



Lookout Mountain Analysis

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Dear Sirs:

Below is a set of comments detailing my viewpoints about some of the economic, socioeconomic, and cost/benefit aspects of your recent EIS for the Powder River Basin. I also enclose a report that I prepared that examines the profitability and costs of some representative CBM projects in the Powder River Basin of Wyoming and Montana.

My attached financial analysis of Powder River Basin Coalbed Methane operations uses two regions to represent the large majority of current PRB CBM production. This report has five major conclusions. (1) Six water disposal techniques were modeled: (a) surface water disposal (ERG data), (b) shallow injection (ERG data), (c) deep injection (ERG data), (d) shallow injection (Hodgson data), (e) deep injection (10% of produced water) combined with surface treatment (90% of produced water) (Pritchett data), and (f) reverse osmosis (80% of produced water) combined with shallow disposal (20% of produced water) (Pritchett data) (for more detailed citations please see the attached report). (2) Using a current gas price of \$3.61 per Mcf, all water disposal techniques in all regions were profitable and yielded ROIs ranging from 20 to 44 percent that represent above-normal profits of about \$59,000 to about \$158,000 (NPV). (3) Regional variations between PRB East and PRB Northern regions were not large (\$0.07 to \$0.20 per Mcf). (4) Surface water disposal was the least costly option and deep injection the most costly, for both regions. Additionally, (5) Pritchett data shows that deep injection of 10 percent combined with surface treatment of 90 percent of produced water was significantly less costly than injecting all produced water. This produced-water-disposal technique shows promise because it minimizes the quantity of water that needs to be injected into costly deep wells and can produce significant amounts of drinking-water-quality water for beneficial consumption.

The Powder River Basin Coalbed Methane Financial Model (PRB-CBM-FM) described in the attached paper is a "work-in-progress." Feedback from government, industry, conservation, and other public and private sources will help to refine the assumptions, scenarios, and conclusions of this financial modeling effort.

*Additional Comments on the Draft Environmental Impact Statement and Draft Planning
Amendment for the Powder River Basin Oil and Gas Project
By the Bureau of Land Management, Buffalo (WY) Field Office*

*By W. Thomas Goerold, Ph.D.
Lookout Mountain Analysis*

The EIS contains three different major scenarios: (1) relatively unfettered development of all coalbed gas resources in the Powder River Basin of Wyoming, (2) Development with reduced emission levels and expanded produced water-handling scenarios, and (3) no action—or no leasing of federal coalbed methane.

Alternative (1) projects recent coalbed methane trends in the region in a “business-as-usual” scenario based on current trends.

Alternatives (2) A and (2) B would mandate more stringent water disposal methods and require that 50 percent of the gas compression stations be electrified—rather than gas-fired. Current water disposal practices allow about 55-75 percent of produced water to be discharged without treatment. Of the remaining water that is treated, infiltration impoundment, land application disposal (LAD), and containment impoundment are the most common alternative water-disposal methods, in roughly decreasing frequency. Alternatives (2) A and (2) B would mandate that very little produced water be untreated, and that infiltration impoundment would become the most prevalent treatment method, roughly followed by active and passive treatment, LAD, injection, and containment impoundment.

Alternative (3) assumes that no further natural gas development would be allowed on Federal oil and gas leases. This scenario was not seriously considered in the EIS.

I. General Comments and Questions

1. There is no systematic or comprehensive economic, cost/benefit, or socioeconomic analysis in the document. Yet, despite this lack of analysis, the document routinely asserts that certain alternative actions are too costly, are not worth the cost or effort, or are not justified.
2. Why doesn't the EIS investigate and cost-out downhole separation of gas and water? This technology exists and is being rapidly enhanced on offshore oil and gas platforms. Downhole separation of water and gas would avoid a large number of the most pressing environmental concerns related to CBM development.
3. The EIS speaks about one well per 80 acres and a total of 39,400 new wells. Does this include dry holes? If a hole is drilled but is not found to intersect a producing zone can another hole be drilled in the same 80 acres. If so, is that additional well above and beyond the 39,400 new wells?
4. As described in the EIS, an ultimately producing well is drilled, de-watered and allowed to vent methane to the atmosphere until it produces enough methane to cap it and drive a production apparatus. Are there estimates about the cumulative impact of all this vented methane to the atmosphere and its hazards? In the absence of economic markets, other historical oilfields with excess methane flared (burned) the excess gas at the wellhead to avoid the explosive hazard. Of course, burning methane

at the wellhead is wasteful and produces air pollution without any significant benefits. I don't know the potential volumes of this vented gas and if it is a significant health, safety, or environmental risk. Especially, when you multiply it by the number of proposed wells in the area.

II. Adequacy of Reasonably Foreseeable Development Scenario

1. CBM well estimates in the EIS range as high as 139,000 by 2010. EIS estimates apparently are largely derived from a BLM document "Reasonably Foreseeable Development Scenario for Oil and Gas Development in the Buffalo Field Office Area, Campbell, Johnson, and Sheridan Counties, Wyoming." At a minimum, this document is outdated (it uses DOE estimates from 1998) and it appears to use flawed gas price projection methods (average oil price change per year).
2. An important omission in the BLM "Reasonably Foreseeable" document is that it fails to account for expiration of tax credits (due to expire at the end of 2002) in Powder River Basin drilling activity forecasts. The Section 29 Tax Credits have been a very significant factor in coalbed methane revenues for many years. At least one report says that over 50 percent of coalbed methane revenues have come from the so-called Section 29 tax credits (EIA, 2002, Coalbed Methane and Section 29 Tax Credits). Because these tax credits expire at the end of 2002, the economics of coalbed methane production throughout the U.S. may undergo a significant change.
3. A very limited set of water disposal options is addressed in the EIS. And, of the few water disposal options presented, none is analyzed in enough detail to be able to determine the economic viability of the options.

III. Cost and Benefit Estimates

4. The Agency claims that the "business-as-usual" Alternative 1 is the preferred alternative. BLM claims that this alternative "provides for the best balance of effects to costs and development of the CBM." Yet, the EIS does not provide either a full accounting or an explicit cost/benefit analysis to support this assertion.
 - a. Critical data that are lacking in the EIS but are needed to quantify the costs and benefits. At least some of the missing data includes:
 - i. Capital and operating costs and profitability of currently operating wells and fields in all different parts of the Powder River Basin.
 - ii. Capital and operating costs and profitability of new wells and fields, including the costs of different water production and disposal options.
 - iii. Profitability estimates of CBM ventures. What risks are the communities undertaking when they tie their futures to corporate CBM production? Crucial data should be available to estimate (1) What is the lowest price at which new CBM development can proceed? (2) What is the lowest price that already existing CBM wells can continue to produce? (3) Is the bonding adequate to cover all of the impacts of CBM whenever it might occur? (I.e., what if the gas price drops in the middle of the CBM "boom"? (4) Would the bonding collected to that point be sufficient to cover the entire costs of remediation? (5) How is the bonding calculated for each well and project?

- iv. How much money would the project generate that could be provided for more effective remediation? E.g., is the typical Powder River CBM project profitable enough to be able to re-inject produced water into subsurface aquifers? Would it be profitable enough to perform downhole gas and water separation?
- b. Estimates of the value of *all* resources on both sides of the cost and benefit equations is also lacking. The EIS should not just quantify the market values of the gas, but should also attempt to estimate the value of the other resources that would be impacted.
 - i. Not only should the revenues from CBM production be quantified but also the foregone and opportunity costs of resources should be counted. For example, currently unquantified resources include water that would be produced from the CBM formations. This water would not be available for future economic activities such as ranching, farming, or even to support potential future human and animal populations in the region. CBM production would produce permanent changes in the aquifers and the water quality and quantity in the region.

IV. Socioeconomic Impact Estimates

1. BLM has not shown how they arrive at their socioeconomic impact estimates. Critical input assumptions and methodologies are not disclosed in the EIS. Even though the EIS assumes a "boom" is driving its preferred alternative, the Agency claims that "most of the jobs would be hired from the local labor force." To believe the local-hire assertion one must assume that *all* of the following conditions would be met: (1) despite the very small population of the region (Wyoming has the smallest population of any state) and the relatively low current unemployment rate, enough willing workers would be found from the current residents of the region to meet the CBM boom requirements. (2) The currently unemployed or otherwise employed people of the study region would have the proper education, skills, and training to fill most of the job positions involving the exploration, development, construction, operation, and reclamation of CBM fields. (3) No significant additional immigration from other areas would occur as news of the CBM boom spreads. (4) Few or no unsuccessful job seekers would move into the area hoping to land any of these new jobs. (5) the "limited" number of successful and unsuccessful in-migrating job seekers would have any appreciable impact on the region's infrastructure, including roads, social services (especially unemployment assistance for unsuccessful job seekers), police, schools, fire, hospital, etc.

The source of CBM employees is absolutely critical to estimating the project's impacts. Workers hired from existing residents (those that already reside in the study area) minimize additional demands on the region's infrastructure. But, every worker and family that migrates to the region creates additional demands on his new county of residence. Each additional person has an impact—whether they end up being a worker in the CBM field, an employee's family member, or even an unsuccessful job seeker. The project will also require additional services for the indirect population brought into the region by CBM. These people are represented by the additional workers needed at the grocery stores, dry cleaners, as well as additional doctors needed to support the larger population related to increased CBM activity.

The EIS does not fully reveal the sources of critical assumptions such as the local hire rate and the number of unsuccessful job seekers that are expected. Also, the study does not adequately show the methodology that calculates the indirect employment. This does not allow one to critique the inputs, methodology or conclusions.

The EIS does talk about some of the non-local transient construction workers with specialized oilfield skills needed. But the study claims that they will reside in area motels. But, there is no motel capacity estimate included in the study. Also, what would happen to the non-construction worker motel clients (e.g. recreation and tourism) that would otherwise fill those motel rooms? This analytical oversight is indicative about the lack of candor and specificity in the analysis. Despite this lack of documented analysis and estimates, the EIS does not shy away from sweeping claims. For example, in Section 4, the EIS states that "[t]he project is not expected to result in significant short- or long-term effects to local population conditions."

2. A document written by Petersen Planning Consultants and titled "*Community Issues and Recommendations Concerning Future Energy Developments*" reveals the results of many interviews with government and community leaders living in counties that are now in the midst of the CBM boom. Some of the more pertinent observations from that document are presented below.

Campbell County, WY is perhaps the most CBM-impacted county in the region. This county has experienced 3 booms since late 1950s: (1) oil, late 1950s through mid-1960s, (2) surface coal mines late 1970s to early 1980s, and (3) CBM late 1998 to the present. The Pedersen document argues that the current CBM boom is less site-specific and is therefore more pervasive than earlier energy booms.

Some of the primary impacts of current CBM boom include:

A. Housing

1. There is a lack of "affordable housing"—Gillette, WY is already the second most expensive county in Wyoming to live in
2. Developers are afraid to build for fear of experiencing the "bust" experienced by apartment complex developers in the mid-1980s
3. Current plan is to build an 800-man construction camp in Wright—will this segregate and isolate CBM workers from other communities, and what impacts will this have on both the CBM workers and the other residents of the region?
4. There are no building permits required in the unincorporated parts of Campbell County, so the effect of CBM in the county outside of incorporated areas is not known or controllable.
5. CBM brings increased opportunity to employ low-income residents in higher-paying jobs, but increased housing costs may limit these career growth opportunities

B. Infrastructure

1. Roads—In Campbell County, WY about 250-300 miles out of 1000 miles of county roads have been impacted by CBM activity
 - a. Dust problem
 1. Particulate standards (PM-10) need to be addressed by WY or EPA may step in and hinder CBM development to comply with pollution issues

2. There is at least anecdotal evidence that CBM-related traffic has created "non-grazable" corridors bordering well-traveled roads where cattle do not eat the grass
- b. Markedly increased wear from CBM-generated traffic
 1. Some CBM developers are paying for additional wear from CBM-generated traffic, but many times there are a number of smaller CBM operators that collectively cause wear and who may individually be reluctant to pay for an entire industry's impact on roads
2. Police/fire
 - a. Increase in crime coincident with latest CBM boom—primarily attributed to alcohol and drug problems
 - b. Major crime increases for larceny, destruction of private property, family violence, and child abuse
 - c. There is an increased demand for fire and Emergency Medical services, but not up-front funding
3. Social services
 - a. Additional demand for dealing with large influx of unsuccessful job seekers
 1. e.g., growth in food services supplied to low-income population
- C. **Revenues**
 - a. Mineral tax revenues may eventually find their way to the impacted counties, but there may be a lag time of 18 months or more between when impacts first occur and when revenues are forthcoming
 - b. The WY Industrial Siting Act only works when impacts come from one or more large scale projects—large cumulative impacts from many smaller projects are not covered under this legislation
- D. **Labor force**
 1. Less stability in public and municipal labor force as CBM boom moves experienced people out of public sector jobs and into higher-paying CBM-related jobs

V. Boom/Bust Possibility

1. Without a full accounting of project assumptions and methodologies, it is impossible to assess whether or not the proposed project might lead to a boom/bust cycle. The report itself refers to the "boom" in CBM, yet the EIS asserts that "[t]he potential for the Project to result in a substantial economic boom/bust cycle is low." There simply is not enough known and/or revealed about the proposed project in the EIS to make that statement. Among other things, a boom/bust cycle might be characterized by (1) an over-reliance of a local economy on one commodity, (2) a remote location with an isolated economy, (3) a low population that can support a relatively fixed level of services provided by the community, and (4) the primary commodity of importance is subject to large price swings and changes in demand outside of the control of the community. One can certainly make the argument that each of these four criteria may be met in the proposed CBM project.

VI. Alternatives Dropped from BLM Consideration

1. **Return all produced water to aquifers** – According to the EIS, “[t]he feasibility of an all re-injection alternative appears to be limited.” Where is the economic analysis to support this contention? What would be the costs and benefits of this action?
2. **Capture and treat produced water for additional beneficial uses** – BLM asserts that the treated water production would occur in a relatively short time-frame and that this fact somehow disqualifies this alternative from consideration. In addition to having no economic analysis to support this assertion, BLM does not provide a full accounting of the possibility of water storage (above or below-ground) which could stretch out the availability of produced water for longer periods of time.
3. **Staged rate of development** – BLM only gives a legal argument to support dropping this alternative. Doesn’t the EPA have a duty to protect the quality and quantity of water resources? Can’t the BLM put conditions on development to avoid “unnecessary and undue degradation?” Also, what happens if the gas price decreases and coalbed methane wells become prematurely abandoned? Wouldn’t the consequences of this gas price decline scenario be magnified with greater rates of CBM development? What impact on the rate of development might the expiration of Section 29 tax credits have? Isn’t it a more prudent course of action to impose staged development so that deleterious effects can be more easily understood and mitigated? Why is it so critical to lease the entire region all at once, without even having an idea of its impacts on the economy, the environment, and on local communities? What would be the costs and benefits of staged development?

Thank you for your consideration of my comments.

Sincerely,

W. Thomas Goerold