

**CENTRAL REGION INTEGRATED SCIENCE PARTNERSHIP FUNDS
Project Proposal Template**

Project Title: Interdisciplinary Investigation of a CBM Infiltration Impoundment
Project Coordinator: Myron Brooks
Partners/Collaborators and Affiliations: U.S. Bureau of Land Management
Total Funding Requested: \$50,000
Proposal Submission Date: 10 February 2003

Problem: Development of coalbed methane (CBM) in the Powder River Basin (PRB) has progressed at a near-exponential rate over the last decade. A recent (January 2003) Environmental Impact Statement (EIS) prepared by the Wyoming office of the Bureau of Land Management (BLM) addresses the possible completion of nearly 50,000 wells in the Wyoming portion of the PRB by 2010. Associated with this development are several environmental issues that, due to the rapid pace of development, have not been adequately addressed. These issues include the potential for contamination of ground and surface waters, changes in habitat, erosion, introduction of invasive species, and depletion of ground-water resources. In Wyoming most of the produced water that is a by-product of CBM production is currently disposed at the surface, primarily into ephemeral and permanent streams. The preferred alternative for future production in the 2003 BLM EIS for Wyoming will most likely result in a shift in disposal practices. The majority of CBM-produced water would be disposed via "infiltration impoundments." This disposal method is also described in the final version of the EIS prepared by the BLM for the Montana portion of the PRB. These impoundments are small ponds where CBM-produced water is collected and then infiltrated into the subsurface. The BLM has established limited monitoring of the effects of water disposal at several existing infiltration impoundments. They are interested in having USGS expertise applied to the basic scientific questions surrounding the environmental impacts of these ponds. Examples of those questions are: where does the water go after it infiltrates? how does its chemistry change as it moves through the subsurface? and how does it impact existing, or support new, wetland plant communities in the watershed?

Objectives and Scope: The main goal for this project is to examine some of the environmental consequences of disposal of CBM-produced water via infiltration impoundments. This will be achieved with an interdisciplinary effort at a common field site. Using water as the unifying factor, the ultimate objectives are to describe the flow path and chemical evolution of water from an infiltration impoundment, and describe how that water impacts and influences local ground and surface water quality, and to relate changes in hydrology to the functioning of nearby existing and newly created wetland plant communities. These objectives are beyond the reach of the initial effort that can be supported with available CRISP funds and accomplished in the time remaining this fiscal year. However, instrumentation can be installed, and samples and data can be collected. Additional support and time will be needed to fully meet the larger objectives envisioned for this project. Because of the BLM's expressed interest in this work it is possible that BLM funding or in-kind services would be available to augment this fiscal year's efforts. An additional goal is to establish and promote the study site in a way that demonstrates USGS interdisciplinary capabilities to the BLM and other potential funding partners, hopefully providing a bridge to additional funding for work in subsequent fiscal years. This project effort will rely on the Geography Discipline's Powder River Information Science Access Site (PRISAS) to promote those capabilities. The geographic area will be a small watershed in NE Wyoming containing one or more infiltration impoundments. Additional field sites within or outside of Wyoming will be considered if additional support can be obtained beyond FY '03. The initial field site will be chosen in consultation with BLM scientists located in the Casper and Buffalo field offices.

Approach: A field trip will be organized with BLM scientists to facilitate site selection. After a site is selected, water scientists will install and operate hydrologic instrumentation such as shallow monitoring wells, lysimeters, multi-level water samplers and streamflow stations. Knowing where the water goes is a key first step in answering other important questions concerning chemical evolution of the water and its interaction with wetland ecosystems. Geology and Water scientists will sample and analyze soil and water samples to better understand evolution of water chemistry along an identified flow path. Geology scientists will use knowledge of subsurface geology, surface geomorphology, bedrock and soils mineralogy and petrology, and chemistry to help explain subsurface water transport. Biology scientists will map existing wetland plant communities and integrate knowledge about water flow and chemistry into their understanding of the wetlands. Through PRISAS, Geography scientist will provide a geographic information and decision support system to facilitate and promote project results.

Benefits: The main benefit of this work will be in setting the stage to provide answers to BLM regarding the fate of CBM-produced waters after they are disposed into infiltration impoundments. This information is also of interest to current state cooperators like the Wyoming Department of Environmental Quality and to CBM producers. Because much of the CBM development in the PRB is occurring on and near public lands, environmentally sound CBM production is of benefit to all U.S. citizens. This work will provide information that is directly relevant to the development of environmentally sound water disposal practices. The Director's goals for integrated science will be advanced as the work at the site will provide opportunities for scientists from each discipline to work at a common site on scientific problems related to CBM water disposal practices that is of significant interest to another DOI agency.

Outcome/Products: The primary outcome/product will be the establishment of a hydrologically-instrumented infiltration impoundment where scientists from all four disciplines can share resources and work on a common problem. Establishment of the site will provide a starting point that can be used to demonstrate USGS interdisciplinary capabilities to potential funding partners such as USGS program managers, BLM and the Wyoming DEQ. Time and funding constraints don't allow for production of technical reports, however a brief progress report (written or presentation to CELT) would be provided shortly after the end of FY '03.

Budget: Dollar amounts in thousands, all figures are gross (includes all assessments)

CRISP FUNDS					
	BIOLOGY	GEOLOGY	GEOGRAPHY	WATER	
CATEGORY					TOTAL
Salary	5.0	2.3	2.0	5.0	14.3
Travel	3.0	3.1	3.0	4.0	13.1
Equipment/ Supplies		0.6	2.0	10.0	12.6
Services (Drilling)				10.0	10.0
TOTAL	8.0	6.0	7.0	29.0	50.0

It is understood that all disciplines will expend existing program funds in order to adequately participate in the project. Discipline-specific "in-kind" contributions are listed in the table below.

IN-KIND CONTRIBUTIONS					
	BIOLOGY	GEOLOGY	GEOGRAPHY	WATER	
CATEGORY					TOTAL
Salary	10.0	11.5	10.0	28.5	60.0
Travel					
Equipment/ Supplies			3.0		3.0
Services (Lab)		7.0		4.0	11.0
Services (Drilling)				8.0	8.0
TOTAL	10.0	18.5	13.0	40.5	82.0

Timeline:

February-March
 April
 May-June
 July-September
 October

Site Selection, Identify participating scientists
 Scientist conference call meeting(s)
 Installation of instrumentation, begin field data collection
 Ongoing data collection, meetings/field site visits with potential funding partners,
 Progress report/presentation to CELT

