

# PROJECT facts

U.S. DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY  
NATIONAL ENERGY TECHNOLOGY LABORATORY

Petroleum Environmental  
Solutions

03/2005



## HANDBOOKS FOR COALBED METHANE DEVELOPMENT

### Background/Problem

Private and government emphasis in recent years has stressed the growing importance of natural gas as a prime source of energy for industrial, power and residential heating needs in the U.S. CBM is of vital interest in the search for new natural gas resources. CBM resources in the Rocky Mountain states have generated an industry drilling boom during the past decade. CBM represents 9% of all natural gas produced in the U.S. Interest is high, particularly in Wyoming, Montana and New Mexico. However, development brings with it a growing concern about how to handle the produced water. Over 14 billion bbl/year of produced water was generated in the U.S. in 2002, according to a recent Argonne National Laboratory study.

The project goal was to develop guidebooks to review the development and mitigation practices employed in various coalbed methane regions in the U. S, and encompass existing Environmental Impact Statements and other NEPA planning documents relevant to CBM development in the Rocky Mountains.

### PARTNERS

**ALL Consulting**  
Tulsa, OK

**Montana Board of Oil & Gas  
Conservation**  
Billings, MT

### MAIN SITES

Rocky Mountains

### Project Description/Accomplishments

Strategies for Coal Bed Methane in the Montana Portion of the Powder River Basin, 2) Handbook on Coal Bed Methane Produced Water: Management and Beneficial Use Alternatives, 3) Coal Bed Methane Primer - New Source of Natural Gas- Environmental Implications.

In order to develop the guidebooks an analysis of Best Management Practices for CBM development in southeastern Montana was performed. The volumes provided a broad overview of coal and coalbed methane resources, summarized the federal and state regulations pertaining to water rights in states with significant CBM resources, and reviewed the available technologies for treatment of CBM produced water. Various alternative beneficial uses for produced water are listed, with comments on application of water with varying degrees of salinity and mineral content. The project summarized the regulatory framework of state and federal laws governing CBM development related to: water use, Endangered Species Act, Antiquities Act, National Historic Preservation Act, Tribal Resources and Split Estates.

Best Practices are identified as a suite of techniques, procedures, measures or practices which are site specific, economically feasible and are used to guide, or may be applied to, management actions to aid in achieving desired outcomes. As applied to CBM development best practices do not constitute state or federal regulations, but may aid the operator in fulfilling the regulations.



## CONTACTS

**David Alleman**  
Technology Manager  
SCNGO  
918-699-2057  
david.alleman@netl.doe.gov

**Dan Arthur**  
Principal Investigator  
ALL Consulting  
918-382-7582  
darthur@all-llc.com

## COST

**Total Project Value**  
\$364,318

**DOE/Non-DOE Share**  
\$283,831/\$80,487

## CUSTOMER SERVICE

**1-800-553-7681**

## WEBSITE

**[www.netl.doe.gov](http://www.netl.doe.gov)**

The key to low-cost CBM produced water management is to make beneficial use of the water, as an alternative to reinjection. Produced water uses can be grouped into surface discharge, impoundments, agricultural and industrial uses. Surface discharge includes releasing the produced water directly to the land surface, into a flowing stream or into an impoundment. Impoundments constructed by earthen dams provide water for wildlife watering and habitat, fisheries and fishing ponds, recreation, wetlands, and recharge for subsurface aquifers. Waters managed by the states and federal agencies provide long-term public benefits.

Local ranchers, industries and municipalities make use of produced water directly for agriculture and industrial pursuits. Agricultural uses include livestock watering, irrigation, and soil remediation. Industrial uses include dust control, drilling and development fluids for coal, oil and natural gas recovery, cooling water for power generation and chemical plants, and to provide a ready source of water for rural and urban fire protection.

## Benefits/Impacts

Publication of the three handbooks has made readily available valuable information on development of coalbed methane plays, national and regional location of plays, technologies for treating CBM produced water, alternative beneficial uses for CBM produced water, environmental issues and regulatory guidelines. The three publications are available from the U.S. Department of Energy, and have been distributed widely at national and regional conferences where CBM issues were on the agenda. The information provided in the handbooks has been useful to answer the many questions arising from the general public and concerned parties on coal bed methane development. These three volumes fill a need for the public to be more informed about CBM issues, and offer useful suggestions for best practices for CBM development, and beneficial uses of produced water.



*Irrigated versus non-irrigated are contrasted.*