

Acid Mine Drainage, What Are The Dangers?

Recorded by Nick Gilbert

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Welcome listeners to another report on water issues. I am Nick Gilbert from Penn State Brandywine and today I'll be discussing what acid mine drainage is and the affects from it.

You might ask, what is Acid Mine Drainage?

Currently, acid mine drainage is the main pollutant of surface water in the Mid-Atlantic region. It comes from water that flows over sulfur-bearing materials, forming higher acidic levels in mines. Typically, abandoned coalmines cause Acid Mine drainage, which degrades more 4,500 miles of streams in the Mid-Atlantic region.¹ This results in the loss of aquatic life, restricts recreational use of the stream, and also ruins public drinking water.

Typically, the water runoff from mines contains large amounts of metals from the water entering the mine contacting sulfur-bearing minerals. The metal in the water makes the acidity levels rise greatly. Due to older mines using gravity to discharge water, the contaminated water flows into nearby streams.

You now might be wondering how acid mine drainage occurs?

Acid mine drainage is formed when pyrite reacts with air and water to form sulfuric acid. Pyrite otherwise known as "fools gold" is often found in conjunction with valuable metals. When pyrite reacts with air and water it forms into the deadly liquid, sulfuric acid. Since pyrite contains iron sulfide, when it runs into the streams the water turns red, yellow or orange. Once water turns colors, the rocks, bridges, and docks it contacts all get stained too making the sight of the stream unpleasant.

Although mining is the leading cause of acid leaching into streams, it is not the only way acid can get into streams. Other instances that can cause acid runoff are construction and other non-mining land changes. Even in some rare cases it can happen naturally. When acid runoff happens naturally it is called "Acid Rock Drainage."

Next I will discuss the problems that come from Acid Mine Drainage.

Acid mine drainage is a worldwide problem; it leads to ecological damages to watersheds and contamination of humans resources. Once pyrite is exposed to oxygen, the process of acid generation cannot be easily stopped. The acid runoff can continue for thousands of years until the sulfide material in the mine is fully drained out. According to the website (groundtruthtrekking.com), there are mines from the roman-era that are still producing acid mine drainage nearly two thousand years after completion of the mine.²

The first major issue that comes from mine drainage is that it contaminates drinking water. Once acid flows into streams humans cannot consume the water even after filtration. This causes major economic issues that I will discuss later on in the podcast. Another big impact it has is it kills aquatic plants and animals. In many cases the streams don't get treated until nothing other than microbes can survive in the water. One impact people find surprising is that acid mine drainage can affect bridges going over the streams it affects. The corroding affects from the sulfuric acid in the water eat up parts of infrastructure like bridges, dams, wells, and even docks.

Acid mine drainage has been affecting America for hundreds of years. Actually the older the mines the more mine drainage is predicted to come out of it. Mines built in the early 1800's were designed to use gravity to help with drainage. This results in the water flowing through the mine and picking up all the metals underground. Once it drains out of the mine the water runs into the local water system. Although on record the older mines cause more problems. Mine drainage can occur even before mines are completed. For example in 2007, the Kensington Mine in Southeast Alaska was heavily inspected and was deemed not to produce any acid drainage. However acidic water was discovered in a stream not too far from the mine.³

State and local governments need to help find the mines draining into streams. Not only does Acid mine Drainage affect waterways, but also affects local economics. When a stream gets affected by mine drainage it can no longer be used. The acid kills all recreational fish species and aquatic plant life. This causes tourism to go down around the streams. Also the biggest issue in result to polluted streams is that it cannot be used as clean drinking water. It takes huge amounts of money to attempt to treat acid runoff. It has proven in the past that treatments of streams are economically impossible. The harm produced from acid runoff is nearly unavoidable once it has started.

The only thing we can do to save our streams is preventing the acid from running out of mines. There are only a couple ways to prevent acid runoff from mines. First we prevent the sulfuric acid from ever forming. This is the most difficult task and is actually nearly impossible. To stop the formation of acid the waste tailings from mines cannot come in contact with oxygen. The ways large mines attempt to do this is isolate the tailings underwater where there is not much oxygen present. Also they can seal them behind a synthetic barrier deep underground where oxygen cannot get in. However, the prevention from oxygen coming in contact with the tailings is nearly impossible and almost never fully works. This is due to the large amounts of tailings large mines produce. The next method is to treat the runoff before it enters streams. Mines will use lime, sodium hydroxide and carbonate in hopes to neutralize the acidity from the runoff. This method does work in a somewhat low cost compared to burying the waste deep underground. Although it does have downsides, the limestone needed to lower acidity level increases the total dissolved solids in streams. This causes impacts on aquatic life and the water quality.

Lastly, the runoffs from mines continue forever and constantly needs to be treated. Mine operations do not usually go back to old mines and treat the water because of the high costs of money to treat it.

Acid Mine Drainage affects thousands of miles of streams every year and needs to be treated. Humans need clean drinking water to survive and our mines could potentially ruin our groundwater. Then all well have to survive is underground drinking water that is also affected every year from other forms of pollution.

This is Nick Gilbert and thank you for listening to this podcast on water issues this week.

References

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