**Predicting Release of Total Dissolved Solids from Overburden Material Using Acid-Base Accounting Parameters**

**J. Odenheimer Joyce1, J. Skousen2\*, L.M. McDonald2,**

**D.J. Vesper2, M. Mannix2, and W.L. Daniels3**

*1 919 Florida Avenue, Pittsburgh, PA 15228 USA;*

*2 West Virginia University, Morgantown, WV 26506 USA;*

*3 Virginia Polytechnic and State University, Blacksburg, VA 24061 USA*

*\*Corresponding author (jskousen@wvu.edu)*

**ABSTRACT**: The Appalachian coal industry has been successful in developing technologies to identify, handle, treat and isolate potentially acid-forming overburden materials at coal mines in the region. Modern coal mining permits have stringent guidelines for reclamation and water discharge limits. Total dissolved solids (TDS) is a new water quality parameter that has been linked to a decrease in survival of aquatic macro-invertebrates in receiving streams. Past techniques to predict acid mine drainage potential to decrease impacts to streams may not accurately predict the release of TDS. The objective of this work was to develop a TDS release index from overburden material that could be used to predict and screen overburden materials that contribute to high TDS concentrations. Forty-one overburden samples containing a range of sandstones and shales were collected from surface mines in West Virginia, Virginia, and Kentucky. Samples were ground to < 2 mm particle size and weathered in dilute HNO3 to determine TDS released. Supernatants were analyzed for pH, electrical conductivity (EC), and other selected ions. Results were compared to Acid-Base Accounting parameters for each sample; i.e. paste pH, maximum potential acidity (MPA), neutralization potential (NP), and net neutralization potential (NNP). Results showed that MPA (sulfur content) had the strongest relationship to TDS release, and low, moderate, and high TDS release indices were developed based on MPA values. Samples with MPA values of 0.0 to 1.0 g kg-1 gave < 150 mg L-1 TDS, 1.0 to 3.0 g kg-1 gave < 300 mg L-1, whereas 3.0+ g kg-1 produced TDS values > 500 mg L-1. NPP was also a predictor for TDS, with an NPP ≥ -2.0 g kg-1 likely to produce < 300 mg L-1 of TDS and NPP < -2.0 g kg-1 likely to produce TDS concentrations > 300 mg L-1.

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