Topic UGM-2

White Paper Topic: Long Term AMD generation from underground mines

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Problem Definition

The problem of predicting long-term acid mine drainage from below drainage deep mines is two fold. The first issue is developing prediction tools to be used in the permitting of new deep mine reserves and their subsequent modification and expansion. Secondly, many existing and abandoned deep mines are now filling with water and will soon discharge.

In modern mining how can standard testing techniques such as acid base accounting and sulfur fractionation be used predict long-term acid mine drainage. Many of the methods developed to predict AMD in surface mines do not work well in deep mines. Because the increased price of coal and the introduction of scrubbers at many power plants, there is now rush to mine large reserves of Upper Freeport, Kittanning and Pittsburgh coal seam in Pennsylvania, Maryland and West Virginia. In addition there are many active deep mines that wish add additional mine reserves down dip of their present mining. Many of these deep mines will hold billions of gallons of water and will eventually discharge several thousand gallons per minute when they reach equilibrium.

Of an even greater scope then new mine permitting is the issue of large below drainage mine pools in inactive, abandoned and forfeited deep mines in high sulfur coal seams. The largest of system of mine pools is associated with the Pittsburgh coal seam in Ohio, Pennsylvania and West Virginia.

Over a dozen different major mine pools will discharge to the Monongahela and Ohio Rivers in the up coming years. Their water quality will range from alkaline with 200+ mg/l iron to acidic waters with over 3000 mg/l of iron and other metal pollutants. Each discharge will flow at rates of several thousand gpm. 2-3 major breakouts will occur in Pennsylvania in the next two years. There are two groups of mine pools in the Pittsburgh coal seam. There are the abandoned mines along the Ohio River and the mine along the Monongahela River, sometimes called the “Monongahela Basin”. Though no mine pools in West Virginia are expected to be a problem in the next two years, many West Virginia mine pools are gaining water and will discharge in the near future. The majority of these mines are abandoned and the legal liability for these discharges is not clear. The potentially poor quality and volume of water in these pools make them one of the greatest water pollution issues in the last twenty years. There are also large scale mine pool issues associated with the Upper Freeport coal seam along the Maryland/West Virginia Border.

For both active and abandoned below drainage deep mine pools water quality prediction is not a simple matter. The water quality of deep mine pools is dynamic over the distance of the mine and even more importantly over long time periods. Water sampling conducted with West Virginia Water Research Institute WV-173 Project has shown the some below drainage mine pools in high sulfur seams have turned alkaline and low iron over time.

The most immediate need is for the study of large existing mine pools in the Pittsburgh and Upper Freeport that will discharge in future. EPA Region III, OSM and WVU have been studying the mine pools in the Monongahela Basin for the last several years. They have been working very closely with the PA DEP. Because of this study, the majority of the pools in the Mon Basin are at least partially understood. Being able to predict the location, quantity and quality of these discharges is vital to any state and federal policy decisions. However, the mine pools in Pittsburgh along the Ohio River and the Upper Freeport mine pools along the West

Virginia/Maryland border are poorly understood. There are several large mine pools along the Ohio River, we know little or nothing about any of them. The recently proposed West Virginia Water Research Institute HRC-4 project will be looking at deep mine pool issues along the Ohio River. There is an immediate need to define the nature and scope of the potential AMD issues with abandoned and inactive deep mine in these two areas.

The fate of modern permitting of below drainage high sulfur coal seams is also tied understanding these abandoned mine pools. Most modern deep mines are adjacent and usually down dip of large flooded mine pools. These mine often have direct or indirect hydrologic connectivity. Also these abandoned mines are the best and most realistic model of what will happen in proposed deep mines. It makes more sense to study a mine that is thirty years and about to discharge, then to wait thirty years for an active mine to fill and reach equilibrium.

The use In-Situ treatments do resolve water quality problems prior to discharge to surface waters is of specific interest.

Cost of Project:

Not estimated

Time Required

Major mile pool studies on the Pittsburgh and Upper Freeport coal seam could be finished within the next 2-3 years if funding is forth coming.

Bibliography

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