



Acid Mine Drainage Water Contamination

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Introduction

71 percent of our world is covered by water, and out of that, only 1 percent is easily accessible fresh water. This small quantity of potable water needs to be protected in order to sustain future generations.

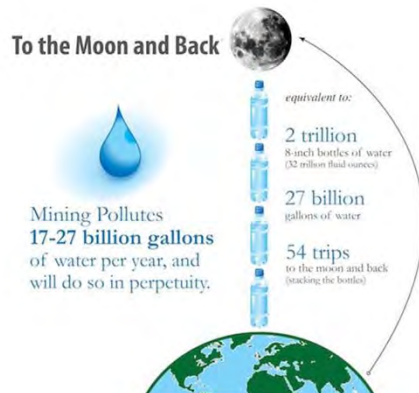
One threat that faces our fresh water supplies is Acid Mine Drainage or AMD. AMD occurs when the sulfide rich ores that are exposed in mines come into contact with water. The sulfides then mix with the air and water and create sulfuric acid which dissolves the surrounding metals and metalloids, many of which are toxic. Over time these toxic pools seep into groundwater or leak into streams, causing severe problems for the surrounding ecosystems.

Project Objective

This project takes the issue of AMD from old mines and looks for a solution to prevent it from contaminating fresh water supplies. Some of the possible solutions that were tested on contaminated areas included installation of caps on the tailings piles, runoff diversion ditches, retention ponds, clay liners and man made wetlands. These methods are designed to capture ores, allow ores to settle out of water, and ultimately clean groundwater before it reaches the creek itself.

Research

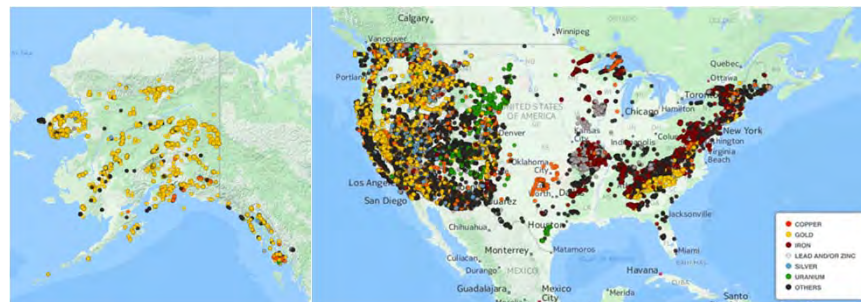
Research for this project was conducted by the University of Arkansas Geologic Field Camp Group of 2015. The goal of this research was to determine which possible solution worked the best. Tests were conducted on the Elkhorn Creek in Coolidge Montana around the already installed retention methods. Measuring the waters conductivity, PH, and total dissolved solids (TDS) helped determine which retention method was working the best. The research showed that clay liners were the most effective retention form while cappings and retention ponds were the



Nationally

The Environmental Protection Agency states that the United States has anywhere between 100,000 and 500,000 abandoned mines (US EPA, 2004). ACM is one of mining's most serious environmental threats. These mines may have connections to our nation's ground water supplies and if left untreated may begin to poison them.

HAZARDS: Minerals get into water cycle, and can be bio accumulated into wildlife and eventually humans.



Local Problems

Arkansas has 779 abandoned mines. Only 30 of them are considered sealed by the United States Department of labor. Washington County has 13 abandoned mines alone, and none are sealed. Not all mines have acid mine drainage but many have the potential to have this problem.

Local Problems

C&H Hog Farms
Poultry Industry
High Phosphorous loads
South Fayetteville Electroplating Plant has had leaks in their underground storage tanks (80's & 90's).
Supreme Court has been involved with Oklahoma contaminating water that makes its way into Arkansas.

Sustainability

The ideal solution for these mines would be to restore them to their natural state which is seen as impossible. In future mining operations companies should be made to invest in protecting mines from outside elements even after the mine is exhausted. It is much easier for preventative measures to be taken than it is to fix the aftermath. The government should also seek ways to implement clay capping in most AMD scenarios as it has proven to be the best retaining method. Only 1 percent of the earth's surface is covered by potable water that is easily accessible, it is up to the current generation to preserve it for the future.

Overall Abiding Problem

Two professors at the University of Arkansas who specialize in hydrology were interviewed for this project. When asked "Water Quality is key around the world... Mines can't be the only contaminating factor, what else is there?" Dr. Ralph Davis and Dr. Phillip Hays responded with similar answers. Their response was, the actions of man.

Anytime we extract something from earth or produce something we have an effect. Most the time they are consequences. Limiting man's footprint and consequences while also enabling us to continue gaining resources.

Sources

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