



Tiger Mine Restoration Project

Leadville, Colorado

Problem

The Tiger Mine is a complex of abandoned mine workings and waste piles in the Sugar Loaf Mining District located near Leadville, Colorado. Developed on the Tiger-Shields Vein discovered in 1879, the Tiger Mine operated from 1880 until around 1906, when the veins were worked out and the mine closed. Intense mining activities in the Sugarloaf Mining District resulted in mine waste piles and mine drainage that contribute toxic heavy metals to Little Frying Pan Gulch/Colorado Gulch and the Lake Fork of the Arkansas River.

Extensive water quality studies have been carried out since 2000 in the Little Frying Pan Gulch/Colorado Gulch area. This research determined that drainage from the Tiger Tunnel and associated waste piles was a significant contributor of metals loading to the Lake Fork watershed. It is estimated that Colorado Gulch contributes approximately 80% of the zinc load to the Lake Fork of the Arkansas River during high flow periods. Drainage from the Tiger Mine Complex contributes approximately 23% of the zinc load into Colorado Gulch during high flow.

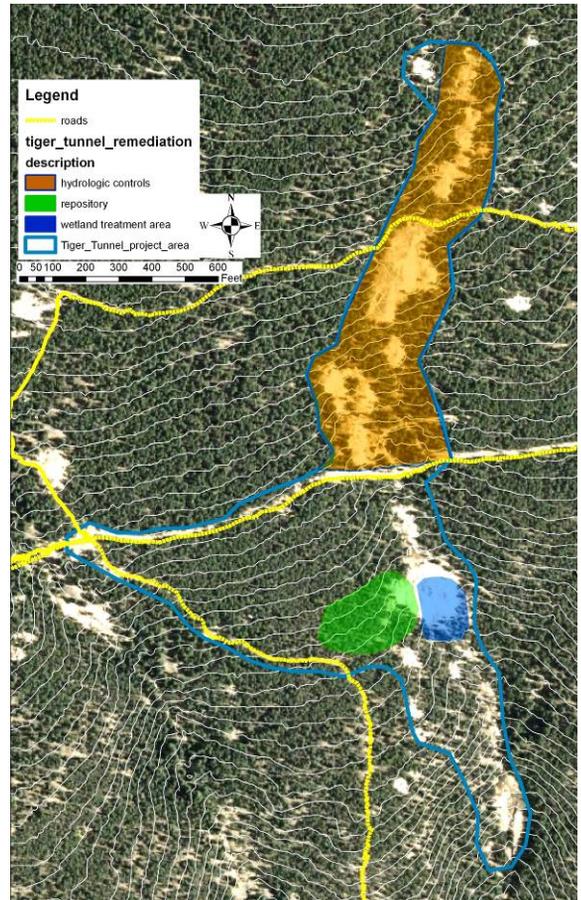
Solution

An Engineering Evaluation and Cost Analysis (EE/CA) completed by the U.S Bureau of Land Management (BLM) in 2006 evaluated several remediation options based on their potential to improve water quality. It was determined that the best approach to reduce metals loading into the Lake Fork Watershed was to remove the large Tiger Mine waste pile to a constructed on-site repository, cap the mine waste to minimize the risk of water infiltration, cover with amended soil, and revegetate.

In addition, the analysis recommended that hydrologic controls constructed above and along both sides of the repository would further reduce surface water contamination. The waste pile reclamation and hydrologic controls phase of the project will be completed in Spring 2010. To address the acid mine drainage discharging from the Tiger Tunnel itself, Trout Unlimited, Colorado Mountain College, and the Colorado School of Mines is currently in the process of developing a sulfate-reducing bioreactor design that will further reduce the metals loading entering the surface streams.



Acid mine drainage from the collapsed Tiger Tunnel runs across the large mine waste pile.



The Tiger Mine Restoration Project involves removing a large mine waste pile, constructing a repository for the waste, installing hydrologic controls, and constructing a sulfate reducing bioreactor (a.k.a “wetland treatment system”).

Good Samaritan Protection, where are you? We're waiting in Colorado!

Sulfate-Reducing Bioreactor

Though the other portions of this project will be successful in reducing the amount of metals pollution entering the Lake Fork of the Arkansas, the sulfate-reducing bioreactor is necessary to treat the acid mine drainage coming from the tunnel. The planned bioreactor is designed to address the low pH and high metals concentrations that are causing the Lake Fork of the Arkansas to be considered one of Colorado's most polluted waterways. These systems remove metals from water and generate alkalinity by transforming sulfate into sulfide via sulfate reduction. The result is cleaner water flowing out of the bioreactor, which helps fish populations and downstream water users.

Why We Need Good Samaritan Protection

Without federal protection that shields Good Samaritans from liability, the sulfate-reducing bioreactor phase of the Tiger Mine Restoration Project is on hold. Despite the fact that it would dramatically improve water quality in the drainage, Trout Unlimited and its partners cannot proceed without liability protection under the Clean Water Act. Discharge of cleaner water through water treatment systems, such as bioreactors, is considered a point -source discharge and requires a discharge permit under the Clean Water Act. That permit requires the discharger to meet water quality standards that are not possible to meet when treating acid mine drainage with a sulfate-reducing bioreactor. In short, any entity that constructs a bioreactor or other similar treatment system becomes liable for that discharge in perpetuity (i.e.: forever!) under the Clean Water Act. Understandably, this is a risk that the Tiger Mine project partners are not willing to take even though the bioreactor design is nearly completed, the cells have been excavated, the liner has been purchased, and all of the funding is in place.

The Tiger Mine is not alone. Across the West there are hundreds of similar historic mine tunnels polluting rivers with toxic acid mine drainage that cannot be touched because of the Clean Water Act – the monumental legislation that was intended to make all the waterways of the United States fishable and swimmable. Ironically, it's the major law preventing successful cleanups in watersheds impacted by legacy mining and acid mine drainage. In many places, would-be Good Samaritans walk away from cleanup projects just like the Tiger Mine for fear that they may be sued. For years Congress has been considering various versions Good Samaritan legislation and it's time that it finally passes. Our rivers need it. Fish need it. We need it.



The Tiger Tunnel drainage and the large mine waste pile that was removed by the BLM in 2009. This drainage has a very low pH and is high in heavy metals, and plays a large role in the Lake Fork of the Arkansas being one of Colorado's most polluted rivers.



At the completion of the removal of the mine waste pile and the construction of the repository, future SRB cells were excavated. These cells will likely remain empty and inactive until the passage of federal Good Samaritan legislation.