



January 13, 2012

Bureau of Land Management  
Attn. Rough Draw, WYW-168317  
1425 Fort Street  
Buffalo, WY 82834

Also sent via email to: [BLM\\_WY\\_Casper\\_WYMail@blm.gov](mailto:BLM_WY_Casper_WYMail@blm.gov)

Dear BLM:

The Powder River Basin Resource Council respectfully submits the following scoping comments on the proposed permitting and analysis of the Rough Draw project concerning microbial enhancement and bio-conversion of coal to methane gas.

We have reviewed the information regarding this project on the BLM website. In addition, we have reviewed extensive materials over the past two years regarding this experimental process that are in the possession of the BLM, the Wyoming Oil and Gas Commission, the Wyoming Department of Environmental Quality and in the public domain.

### **The Need for an EIS unless the project is significantly downscaled to a small pilot project**

The Rough Draw project is exactly the sort of project that NEPA and its implementing regulations contemplate warranting an Environmental Impact Statement (EIS). Several of the significance factors of the Council on Environmental Quality regulations implementing NEPA are implicated in this case. Importantly, the project's effects are highly controversial and highly uncertain. 40 C.F.R. § 1508.27(b)(4)-(5). BLM itself has stated that one of the main purposes for allowing the Rough Draw project to proceed is to gather information about the effects of the microbial enhancement and coal bio-conversion processes because as of now there are many unknowns in terms of the project's impacts to human health, the environment, and other interests, such as the Federal coal estate.

Moreover, the project "may establish a precedent for future actions with significant effects." 40 C.F.R. § 1508.27(b)(6). For the first time that we are aware of, BLM is using the Sec. 2920 process to permit a major mineral development project. As discussed below, these projects would normally fall under the Mineral Leasing Act and would require a different permitting system (either through an Application for Permit to Drill if an oil and gas project or a Federal coal lease and plan of operations if a coal project). BLM is now setting a precedent that the Sec. 2920 process is available for the permitting of microbial coal conversion projects (which is admittedly a use unintended when the Sec. 2920 regulations were established). BLM needs to fully examine the precedent setting nature of using the Sec. 2920 permit process for the Rough Draw project and if and how this

permitting method will be available for future microbial coal projects which may be larger or are likely to have more impacts. Under the NEPA regulations, these issues are best analyzed pursuant to an EIS.

Finally, if BLM truly wants to avoid the preparation of an EIS, it must clearly demonstrate that likely impacts from this project will be insignificant. As discussed below, BLM should consider permitting only a *small* pilot project of a handful of wells. Permitting a small project will allow the operator and BLM to ensure that impacts will be insignificant and closely monitored. It will also allow BLM to address the uncertainty and controversial nature of impacts associated with microbial coal projects.

### **BLM must adequately determine the purpose and need for this project**

Too often, BLM determines that its purpose and need for environmental analysis is to respond to an operator request for a permit. This is not a legally defensible purpose and need under NEPA as it unlawfully restricts the range of alternatives the agency can consider. In this case, BLM must determine the *public* purpose and need for this project. The public purpose and need should encompass protection of water resources and minimizing impacts to the Federal coal estate. Alternatives and mitigation measures should be considered that will meet those public purposes and needs.

Additionally, BLM should fully assess whether this project will meet a public purpose and need of producing more natural gas. As discussed below, based on a review of publicly available information on Luca's project and after talking to several scientists in the field, we believe it is less than likely that substantial (if any) additional gas reserves will be produced.

### **A Wider Range of Alternatives must be Analyzed and Considered**

Under NEPA, BLM has a duty to consider a range of reasonable alternatives. *See* 40 C.F.R. § 1502.14. Alternatives analysis is the "heart" of NEPA documents and is required for both EISs and EAs. In order to meet NEPA's requirements, BLM must consider a wide range of alternatives. Aside from helping BLM meet NEPA's legal requirements, in this case, considering a wide range of alternatives will also be beneficial for the agency because it will better allow BLM to compare and contrast the likely impacts of different size projects and projects with and without various mitigation measures. This alternatives comparison can be particularly beneficial for precedent setting projects where impacts must be strictly managed and monitored.

Aside from the legally required No Action alternative (which in this case is the shut in of CBM wells in the Rough Draw project area), BLM should analyze and consider a smaller scale project at this same location with a limited number of wells (for instance 20 or so), to document and demonstrate gas recovery and the impact or absence of water quality changes. To date, a carefully and well-designed pilot project has not been established or demonstrated and subjected to peer review analysis or design. Patriot has made claims regarding this process but those claims have not been independently reviewed or confirmed. In fact, the Tongue River project where Patriot claims the process was used has been abandoned and the CBM wells in that area are not producing gas and the large compressor stations in that area have been removed about 2 years ago.

Ciris Energy, which is another microbial coal company, has proposed a pilot project to the Wyoming DEQ consisting of two projects each with 13 wells. It therefore makes sense that Luca could propose a similar scaled pilot project for the Rough Draw project. However, regardless of what the operator has proposed, BLM has an independent duty to consider alternatives.

An alternative which carefully constructs and monitors a pilot project can also discern whether: 1) BLM's royalty calculations which assume 100% of the gas produced will be recovered is accurate; 2) whether all of the injectate will be biologically processed and no impacts on water quality will result are accurate; and 3) what the specific impacts to the coal BTU value actually are.

BLM also has a duty to consider "mitigation measures not already included in the proposed action or alternatives." 40 C.F.R. § 1502.14(f). In this case, BLM has a duty to fully consider a broad suite of mitigation measures designed to protect water resources, public health, surface uses, and the Federal coal estate. We remind BLM that requiring effective and enforceable mitigation measures will be necessary to justify the agency's FONSI. Please consider the following mitigation measures:

1. BLM should require a list of the chemicals/nutrients to be injected and should place a limit on the maximum injection rate for each constituent (lbs/well/year). If we do not know the concentration of the chemical to be injected we do not whether that chemical will indeed be harmless.
2. BLM should require the replacement of any domestic or livestock well that is adversely impacted by the project. BLM has this requirement for typical CBM development and should modify that requirement to address the unique impacts to water quality that could render domestic and livestock water wells and the aquifers used by this project useless. Patriot should be obligated to drill another well in a different aquifer and pay for any additional pumping costs.
3. BLM should require full bonding and financial assurance to cover the costs of surface reclamation, water restoration, and any impacts to water wells or ephemeral drainages (that may result from the discharge of produced water associated with these operations). BLM has significant discretion to require additional bonding and has demonstrated that authority by requiring a bond for potential impacts to the Federal coal estate. The bond should also protect the public against impacts to water or other resources.

### **BLM does not have regulatory authority to use the Sec. 2920 permit process for this purpose**

Aside from the NEPA process, there remains significant legal doubt about whether BLM can use the Sec. 2920 process to permit microbial well projects.

Sec. 2920 states that "Uses which may be authorized include residential, agricultural, industrial, and commercial, and uses that cannot be authorized under title V of the Federal Land Policy and Management Act or section 28 of the Mineral Leasing Act." However, in this case, microbial coal can be authorized under the Mineral Leasing Act because the project consists of development of Federal mineral resources (mainly the Federal coal estate). We believe permitting of this process like an in-situ coal gasification project makes the most sense, is less likely to lead to conflicts or inconsistencies with permitting of future coal-related projects, and provides the most clarity to the

regulated companies. Please explain why the Sec. 2920 permit process is appropriate in this case and how it may or may not be used for future microbial or in-situ coal gasification or mining projects. Even the operator has submitted a “plan of development” or POD which is most akin to FLPMA authorizations for oil and gas authorizations. It seems like the BLM is torturing the reading of the Sec. 2920 regulations in order to make it fit for this purpose when in reality it doesn’t.

Moreover, Sec. 2920 states that “Permits shall be used to authorize uses of public lands for not to exceed 3 years that involve either little or no land improvement, construction, or investment, or investment which can be amortized within the term of the permit.” Please explain how the permit will be limited to 3 years when the state DEQ UIC permit authorizes five years of injections into the coal seam. Also please explain how BLM made the determination that this project involves little or no land improvements, construction, or investments.

Additionally, as the Sec. 2920 process is most commonly used for permits for short-term uses of BLM surface lands, please explain how a Sec. 2920 permit applies in a split estate situation where the surface ownership is different from the Federal mineral estate. Is surface owner consent required? If not, is there discretion to require it? Since this is effectively development of the coal estate, we believe surface owner consent should be required.

### **Specific Comments & Questions that should be assessed in BLM’s NEPA document for this project**

1. The project description on page 1 states that minimal additional facilities will be needed. Please describe in detail what “minimal” additional facilities will be needed and the impacts of those facilities.
2. The document states that, “The coal seams which Patriot seeks permission to use through this application are not currently leased for coal development nor used for any other purpose.” While the coal seams may not yet be leased for coal development, this statement is not accurate since the coal seams consist of aquifers and are currently relied upon and used for water for domestic and livestock use. These are important purposes of the coal seams. Please clarify that the coal seams are encompassed in the Fort Union aquifer and these aquifers are important local water sources.
3. What is the proposed water management plan for this project? Will water be discharged to the surface? The scoping document makes contradictory statements saying all water will be injected and then says, “Patriot may need limited surface discharge to initiate this process.” The EA must analyze the water management and discharge of produced water given the already serious downstream impacts of CBM discharges in this area. Alternatively, please analyze the impacts related to any additional water storage or transportation systems, including tanks, ponds, reservoirs, pipelines, and any other associated facilities.
4. How will the EA and BLM account for the loss of baseline impacts to the aquifer and the coal because Luca injected chemicals/nutrients in 2009 to 2010. Therefore, a true baseline prior to any injections should be the focus on BLM’s impact analysis. Luca/Patriot submitted numerous documents to the WOGCC throughout this time frame that documents the injection of water and

chemicals for the biogenic process. The EA should describe what volumes of chemicals and water have been injected by Luca/Patriot in their self described previous “pilot” project.

5. The list of chemicals and accompanying material safety data sheets Patriot/Luca provided to the Wyoming DEQ for their UIC permit are attached on the enclosed CD. The list of chemicals and the MSDS sheets should be disclosed to the public and included in the EA and analyzed for impacts to water quality. The current list of “nutrients” in the proposed scoping materials is misleading and not accurate. Calcium chloride is not calcium, magnesium chloride is not magnesium, etc. To describe these chemicals that are being mixed and injected as akin to milk and other food products is inaccurate.

6. Exhibit 6 states, “TDS of injected fluids is slightly higher than TDS of the field waters used to carry the nutrients into the coal seam. The difference is, of course, the nutrients.” It goes on to claim these nutrients are consumed by the biogenic process and are therefore of no consequence to produced water quality. Table 3-1 in the POD lists the chemicals and nutrients to be injected. Notable among these are various compounds containing sodium and phosphate (contributing to TDS). The EA should assess water quality impacts in depth, as it seems unlikely that dissolved solids such as sodium could be consumed by microbial action. More likely, many of these dissolved solids – especially salts – would become waste products that would re-dissolve in the water. In fact, the Luca/Patriot report submitted to the WOGCC in March of 2010 noted an increase in TDS and sodium. The EA should disclose the results of that report and the EA should address the absence of any standards imposed by Wyoming DEQ for specific chemicals injected by the process (note that sodium is monitored but not regulated in the proposed UIC permit). BLM should consider including water quality standards for sodium as part of the mitigation for its permit.

7. There appears to be a discrepancy between water production and injection rates. On page 18 the POD states, “The maximum sustainable total water production rate for the Project Area is expected to be 1575 gallons per minute.” Assuming that half of the 283 wells operated by Patriot are injection wells and half are producing wells, the average production rate per well would be 11.1 gpm (5.6 gpm per well if all wells were producing). By contrast, page 22 references a request to Wyoming DEQ for maximum injection rates of 2,000 bpd for each interior well and 400 bpd for each perimeter well over the life of the permit. This corresponds to 58.3 gpm per interior well – roughly five times the acknowledged maximum production rate (perimeter well injection rates are more consistent with production rates). If injection rates exceed production rates by a factor of five, where will the excess water (and chemicals) go? Where will the water come from? Or if Patriot injects through only 10% of the wells at one time (in order to balance the water), how will these high injection rates be achieved without pressurizing the water and potentially compromising formation integrity?

8. The POD states, “While a significant portion of the new enhanced-recovery gas will be recovered within the down dip area, in general the movement of new gas is expected to have a west-to-east (down dip to up dip) vector.” The EA should assess the risks of gas migration to the coal seam outcrop, surface mine face, or unplugged wells outside the area of interest. Since methane has a greenhouse gas potential 21 times greater than carbon dioxide, unintended methane releases from the coal seam should be considered as a potential environmental consequence of the proposed action. Obviously, the inability to confine gas migration could also hinder gas recovery and project economics.

9. According to the POD, the Wyoming Oil and Gas Conservation Commission (WOGCC) requires a demonstration that the value of additional energy produced from this process exceeds the cost of development. The EA should analyze the economics and require public disclosure of these amounts, as it is probable that Luca Technologies would utilize a favorable BLM decision to obtain public and/or private financing. The POD states that “operating profit margins will be thin,” an admission of elevated risk and an implication of a high burden of proof.

10. The POD states, “Patriot is faced with potential liability from these mineral owners for failure to develop the leases if Patriot does not move forward with all diligence.” In reality, diligent pursuit of the project entails permitting and feasibility studies, but not actual development if such development poses unacceptable environmental or economic consequences. The EA should not be influenced by an implied legal urgency.

11. To expand on the previous comment, the POD further states that if the gas resources are not developed, “Patriot and the BLM face the threat of litigation and liability.” To suggest that BLM could be sued if it doesn’t approve the proposed action is disingenuous. This scenario would presume the outcome in advance, and render the NEPA process irrelevant. Moreover, there can be no legal obligation to apply an experimental technology that may or may not work. Commercial viability has never been demonstrated. It is no more ludicrous to claim that BLM could be sued if it approved the action and Luca lost money. Presumably, Patriot has the option to return the development rights to the mineral rights holders, who would then be free to pursue other avenues of commercial development. Again, the EA should dispel this fallacy.

12. To minimize any potential impact from the process on in-situ coal quality, the POD states, “Trillions of cubic feet of gas have been produced from the methanogenesis process and the coal remaining in the basin still has a high BTU value.” This is misleading, as subbituminous (including PRB) coals have a low BTU value compared to bituminous and other higher-rank coals. Exhibit 6 attempts to solidify Patriot’s case by observing that calorific values of CBM-productive coals are higher than nonproductive coals in the region. This may be true, but the explanations offered in Exhibit 6 are not: “either microbes don’t want to live in lower quality coals, or else the biogenic process consumes lower quality parts of the coal.” The first explanation is counterintuitive, since lower-rank coals contain more hydrogen than higher-rank coals and are therefore more amenable to methanogenesis. It is well known that the coalification process gradually raises the BTU value of coal over millions of years – the same time frame over which methanogenesis occurs. Under heat and pressure, the coal seam is subjected to bituminization, a series of chemical reactions that drive off water, oxygen and hydrogen while raising the percentage of carbon. The degree to which this bituminization has progressed determines the coal rank and calorific value. Subbituminous coal seams that have undergone greater coalification would probably have undergone more biogenic activity as well. This may explain the connection between higher BTU and higher gas producing potential. Addressing the second possible explanation, it can be shown that unlike bituminization, the biogenic production of CO<sub>2</sub> and CH<sub>4</sub> consumes carbon, oxygen, and hydrogen in the coal at ratios that extract proportionately more energy than mass from the coal. It is no accident that the produced gas has over twice the BTU density per pound as the parent coal. There is simply no denying that methanogenesis reduces the BTU content of coal, **a fact that should be clarified and quantified in the EA.**

13. Related to the above comment, the POD and supporting documents utilize BTU per unit mass as the measure of energy contained in a coal seam before and after methanogenesis. A more appropriate measure is BTU per unit volume. Assuming the biogenic production and removal of gas from the seam does not lead to structural changes (i.e. subsidence), the moisture-free density of the coal (lb/ft<sup>3</sup>) will go down. Therefore, even if the moisture-free BTU/lb remains unchanged, the BTU/ft<sup>3</sup> will be reduced and the calorific content of the entire seam will therefore be diminished. Although reductions in volumetric heat density are likely to be less than ½%, recognizing this measure would make it easier for the EA to address issues of reserve loss, relative royalty payments, etc.

14. Another discrepancy appears in the calculation of comparative royalties from coal vs. coal gas. The POD states, “Mr. Fred Crockett and Mr. Steven Wright of the BLM determined that the federal government would recover nearly triple the royalties under a gas lease that it would under a coal royalty.” This statement is correct insofar as the same royalty rate is used for both minerals. It is no coincidence since, CBM gas obtains at least triple the price of coal per million btu. The discrepancy arises in the use of different royalty rates. While the POD acknowledges that the calculation by Crockett and Wright is based on federal coal estate royalties under a coal lease (12.5%), it goes on to claim, “Under a ‘best case scenario’ the coal estate would be entitled to \$0.08/mcf” (for bonding purposes, Patriot proposes to further reduce this to \$0.06/mcf to account for already existing gas). The \$0.08/mcf is based on a different royalty rate (about 4%) than that used by Crockett and Wright. The POD claims that “if there were ever a determination that this process is akin to coal gasification ... royalties would be paid under the coal gasification regulations and BLM guidance documents.” The POD is inconsistent in first citing the BLM calculation of triple the royalties (presumably to make the project more attractive), but then using a much lower (and hypothetical) royalty rate to calculate Patriot’s bonding obligations. In fact, using Patriot’s hypothetical \$0.08/mcf, the royalties for produced gas would be 7% less than the royalties for the coal consumed to produce that gas, and the government and public would be shortchanged.

15. Exhibit 6 states that the native biogenesis process “has slowed or halted, and now needs a nudge to get going again.” Yet, the POD also states this “process has naturally occurred in the coal for millions of years.” If it takes that long, on what basis do they claim it has slowed or stopped? Surely a change in the rate of methanogenesis would be undetectable within our lifetime. The POD states, “Patriot’s only activity that will occur under this project is to place benign nutrients into the coal seams to reactivate this methanogenic process.” Such a statement implies, without logic, that Patriot’s brand of methane farming will only restore a failed natural process.

Thank you again for the opportunity to supply scoping comments on the proposed Rough Draw project. We request that BLM address our comments and concerns regarding this unique and experimental technology and that BLM keep us informed on the environmental review process.

Sincerely,

Handwritten signatures of Shannon Anderson and Jill Morrison. Shannon Anderson's signature is on the left, and Jill Morrison's signature is on the right.

Shannon Anderson

Jill Morrison

Powder River Basin Resource Council

Enc - CD Attachment of MSDS documents sent with regular mail