



Lookout Mountain Analysis

W. Thomas Goerold, Ph.D.

Specializing in environmental and natural resource issues

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Mary Bloom
Project Leader
Bureau of Land Management
111 Garryowen Road
Miles City, MT 59301
(Also delivered via email to: mbloom@blm.gov)

Dear Ms. Bloom:

Below is a set of comments that I am submitting that discuss my viewpoints on some of the economic, socioeconomic, and cost/benefit aspects of the Powder River and Billings RMPs. 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.

Five major conclusions come from the financial analysis report that is attached. (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 paper). (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 Statewide Oil and Gas EIS and Amendment of the Powder River and Billings RMP's--
Bureau of Land Management and State of Montana*

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

The EIS contains five different major scenarios: (A) "no action" alternative—only allows development that qualifies under existing BLM and state management directives, (B) "protection emphasis"—stresses special protection of natural resources (C) "development emphasis"—favors increased petroleum and gas development, (D) "combo scenario 1"—encourages development with increased downstream water protection, and (E) "combo scenario 2"—selectively chooses items from alternatives (B) through (D). The "combo alternative 2", (E), is the agency's preferred alternative.

I. Comments and Questions

1. Site-specific, timely, and pertinent data should be the bedrock foundation on which Powder River CBM decisions should be based. Yet the EIS specifically asserts that little or no new data and no new studies would be generated for the EIS (p. 1-5, number 8). Why?
2. Despite this lack of site-specific analysis, the EIS routinely asserts that certain alternative actions are too costly, are not worth the cost or effort, or are not justified. These assertions are apparently based on gross generalizations and extrapolations of outdated and temporally or spatially distant data—rather than current, site-specific analysis within the affected region.
3. There is no recent, comprehensive, site-specific analysis of projected socioeconomic impacts of CBM development for any of the EIS' five alternatives. From my reading of the entire supplied CD-ROM containing the Draft Statewide Oil and Gas EIS and Amendment of the Powder River and Billings RMPs, there is only one referenced document that appears to contain even a cursory study of potential socioeconomic impacts. The reference that I noted in the bibliography and in scattered portions of the text of the EIS CD-ROM is ZurMuehlen, A., 2001, *Coalbed methane development: economic and social impacts of proposed development in the Powder River Basin of Montana*. Anderson ZurMuehlen and Co., PC, Certified Public Accountants and Business Consultants, Billings MT. June 1, 2001.
 - a. Why is this study not included in its entirety in the EIS?
 - b. My understanding of the results of this study is that the proposed coalbed methane development activities would generate \$4.1 billion in benefits but would be virtually costless. Is that a correct summary of the ZurMuehlen study results? If so, how is a costless coalbed methane program possible?
 - c. Why are there apparently no alternative scenarios estimating the socioeconomic impacts under different assumptions for key variables (e.g., gas price and number of in-migrating people)?
4. There is no recent, comprehensive, site-specific economic analysis of projected CBM development in Montana's Powder River Basin for any of the EIS' five alternatives. 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:

- a. Capital and operating costs and profitability of currently operating wells and fields in all different parts of the Powder River Basin.
- b. Capital and operating costs and profitability of new wells and fields, including the costs of different water production and disposal options.
- c. 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?
- d. 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?

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.
5. There is no recent, comprehensive, site-specific cost/benefit analysis of projected CBM development in Montana's Powder River Basin for any of the EIS' five alternatives.
 6. The driving force behind this EIS seems to be a desire for a very quick analysis rather than the desire for a comprehensive and thoughtful analysis.
 7. The EIS specifically states that "the alternatives chosen will be economically and technically feasible. Those alternatives, or components of those alternatives, found not to be economically or technically feasible or viable will be dropped from or modified for consideration in the range of alternatives (p. 1-5, number 5). What if the EPA finds that there is no way that large-scale CBM production in the Powder River Basin can economically proceed and still comply with state and federal environmental laws? Does the statement above mean that, if complying with state and federal environmental laws is too costly, compliance would be discarded? And does that statement mean that "cost-effective" CBM production which may violate pollution standards would be allowed to proceed? How does the EIS determine whether or not an alternative is "economically and technically feasible?"

8. The EIS states that "[b]ond increases can't exceed the total of estimated costs of plugging and reclamation, the amount of uncollected royalties due and monies owed because of outstanding violations (p. 2-1). What financial safeguards are in place that protect Powder River Basin land users from potential large-scale or catastrophic changes in the region's water quality and quantity from CBM activity? What if large-scale development of CBM causes major changes in the area's water resources, and the dollar value of the water resource degradation exceeds the total value of allowable bond collection? In this scenario who pays for the long-term costs of potential water resource degradation? Do PRB residents have any water quality and quantity "insurance"?
9. Do the population estimates presented in Table 3-15 assume large-scale development or PRB CBM, or are they assumptions based on little or no additional CBM-based development?
10. Why are the most recent vacancy and housing estimates in the EIS based on 1990 data? This data is 12 years old and is completely out-of-date. Based on this data we do not really have any idea of current housing stocks, vacancy rates, and other crucial socioeconomic data. As acknowledged in the EIS document, there have been very significant changes in the region since 1990—many or most of them caused by current and prior CBM development. As far as we know from the EIS, there could be a large surplus (deficit) of housing with very low (very high) vacancy rates and large increases (large decreases) in housing values. Yet, the EIS talks about 1990 vacancy rates as if they are at all representative or relevant to the current EIS decisions.
11. Table 3-19 shows Montana employment trends by sector. For the EIS analysis the most important sector is the oil and gas sector. Yet, Table 3-19 does not even identify current or recent oil and gas employment in the state or the affected communities. Why not? Why isn't the most pertinent data used? How can one project the future impact of increased oil and gas employment activity if current or recent oil and gas activity is not even known?

I paid about \$45 to the U.S. Census Bureau and received a CD-ROM that contained statewide oil and gas employment from 1969 to 2000 for oil and gas extraction. Why doesn't the EIS have at least that amount of information? Below is a portion of the statewide employment information for Montana that I was able to find.

U.S. Bureau of Economic Analysis, SA25 Series, Montana, Employment in oil and gas extraction from 1969-2000 (by year)

Oil and gas extraction (year-employment), 1969-2676, 1970-2283, 1971-2164, 1972-2193, 1973-2270, 1974-2550, 1975-2482, 1976-2766, 1977-3249, 1978-3987, 1979-4019, 1980-5265, 1981-7615, 1982-6251, 1983-4632, 1984-5219, 1985-4264, 1986-2986, 1987-3338, 1988-3172, 1990-2951, 1991-2870, 1992-2866, 1993-2750, 1994-2957, 1995-2877, 1996-2637, 1997-2637, 1998-2801, 1999- 2597, 2000-2588.

Note that the highest oil and gas employment in Montana in the study period occurred in 1981, (7615 persons). The lowest employment occurred in 1971 (2164). The 1981 employment was more than 250 percent higher than the 1971 employment. And, the year 2000 employment of 2588 is only 424 employees higher than the all-time low that occurred in 1971. Oil and gas extraction employment levels have fluctuated by more than 250 percent in the last 30 years. An

unstable employment record is one of the primary attributes of a "boom and bust" economic sector.

12. What proportion of the gas and bonus revenues shown in Table 3-27 were derived from CBM development and what proportion came from conventional gas development?
13. Why does the Montana EIS assume that the average life of a PRB CBM well would be 20 years, but the WY EIS assumes that an analogous well in WY would only last 5-7 years (p. 4-8)? This assumption results in a very large positive boost to total revenues and profitability of Montana's potential CBM production.
14. Why does Montana assume that all dry holes would be drilled in the first 5 years (and, after 5 years there would be no more dry holes)? Does that mean that, after 5 years, all Montana oil and gas operators have perfect knowledge of the entire subsurface of Montana's Powder River Basin? This assumption has the effect of increasing the assumed duration and profitability of Montana's CBM resources (p. 4-8).
15. Why doesn't the economic analysis presented in Chapter 4 use more than one gas price? The value used in the Montana EIS is \$4.00 per thousand cubic feet (Mcf). This value is well above typical prices used by the EPA in many of their studies. Typical EPA assumptions for future gas prices are in the neighborhood of \$2.50 to \$3.00 per Mcf. Using only the \$4.00 gas price assumption the Montana EIS tends to show only a "best-case" scenario for PRB CBM revenues and profitability (p. 4-75).
16. Why doesn't the Montana EIS economic analysis examine the higher royalties that are typically paid to private landowners within the PRB region? Royalties as high as 20 percent are used in EPA economic analysis for private WY landowners.
17. The EIS asserts that "because changes in population discussed above would be moderate and dispersed throughout the CBM emphasis area, any resulting increases in demand on public services and utilities are anticipated to be within the capacity of the providers (p. 4-83)." But, the EIS does not use recent or site-specific data to adequately back-up that assertion. How can the EIS say that resulting increases in demand for services is within the capacity of the providers without defining (1) what the ultimate population would be, (2) where it would be located, and (3) what is the current and projected capacity of the services in these regions? There simply is not enough information to make such sweeping statements.
18. The EIS states that "vacancy rates for both temporary and permanent housing are adequate to high in the CBM emphasis area (p. 4-83)." As far as I can tell the housing vacancy data in this study is 12 years old (1990 data). The EIS gives absolutely no indication of what current or recent regional vacancy rates are. Therefore, the EIS cannot adequately support this statement with data.
19. The Minerals Appendix of the EIS shows Powder River RMP Area Production Trends in Figure MIN-1. The figure shows trends from 1986 to 2000. The continually declining trend of oil production in MIN-1 and declining oil and gas production trend seen in MIN-2 (Billings RMP Production Trends) could mislead a reader. Extending the study period back to the late 1970s would show that there was an enormous surge

in oil and gas production in the early 1980s. For example, Montana oil and gas employment in 1977 was 3249, but by 1981 it had more-than-doubled to 7615. Oil and gas production in Montana also surged by the early 1980s. Using a chart that only looks back to 1986 shows only the “downside” of the huge oil and gas production surge of the early 1980s. A reader could therefore believe that the oil and gas production levels of the mid-to-late 1980s were typical of the oil and gas sector throughout the late 20th century. In fact, the late-1980s time period could be considered to show abnormally high petroleum production rates—rates which have since declined to lower values.

20. The EIS purports to give a Reasonably Foreseeable Development estimate of several pertinent resources. For example, the document projects the reasonably foreseeable additional surface disturbance for new coal mines and proposed additional to existing coal mines in the Powder River Basin. Yet, despite the fact that these mines are very significant employers in the area, the EIS does not appear to address the additional population that may result from these new and expanding coal mines, or the additional capacity needed for social services such as water, sewer, roads, etc to serve this additional population and workforce. This same comment is applicable to the additional population, employment, and social service demands that would be generated by the Tongue River Railroad, and is especially true for unanalyzed Wyoming CBM population and workforce impacts.
21. Why does the Socioeconomics Appendix end so abruptly and without a conclusion? Was this portion of the EIS unfinished for a reason? The appendix talks about the importance of natural resource taxes as government revenue sources, but it does not begin to address any of the costs of CBM development.
22. Why doesn't the EIS investigate and investigate the costs of 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 water concerns related to CBM development.
23. The EIS speaks about the “relatively high unemployment rates (about 9 percent) in the mining sector in Big Horn and Rosebud Counties” that would be decreased if unemployed persons gain employment from new CBM development (p. 4-80). Yet this assertion presumes that “mining” jobs are equivalent to “oil and gas” jobs. According to the U.S. Bureau of Economic Analysis classification system, the Oil and Gas Sector is a subset of the Mining Sector—but all mining jobs and skills are not synonymous with all oil and gas jobs and skills. For example, the skill set of an employee that may have experience in operating a dragline at a coal mine is likely to be significantly different than one required for operating a drill rig, laying pipelines, or many other oil and gas jobs.
24. 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. Indeed, even with this information one may not be able to confidently predict whether or not a boom and bust might occur. A boom/bust cycle might be characterized by (1) an over-reliance of a local economy on one commodity, (2) 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.

25. 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 some WY counties that are now in the midst of the regional 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 the current CBM boom include:

Housing

- a. There is a lack of "affordable housing"—Gillette, WY is already the second most expensive county in Wyoming to live in
- b. Developers are afraid to build for fear of experiencing the "bust" experienced by apartment complex developers in the mid-1980s
- c. 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?
- d. 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.
- e. CBM brings increased opportunity to employ low-income residents in higher-paying jobs, but increased housing costs may limit these career growth opportunities

Infrastructure

- a. Roads—In Campbell County, WY about 250-300 miles out of 1000 miles of county roads have been impacted by CBM activity
 1. Dust problem
 - i. Particulate standards (PM-10) need to be addressed by WY or EPA may step in and hinder CBM development to comply with pollution issues
 - ii. 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
 2. Markedly increased wear from CBM-generated traffic
 - i. 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 entire industry's impact on roads
- b. Police/fire
 1. Increase in crime coincident with latest CBM boom—primarily attributed to alcohol and drug problems

- i. Major crime increases for larceny, destruction of private property, family violence, and child abuse
 - ii. There is an increased demand for fire and Emergency Medical services, but not up-front funding
- c. Social services
 - 1. Additional demand for dealing with large influx of unsuccessful job seekers
 - i. e.g., growth in food services supplied to low-income population

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. WY State 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

Labor force

- a. 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

Thank you for your consideration of these comments.

Sincerely,

W. Thomas Goerold