Remediation of Pyritic Rock
Interstate-99 Highway Project Centre County, Pennsylvania
Agenda

- History and Background
- Interim Treatment
- Immoveable Material
- Moveable Material
- Summary
HISTORY and BACKGROUND
Public Information

- Partners’ Meetings (over 40 bi-weekly meetings)
- Web site
- Newsletter
- Public meetings

Overview of Project

The I-99/SR. 6220 Project extends from the Village of Bald Eagle (I-99) in Blair County to the Mount Nittany Expwy (US. 322) in Centre County, just west of State College. The improvements involve the construction of a new four-lane limited access highway that includes five interchanges and approximately 18 miles of roadway.

PennDOT divided the project area into seven design sections: Sections 10, 11, and 12. Section 10 extends from the existing I-99 in Blair County to the North Bald Eagle Creek crossing, south of Port Matilda. Section 11 extends from Section 10 to the North Bald Eagle Creek crossing, north of Port Matilda. This section of roadway will provide a direct high-speed connection from U.S. 322 (west of Port Matilda) to I-99 northbound. Section 12 extends from Section 11 to the Mount Nittany Expwy, west of State College. This design section includes construction sections A12 and C12, the areas of FARD concern.

Acid Rock Drainage (ARD)

ARD is acidic water runoff that contains elevated concentrations of contaminants including heavy metals and sulfates. The acidity is caused by the reaction of sulfide minerals (commonly pyrite, pyrrhotite) with oxygen and water. The acid dissolves and leaches minerals from the rock, further increasing the potential to degrade water quality in nearby streams if left untreated. Sulfide minerals were exposed during the construction of Section A12 when large volumes of ground were excavated. This material was initially neutralized with lime in dust. Some was used as fill for the roadway, and the rest was stockpiled as waste material within Sections A12 and C12. Rainfall from the site was monitored. Early monitoring results from the Spring of 2003 indicated that the material was contained and there were no signs of FARD. In mid-September, the first readings of runoff from the site started to fall, indicating that the runoff was becoming acidic. More rigorous chemistry testing was started during and after storm events, at that time.

In October and November of 2003, PENNDOT coordinated with PA DEP to address the ARD occurring at the waste sites and the need for treatment, primarily Buffalo Run, from receiving acidic runoff.

Within the I-99 Sections A12 and C12, there are eleven areas that have been identified as containing pyritic rocks: Trumbull Basin Plant, Blimous/Blouvers Area (includes a small Car-Rice area), Skypoint Waste Area, Siebert Waste Area, 1042 Fill Area, Cawood Rock Pile, Cat-Face Area, Arboagast Waste Area, Structure 317 Fill Area, Sellers Lane Area, and Rock on A dugout. These sites are depicted in the figure provided with this newsletter. Currently it is estimated that 400,000 to 1,000,000 cubic yards of pyritic-laden material exists. The ADR Monitoring and Remediation Plan (May 2004) was developed by PENNDOT to implement monitoring and remediation (corrective) measures for acidic water discharges from these areas.

Monitoring Efforts

The ADR Monitoring Plan includes water quality monitoring for both surface and ground water resources within the vicinity of the areas of concern. This effort includes the following:

- 164 residential water supplies are sampled either biweekly, monthly, quarterly, semi-annually.
- 89 groundwater monitoring wells have been installed and are sampled monthly or quarterly.
Pyritic Veins in Bald Eagle Sandstone At Large Cut Face

Pyrite Veins
Locations of Pyritic Material as a Result of Project

- Trumbull Batch Plant
- C12 Structure Fill
- Small Cut Face
- Bifurcation Buttress
- Skytop
- Structure 317
- Large Cut Face
- Siebert
- Arbogast
- Sellers Lane
Skytop

Large Cut Face Area

322

Matternville Road

322

After

Buffalo Run Road 550
ARD
Residential Water Monitoring

- Residential groundwater monitoring – 2003
- Monthly and quarterly monitoring
- Currently providing bottled water to nine residences
- Continue to monitor 103 residential supplies
- Overall evaluated 178 residences, three businesses, and one school
INTERIM TREATMENTS
Temporary Tarps
Interim Treatment Facility

Ponds 1 and 1A Treatment Area

Geotubes

Pond 1

Pond 1A
IMMOVEABLE MATERIAL
Immoveable Material
Immovable Options

PADOT evaluated multiple options for immovable materials
Design/Build
Remediation Plan – Immoveable Material

- Covered by geoweb material filled with limestone, leachate will be collected, tested, and treated as necessary.
Design Considerations

- 8 slopes of various lengths and inclinations
- No penetrations through the liner system
- Matrix developed based on slope length and inclinations (2T - 8T)
- Anchor designs varied based on access to each slope
Tendons
Stop Sleeve and Washer Detail
Crimping Equipment
Deadman Anchor Block
Runout Anchor Trench
Small Cut Face

Soil Anchors
Soil Anchors
Large Buttress Slope
Termination and Stops
Stone Infill
Large Buttress Completed
Median
Soil Filled
Small Cut and Large Buttress
317 Fill
Large Cut Face
High Wall and Low Wall
Safety Training
High Wall
1H:1V 400’ long
High Wall
MOVEABLE MATERIAL
Why Must It Be Moved?

- Specially protected watersheds (Buffalo Run and Waddle Creek)
- Limestone/karst geology – potentially unstable base
- Cannot guarantee acceptable discharge into HQ streams
Potential Contamination from a Stockpile Site

- Temporary Fills
- Sediment Ponds
- Surface Water to Buffalo Run
- Water table
- Water supply wells
- Contaminated groundwater
Moveable Material
Moveable Material

Siebert

Mainline Cut

3042 Fill

Skytop
Mainline Cut
Options for Moveable Material

- Twenty-eight off-site locations evaluated
- Narrowed to two sites
- In-place treatment – Bauxsol
ERPA Site – Centre County

Advantages
- State-of-the-art design
- Geology very favorable
- No impact on wells
- Minimum hauling
- Minimal traffic impact
- Uses lime dust

Disadvantages
- Greenfield site
During Construction
After Construction
ERPA Details

**Geocomposite/40milHDPE/Geotextile**

**Protective Cover Leachate Collection Zone**

**60milHDPE/GCL/Geocomposite**

**Subbase**

**Final Cover**

**Intermediate Cover**

**Select Rock Fill**

**Subbase**
Geosynthetic Installation
Transportation of Lime to ERP
ERPA Closure
Summary

- Design/Build/Design
- Largest Geoweb project in USA
- Two year construction project
- 40 Acres of Geoweb/Geomembrane
- 25 Acre ERPA
THANK YOU