Problems with Pyrite or All that Glitters is not GOLD

Pyrite and Tennessee Roadways – a 25 Year Perspective
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Conceived in 1958, design and survey got underway in 1962.

The project received initial funding in 1963 with the first construction awarded in 1965.

By 1969, 7.2 miles of the road had been completed on the TN. Side.

By 1977, acid drainage from the excavated material was finding its way into McNabb Creek and Hemlock Creek.
Guidelines for Handling Excavated Acid-Producing Materials

Assume the excavated material is acid bearing unless proven otherwise.

Design to minimize excavation of potentially acidic materials.

Design an exploration plan to test potential excavated materials during the geotechnical investigation.
Both the 1989 and 2001 Studies involved preliminary geophysical studies, conducted by Marrich Inc., that were used to determine anomalies through the use of self-potential (SP) and induced polarization (IP) measurements.

From these data, boring locations were determined to confirm the geophysical information.
Testing was conducted at random 5’ intervals within the cored bedrock.

Of the 73 samples tested during the 1989 study, only 1 exhibited high acid production potential.

Of the 163 samples tested during the 2001 to 2002 field study, only 10 exhibited high acid production potential.

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<th>Table 3 - SAMPLES EXHIBITING LOWEST +CaCO₃ VALUES</th>
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* Test results generated during 1999 study.
* Note: 1. Total number of samples tested during current study = 163
* 2. Total number of samples exhibiting high acid production potential (current study) = 10 = 6.12%
* 3. Total number of samples tested during 1999 study = 73
* 4. Total number of samples exhibiting high acid production potential (1999 study) = 1 = 1.37%
* 5. Total number of samples tested combined studies = 236
* 6. Total number of samples exhibiting high acid production potential (combined) = 11 = 4.67%

In the table above, samples with a +CaCO₃ value of −15 or more (negative), are considered to have the potential for significant acidic runoff. Values between −5 and −15 have a moderate potential for creating acidic runoff.
STATE ROUTE 29 (US 27)  
CHATTANOOGA, TENNESSEE

- State Route 8 south bound on ramp to State Route 29.
- Original design involved retaining walls to encapsulate potentially pyritic materials found within the S-1 Slope.
- Value Engineering study was conducted by the contractor in order to eliminate retaining walls and construct slopes.
- Results of the two studies conflicted. Which study does the State accept????
STATE ROUTE 29 (US 27)
CHATTANOOGA, TENNESSEE

Acid Drainage From Slope, 1999
Along Concrete Drainage Ditch

Drilling in Overturned Bed of Chattanooga Shale Within The S-1 Slope
S1-273A, Chattanooga Shale began at approximately 10’ and continued below exploration depths of 59.4’.

S1-274 encountered decomposed shale at 1.0’, continuing to auger refusal at 22.5’.
- Exposure of Chattanooga Shale across the entire S1 slope, in addition to the roadbed.

- TDEC became involved with the site, requiring the installation of a geomembrane liner to encapsulate the black shale.
PYRITE REMEDIATION FOR I-99 IN PENNSYLVANIA

Cut Slope Entirely Encapsulated With 40 mil Geomembrane
Geocell Installation on 1H:1 V Slope With Stone Infilling of Cells
SUMMARY

- INCREASING REGULATIONS $$$$ 
- INCREASING COSTS $$$$ 
- OPENS THE DOOR TO INOVATION 
- ELEVATED LANES, OR SKYWAYS 
- LONGER ROUTES 
- WHERE DOES IT END???
ANY QUESTIONS?