RESPONSE TO REVIEWER COMMENTS ON THE PROPOSAL ENTITLED:

"Geomechanical Study of Harmon Lignite and Surrounding Rocks for Underground Coal Gasification in Western North Dakota"

OBJECTIVES

Reviewer 12-07

The goals should have addressed the commercial aspects of UCG more. As written, I'm not sure whether this is just a research project or a research project slanted toward commercialization. Given the goals of the Commission and the industry participation, it should be the latter. See my general comments below and in the proposal. For example, the proposal should have included some preliminary calculations regarding the area needed for a small commercial operation and related that to size of the "model UCG site" in the proposal. The proposal wording and scope should be changed to a "potential model UCG resource" rather than a site. I inferred from the proposal that the model site might be perhaps a quarter of a section which is of no commercial development value.

Response to reviewer's comments:

The goal of this research project is aimed at providing information that can be used to determine the feasibility of underground gasification of deep North Dakota lignite seams. The first is to identify barrier issues such as ground water flow patterns, roof stability, and gasification conversion efficiency. Once determine the research information incorporated into a "model site" for use to evaluate the commercial potential of UCG for North Dakota lignite.

ACHIEVABILITY

Reviewer 12-07 (Rating: 3)

My main questions in this regard are-- (1) if the drilling schedule slips due to climate, previous driller commitments or lack of drilling personnel (which often happens), what impact this would have on the project schedule and (2) what are the impacts and contingency plan if the equipment modifications to the core tester fail to materialize.

Response to Reviewer comments:

The possibility of inclement weather and other issues are always a risk to be considered and managed. The Interstate Drilling Services has provided a price quotation to spend a sufficient time on site to complete the drilling and obtaining the core samples. The Interstate Drilling Company is a reputable firm that has provided drilling services for organizations interested in mineral resources, coal mines, and geothermal applications in North Dakota, South Dakota, and Wyoming.

CONTRIBUTION

Reviewer 12-07 (Rating: 2)

The contribution, as the study is proposed now, would be small. If the suggestions proposed below are incorporated, the study would become very significant since, it would provide an initial evaluation of a commercially sized resource. If the 'model UCG resource' evaluation is favorable, it should give industry the incentive to take it one step further and further evaluate the prospect on its own. This would also encourage the state regulatory agencies to implement a policy for permitting UCG. I expect this policy would be very similar to that of Wyoming.

Response to reviewer's comments:

The information derived from this project will provide a "model UCG site" that is equivalent to the reviewers suggested "model UCG Resource".

PROJECT MANAGEMENT

Reviewer 12-07 (Rating: 2)

A simple critical path analysis should be presented to insure that the project activities and schedule has been thought through. There is no indication regarding the disposition of the wells and the budget implications. Will the wells be plugged and abandoned or left open for later hydrological testing or logging. I assume the cost of completing the wells as per state regulations has been included.

Response to reviewer's comments:

The well will be completed within the costs of the project in accordance to state regulations.

EQUIPMENT PURCHASE

Reviewer 12-07 (Rating: 3)

The 'word of mouth' pricing of the triaxial load cell is unacceptable however.

Response to reviewer's comments:

A formal quotation for the equipment has been requested and is consistent with the "word of mouth" pricing.

OVERALL COMMENTS AND RECOMMENDATION: (Responses are provided after the bullets)

- One of the project goals "to develop a procedure to characterize the potential UCG sites" has been described numerous times before – starting around 1975. This procedure does not vary by state or country. If new software to interpret site data is available, that would be useful to know.

  Response to Reviewer's Comment: we will provide an update on the software available to interpret site information.

- The project, as written, would have low commercial impact but could be changed fairly easily to make it much more commercially oriented (see comments above and below).

  Response to Reviewer's comment: The project is aimed at identifying barrier issues to UCG of ND lignite. This is a precursor activity to determine the commercialization potential.

- The "potential model site" should be expanded to a "potential model resource" – at least large enough to support a small commercial process, A minimum would be 1 square mile.

  Response to Reviewer's Comment: An option for expanding the "model site" is included in the proposal. This could be used to extrapolate to a model that defines the potential of a seam of lignite to produce a syngas or fuel gas will that can be used as a feed stock to produce fuels, chemicals, or power.

- The literature background search should include searching for the results of previous seismic surveys, some of which can be purchased.

  Response to Reviewer's Comment: The literature review will include seimic surveys.

- The well program must be expanded to include well logging and hydrogeologic data acquisition (drill stem testing etc. This will add cost, some of which can be taken from the activities to develop a characterization plan. Steve Korom should be of great value in designing a good well testing procedure. If more money is needed, it might be taken from the thermal core testing studies.

  Response to Reviewer's Comment: Scott Korom will be involved in the well logging and hydrogeological data acquisition. Decreasing the thermal core testing would be a major mistake since this is the key in determining the gasification potential of the lignite. Without this testing future projections of gas yield could not be conducted.

- Better definition of the project tasks is needed, for example, well disposition after the cores are taken.

  Response to Reviewer's Comment: The wells will be completed in accordance to North Dakota State regulations.

- A very short review of the permitting situation in North Dakota is in order –I understand there is no UCG permitting procedure in North Dakota but I assume it could adopt the Wyoming procedure?

  Response to Reviewer's Comment: This aspect will be discussed with North State Health department.

- A short review of the groundwater usage situation on the resources in consideration is also in order. This review will not take much time given the state databases which are available

  Response to Reviewer's Comment: The groundwater usage situation will be evaluated.

- The proposal does not seem to be very well thought through, for example; the well drilling/testing/disposition aspects and the lack of critical path analysis.

  Response to Reviewer's Comment: The critical path components are illustrated in Figure 1 and are described in the proposal. More detail can be added to enhance the drilling and completion components. Details of the geophysical as well as gasification potential of the coals are included.

- Note that a 'model' ucg site won't help much if it does not have commercialization potential i.e. resource, surface restrictions, groundwater usage etc.

  Response to Reviewer's Comment: The project is aimed as provided information on the technical feasibility of UCG for ND lignite. Once technical feasibility has been determined an economic feasibility analysis can be performed. This information can be used to evaluate the commercialization potential.

- The drilling costs seem to be based on VERY optimistic estimates. My drilling costs in Wyoming are much greater. I assume the drilling rate of penetration is based on experience and is realistic.

  Response to Reviewer's Comment: The Interstate Drilling Company is a reputable firm that has provided drilling services for organizations interested in mineral resources, coal mines, and geothermal applications in North Dakota, South Dakota, and Wyoming.