

Preventing AMD From Mine Waste Using Commercial Asphalt/water Emulsions

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CARBOHYDRATE
SOLUTIONS INFILTRATING
MINE WASTE have been used
(Sugars and Alcohol)

[Joe Harrington Patents]

Carbohydrate Solutions

- **Infiltrate Mine Waste and Make it Anaerobic**
- **Oxygen (6-7ppm) Dissolved in Water Entering Mine Waste is Converted to HCO_3 and H_2O**
- **As and Metal Sulfates are Reduced to Sulfides, if sulfate reducing bacteria are present.....and they usually are**

This Method Is NOT Permanent

Carbohydrates Being Soluble,
DRAIN OUT of the Mine Waste

What is Needed is an
INSOLUBLE ORGANIC
Substitute for Carbohydrates that
can be Dispersed in the Mine
Waste and REMAIN there

Asphalt/Water Emulsions Are the ANSWER!

- Commercially Available, Made at over 100 USA Sites in many grades to ASTM Stds
- Asphalt Microdroplets are Suspended in Water by a Surfactant that Binds to Asphalt

ANIONIC Asphalt/Water Emulsions

- Anionic Asphalt Microdroplets are Weakly Repelled by Common Mineral Anionic Surfaces
- This Allows Emulsion Penetration into Mine Waste

Summary of Laboratory Results

- Penetration in Sand-Filled Columns, Using Diluted Anionic A/W Emulsion was Proven
- Emulsion Breaks in Good Time: not too fast or too slow

Results (continued)

Arsenic lowered to 15 micrograms/liter
(15 ppb) in 7 days or less

Cationic Emulsion Seals Sand (Mine Waste)

Process Design Goals for Site

- Select Emulsion Dosage
(Cost versus Protection Longevity)
- Select Emulsion Dilution
Specific Retention (Field Capacity)
Hydraulic conductivity

Limiting Rainwater Infiltration Rate May be Needed

- Install Layer of Soil (Dirt), and
- Plant Vegetation (likely Required by EPA)
- Infiltration of Rainwater in Mine Waste cannot exceed Hydraulic Conductivity of Soil Cover

Cost of Materials

- Delivered 60% emulsion in Nevada is about \$3.00 per gallon
- 1,000 gal per acre (\$3,000) = 350 years of Protection

Process Steps Using A/W Emulsions at Mine

- Dozer Rip Mine Waste (optional)
- Receive and Dilute Emulsion
- Apply Emulsion to Mine Waste
- Install Soil Cover and Replant

Future

- Lab Research is Complete
- Need Test on Mine Waste
- When?
- Where?
- Suggestions?