

**INTEGRATION OF AIRBORNE, GROUND, AND BOREHOLE GEOPHYSICAL SURVEYS
TO CHARACTERIZE SHALLOW HYDROGEOLOGY IN AN AREA OF COALBED
NATURAL GAS PRODUCTION IN THE POWDER RIVER BASIN, WYOMING**

James I Sams III

Garret Veloski

Richard Hammack

Department of Energy
National Energy Technology Laboratory
626 Cochrans Mill Road
P.O. Box 10940
Pittsburgh, PA 15236-0940
Voice: 412 386 5767
Fax: 412 386 5767
jsams@netl.doe.gov

Bruce D Smith*

US Geological Survey
Lakewood, CO

John Supancic

BeneTerra LLC
Sheridan, WY

Development of coalbed natural gas (CBNG) in the Powder River Basin (PRB) of Wyoming has rapidly increased since 1997, focusing national attention on produced water management. The U.S. Department of Energy's National Energy Technology Laboratory has utilized multi-frequency airborne, ground electromagnetic, ground resistivity, and borehole methods to characterize the near-surface hydrogeology of several areas within the PRB from 2004 through 2008. Comparison of the datasets illustrates differences in the resolution of each. The geophysical data is consistent between surveys utilizing different geophysical techniques and between surveys carried out at different times. Results from the geophysical surveys show the heterogeneity of the near-surface geology and hydrology of the basin. Findings suggest that the geophysical methods applied as part of this research are suitable to address a number of issues of produced water management issues for CBNG production. Applications at the site scale include surface-water and ground-water characterization and monitoring. Airborne geophysical surveys can be used in conjunction with geographic information system modeling methods to characterize hydrogeologic settings in terms of water management for larger areas. Results of the study have applications in assessing impacts of CBNG-produced water utilization and disposal within the basin.

###