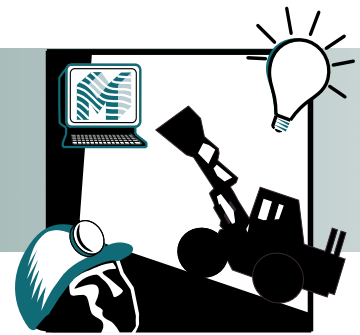# MINING

Project Fact Sheet

REAL-TIME COAL/ORE GRADE SENSOR

BENEFITS

- Decreases mining of low-grade ore or high sulfur/ash content coal
- Improves processing by properly identifying ore grades and coal content
- Allows for assaying during exploration

APPLICATION

This sensor will be suitable for use in both surface and underground mining operations either at the working face or where mined material is being processed.

REAL-TIME SENSOR DECREASES ENERGY REQUIREMENTS FOR EXPLORATION, MINING, AND PROCESSING ACTIVITIES

Project partners will develop a real-time coal content/ore grade sensor that can be used during exploration, mining, and processing operations. The sensor will be developed based on advanced multi-spectral and hyper-spectral imaging technology that is currently used in airborne and satellite applications.

This project will utilize the unique spectral characteristics of coal and platinum/ palladium to quantify coal content and ore grade. Because the instrument will utilize imaging technology that requires only a few hundredths of a second per measurement, the mineral content across a working surface or in particulate matter will be rapidly measured. Using modern reflectance spectroscopy and digital image processing techniques, the spectral signatures of target minerals will be used to generate and easily interpret a false color map indicating mineral content in coal or ore. This will allow for greater selectivity as well as decrease environmental impacts and energy requirements in exploration, mining, and processing activities.

PROCESSED MICROSPECRAL IMAGE OF ORE SAMPLE

False Color Image of Ratio Indices

0   1   2   3   4
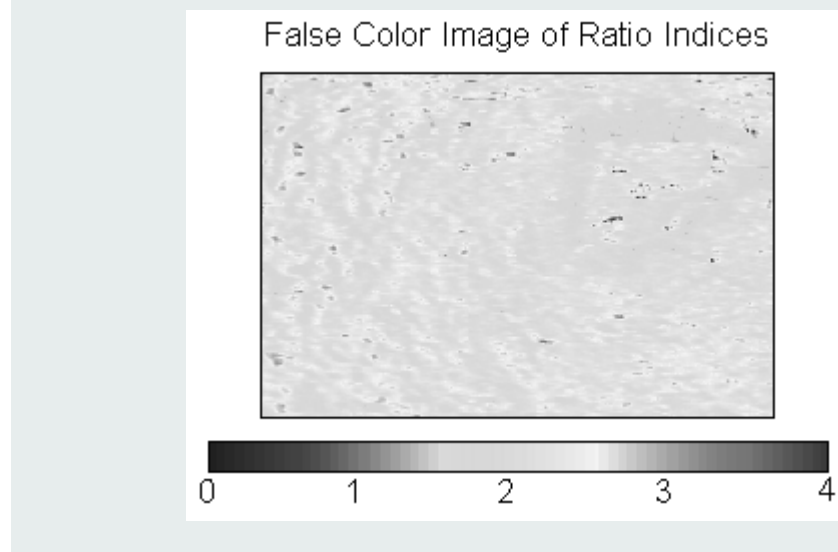
The dark areas above show false coloring used to highlight the presence of sulfides within the ore.

Project Description

Objective: To develop a real-time coal content/ore grade sensor that uses digital imaging techniques for use in exploration, mining, and processing operations. The sensor will increase safety, decrease environmental impacts, and decrease energy requirements.

Progress and Milestones

This project includes the following activities:

- Measure the reflectance spectra of coal and platinum/palladium as well as background material.

- Determine the viability of the technology for as many phases of mining and mineral processing as possible by investigating the effects of particle size and the presence of water on the spectra.

- Find distinctive spectral features that are free of interference from the background material and discover the conditions needed to optimize the spectral signature.

- Develop algorithms necessary to provide real-time coal content analysis and ore grading based on spectral information.

- Design coal content/ore grader that will differentiate the signature spectra of coal and platinum/palladium.

- Manufacture a dedicated coal content/ore grader.

- Test and calibrate the coal content/ore grader and software.

- Incorporate the coal content/ore grader sensor into a working mine.

- Monitor long-term performance for determining maintenance requirements and performance improvements.