

Non-Confidential Description - PSU No. 3250
“Composite Material and Methods for Controlling Acid Rock Drainage”

Keywords:

Environmental Remediation; Treatment of Acid
Rock Drainage (ARD); Construction Site
Passivation; Mining waste beneficiation

Links:

[Inventor Website](#)
[Published Patent Application](#)

Inventors:

Hubert Barnes

Background

Excavation into pyritic, carbonate-free bedrock or soils is often necessary during the construction of highways, large foundations or mining of coal and/or metal ores. The consequent exposure of pyrite to oxygen and water generates acid which causes pollution and subsequent harm to the environment. The natural process that produces ARD is spontaneous with simultaneous reactions of pyrite, or similar metallic sulfides such as marcasite, with both water and oxygen or other oxidants. It has been reported that annual acid released just from US mines is about 2.7 million metric ton. According to the U.S. Bureau of Mines, that ARD has polluted over 12,000 miles of rivers and streams. Approximately sixty (60) Superfund sites are abandoned mines. Acid mine drainage is generally considered to be the single largest cause of damaging environmental impacts resulting from mining. Construction can be similarly harmful. This is a global problem.

Invention Description

The subject invention provides a practical means for controlling the pollution produced by reaction of water and oxygen with carbonate-free pyritic rocks (commonly known as ARD). The invention can be applied as a powder or slurry depending on the available local water supplies. This invention can be used to control the acidity of water runoff resulting from the weathering of pyrite or from other sources by persistently buffering the acidity to near neutrality. The Materials used in the invention can never produce caustic water, a problem with competing lime treatments. The invention also has the capability of absorbing several pollutants such as arsenic and trace metals during treatment of contaminated runoff. The invention's environmentally safe composition and adjusted rheological properties regulates treatment penetration into rock and soil masses and coating of contacted rock surfaces. Controlling the slurry's viscosity allows for its specific application on, and utility for, slopes ranging up to at least 40° or on piles of broken rock.

Advantages/Applications

The invention has been field-tested and demonstrated long-term neutralization of ARD sites even with single applications. More field-trials are underway. Because of the durability of the treatment and complete reaction of its materials, the technology offers favorable cost/benefits over competing commodity treatments such as limestone, which can lose efficacy within a short period of time (days) due to armoring by gypsum. The technology is covered by a pending patent application. Potential commercial applications include acid mine drainage, mine rehabilitation, sulfide waste rock tailings and sediments, and acid sulfate soils.

Contact: Matthew D. Smith
Sr. Technology Licensing Officer
The Pennsylvania State University

Phone: (814) 863-1122
Fax: (814) 865-3591
E-mail: mds126@psu.edu