUP PROGRESS:**

Numerous mine reclamation and mine waste cleanup projects have been completed in the Upper Animas watershed over the last 20 years. These efforts have included diverting runoff away from and capping mine waste piles, moving mine waste piles away from drainages, consolidating mine waste piles and re-vegetating mine waste piles.

## **OTHER CLEAN UP EFFORTS:**

The Animas River Stakeholders Group (ARSG), a collaboration between concerned citizens and representatives from industry and federal and state agencies, was created in 1994 to address the water discharges. The ARSG, along with federal and state agencies, continue to work to clean up the mines.

In addition, ARSG has been using a watershed approach and has developed a remediation plan, recommended feasible water quality standards (which were adopted in 2001) and has implemented remediation projects throughout the Upper Animas River Basin.