RES2013-24

Controlling Sources of Acid in Pyrite-Bearing Rock Formations

Period
September 1, 2013 To: July 31, 2016

Work Completed (%)
Estimated 90 %

EXECUTIVE SUMMARY

The project is nearing completion and all field work and sample collection has been completed. The project activities are focused on publishing and presenting results of the investigation and completing final reports for TDOT. The remaining tasks for the investigation will be completion of the final report and data-series for the research. A journal article describing bioremediation of ARD has been completed and prepared for a scientific journal. Two sessions at the Tennessee AWRA were devoted to the results of the acid-rock investigations. Presentations described the investigations conducted by USGS, UT-Knoxville, Tennessee State University, and ARCADIS. An abstract and presentation on the ARD project has been accepted at the 2016 Geohazards in Transportation Forum to be held in Knoxville, Tennessee.

SYNOPSIS OF THE PROBLEMBEING RESEARCHED

Pyrite and similar minerals containing sulfur and trace metals occur in several rock formations throughout Middle and East Tennessee. The pyrite can decompose in the presence of oxygen and water and form sulfuric acid resulting in environmental problems and damage to the transportation infrastructure. In Middle and East Tennessee pyrite occurs in black shale in the Highland Rim and Valley and Ridge provinces, shale and coal formations along the Cumberland Plateau, and metamorphic rocks and shale in the Blue Ridge. Information is a needed to better understand the factors, chemical, geologic, hydrologic, and bacterial, that control the acid formation and transport of metals to surface water. The investigation will be conducted at sites representative of Chattanooga Shale road cuts, Fentress Formation road cuts, and metamorphic/igneous formations in East Tennessee.

Project Objectives

The primary objectives of the investigation are 1) to evaluate engineering / hydrologic controls to reduce formation of acid and metal transport, 2) to define mechanisms and sources for transport of water and oxygen into pyrite bearing formations and the formation of acid runoff, and 3) to identify chemical or environmental conditions that reduce the biological production of acid from pyrite, with an emphasis on beneficial microbial communities that reduce pyrite oxidation.