

AN OVERVIEW OF ENVIRONMENTAL ISSUES RELATED TO COALBED METHANE DEVELOPMENT IN MONTANA

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ABSTRACT

In recent years, the Wyoming portion of the Powder River Basin has seen a tremendous boom in coalbed methane exploration and production activity. The geology of the Powder River Basin indicates that similar resources are likely to occur on the Montana side of the basin. However, development of the Montana coalbed methane resources is currently being strictly limited until the completion of two environmental impact statements: one by the U.S. Bureau of Land Management, and one by the Montana Department of Environmental Quality. Further complicating the development are lawsuits brought by local nongovernmental organizations and the concerns of two Native American reservations whose lands and resources may be affected. The technical aspects of major environmental issues facing the development of Montana's Powder River Basin coalbed methane resources and where key stakeholders currently stand on those issues will be discussed.

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INTRODUCTION

Background

The latest and most controversial exploitations of coalbed methane (CBM) are occurring in the Powder River Basin (PRB) of southeastern Montana and northeastern Wyoming. The PRB, which is illustrated in Figure 1, encompasses approximately 12,145 square miles. There are currently approximately 3100 wells in the PRB, with expectations of up to 39,000 more wells to be drilled over the next 10 to 15 years. A majority of the future exploration and production activities are expected to occur in the Montana portion of the PRB where only approximately 200 wells are currently producing. There have been 270 wells permitted by Montana regulatory agencies; however, a moratorium has been placed on additional permitting until an environmental impact statement (EIS) addressing the accelerated growth is completed.

The methane extraction process involves removing large volumes of water from the aquifer. Lowering the water pressure, which confines the methane within the coal seams, results in methane release and migration into extraction wells. Because of the potential for thousands of wells, and because CBM extraction consists of continual pumping and discharge of groundwater, several environmental concerns have been raised.

ENVIRONMENTAL CONCERNS

Potential Reduction of Groundwater Resources

A CBM production site often comprises multiple dewatering wells to reduce the hydrostatic pressure that confines the methane within the coal seam. These production sites are generally spaced in 20- to 40-acre increments in order to target a coal seam in a specific area or region. A conservative average of 10 gallons per minute of water production is estimated for each well within the PRB. Because of the magnitude of water being produced in an area, the potential exists for private drinking water, irrigation, and livestock wells to be affected. It is anticipated that many wells currently utilizing the coal seam aquifers for their well source water may be affected and left unproductive after the massive dewatering is deployed.

Impacts to Streams, Soils, and Biological Constituents

Because of the potential for millions of gallons of produced water to be discharged to nearby streams and rivers, concerns have been raised about the potential for accelerated streambank erosion and impacts to water quality. The main issue with water

quality is the amount of total dissolved solids (TDS), consisting of sodium, calcium, magnesium, various metals, etc. The chemistry of the discharged produced water is dependent on the source zone from which it is extracted and varies significantly across the PRB production area. In areas where the dissolved constituents are elevated above the background conditions, impacts to stream water quality are possible. The increased quantity of flow would not only have an impact on the water quality of the river, but also increase the rate of stream channel erosion and sediment load, which could potentially have a negative effect on the vegetation and aquatic organisms existing in the river ecosystem. According to Regele and Stark (1) the operation of 9000 CBM wells is estimated to produce approximately the same amount of annual flow as historically seen naturally in the Tongue River.

Another aspect of water quality concerns is the use of stream flow for crop irrigation. In areas where sodium absorption ratios, TDS, and other organic and inorganic constituents are above background levels, there exists the potential to adversely affect plant growth and soil morphology over a period of time.

Miscellaneous Environmental Concerns

Several other potential environmental impacts could occur from the accelerated growth of CBM production, including:

- Air quality impacts from methane-fired compressors and other construction activities.
- Potential saline seeps from constructed holding ponds.
- Reduced recharge to coal mine spoils.
- Potential methane migration within aquifers.
- Impacts to various forms of wildlife due to changes in water availability.
- Impacts from alternative disposal methods like reinjection, timed releases, etc.

STAKEHOLDERS

Because there are a wide variety of possible environmental implications from CBM exploitation, the number of organizations and individuals that hold an interest in these issues is far reaching. Several state and federal agencies are also required to assess and regulate the permitting process for drilling activities and evaluate the effects of the production process. The complex nature of these interactions has resulted in a widespread network of stakeholders in southeastern Montana, which are listed below.

Nongovernment

- PRB Region Farmers and Ranchers
- Tongue River Water Users Association (TRWUA)
- Northern Plains Resource Council (NPRC)
- Sierra Club
- Montana Ranchers Association
- Montana Petroleum Association

Native American Tribal Nations

- Northern Cheyenne
- Crow

Federal Agencies

- Bureau of Land Management (BLM)
- Forest Service (USFS)
- Army Corps of Engineers
- Environmental Protection Agency (EPA)

Montana State Agencies

- Department of Environmental Quality (MDEQ)
- Board of Oil and Gas Conservation (BOGC)
- Department of Natural Resources and Conservation
- Fish, Wildlife, and Parks

LEGAL ISSUES

The CBM activity on the Montana side of the PRB has received rigorous scrutiny over the past two years because of the accelerated nature and potential environmental impacts of the production activities. Individuals and nonprofit environmental advocacy groups have filed several lawsuits in an attempt to ensure accountability by the industry and the regulating entities. A significant result of the courtroom activity has been a moratorium on CBM well permits being issued until an extensive EIS is performed.

According to NPRC Web site information, it has filed five separate lawsuits over the past two years. The first lawsuit was filed in March of 2000 against the Montana BOGC for violation of the Montana Environmental Protection Act by issuing drilling permits without the appropriate environmental review process. In a settlement in this case, the BOGC placed a moratorium on additional permitting until an EIS is completed.

In June 2000, a second lawsuit was filed by NPRC against an active exploration and production company for violation of the Clean Water Act (CWA). NPRC suggested that the CWA was violated through the discharge of produced water into the Tongue River and its tributaries without a permit. As a result of this lawsuit, the operator in question applied for and received the appropriate discharge permit issued by MDEQ. In April 2001, NPRC and the Montana Environmental Information Center, objecting to the discharge permit issued to the operator by MDEQ, filed a third lawsuit. A similar suit was filed by TRWUA.

In June of 2001, NPRC filed its fourth lawsuit against BLM for violation of the National Environmental Policy Act, the Federal Lands Policy and Management Act, the National Historic Preservation Act, and the CWA by approving applications for permits to drill.

The most recent CBM-related lawsuit was filed in August 2001 by NPRC against a producer. The suit claims that the producer violated the CWA by discharging fill material into the Tongue River and various other intermittent streams without a permit. The suit has requested that the producer obtain the necessary permits or remove all related fill materials from the drainages.

CURRENT ACTIVITIES

An EIS is currently being prepared jointly by BLM, the Montana BOGC, and MDEQ and is scheduled to be released in draft format in late February 2002. The draft version of the EIS is intended to identify potential environmental complications from the production activities of CBM and will be available for public comment for a period of 90 days after its release. The EIS will then be finalized, addressing the public input.

Interagency meetings occur approximately every 3 to 4 months. These meetings are a combination of federal, state, tribal, and local agencies interested in various issues related to CBM. Some of the attending parties are the United States Geological Survey, EPA, BLM, MDEQ, the Northern Cheyenne Tribal Nation, the Crow Tribal Nation, the Montana Bureau of Mines and Geology, USFS, and various research universities. These meetings are intended to provide the means for an informal exchange of ideas, concerns, and information between the agencies.

Public meetings are also periodically sponsored by the Coalbed Natural Gas Alliance. The alliance is comprised of several industrial entities performing CBM exploration and production in both Wyoming and Montana. The meetings are held in different cities throughout southeastern Montana for the purposes of informing and educating the public on CBM activities.

The purpose of the EIS and regulatory and public meetings is to ensure that CBM production activities are performed in an efficient and environmentally friendly manner. It is expected that this form of public involvement will continue to exist throughout the future of CBM exploitation. These activities have resulted from various concerned groups in the public and private sectors and from concerned citizens and landowners whom the production activities affect.

FUTURE RESEARCH NEEDS

The EIS is expected to identify areas that are in need of further investigation prior to and during future CBM exploitation. Because of varying physical conditions and associated water quality within the vast PRB, environmental implications may change over time and vary significantly from place to place. Some of the areas that are expected to require further research and evaluation are the following:

- Air emission impacts from operations
- Erosional impacts to waterways
- Treatment and disposal options for produced water

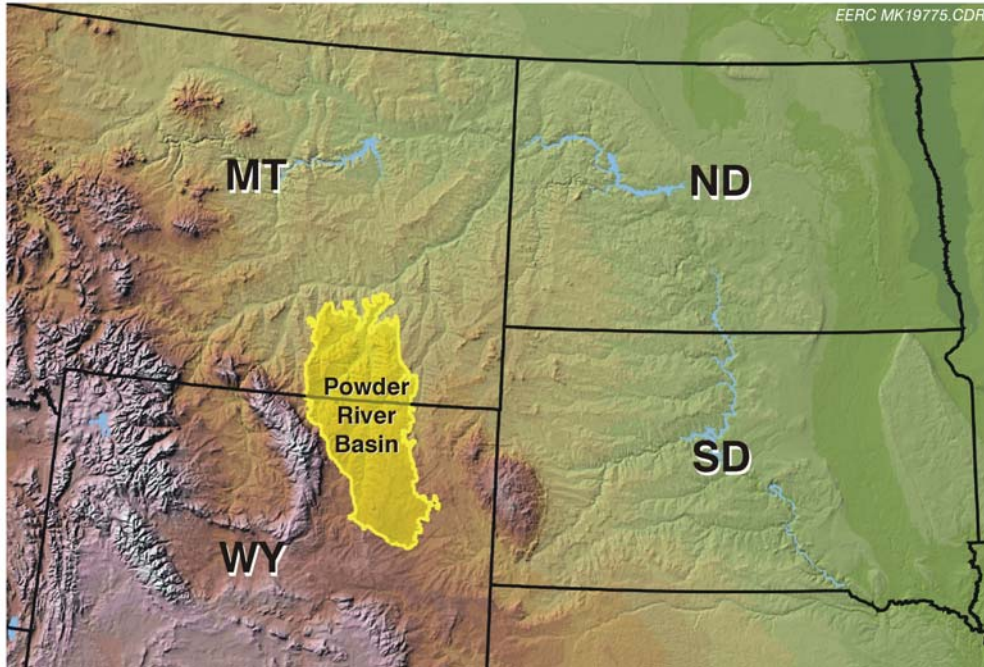
- Soil quality impacts from continuous produced water discharge
- Ecosystem disturbance

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REFERENCES

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Source map taken from United States Geological Survey

Figure 1. Map of the Powder River Basin (PRB).

Figure Captions

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