

Final Report

Coalbed Methane Working Group

INTRODUCTION AND BACKGROUND

Water Quality Rules and Regulations Chapter 1, Section 20, Agricultural Water Supply, states that All Wyoming surface waters which have the natural water quality potential for use as an agricultural water supply shall be maintained at a quality which allows continued use of such waters for agricultural purposes. Degradation of such waters shall not be of such an extent to cause a measurable decrease in crop or livestock production. Unless otherwise demonstrated, all Wyoming surface waters have the natural water quality potential for use as an agricultural water supply.

The current approach to meeting the requirements of Chapter 1, section 20 describes that effluent limitations at the point of discharge will be established by one of three methods: a default number that is deemed protective of the most sensitive crop; or a number that is based on actual soil samples taken at the location of crop irrigation; or a number to be derived by an agreement between the discharger and the surface owners using the water.

Several scientific and technical reports on coalbed methane produced water have been generated, some of which were used as the basis for current DWQ rule-making. However, a 2010 report by soil scientists is critical of the first two methods, and has raised serious questions about this permitting approach. They state: “We present scientific evidence that no unique relationship exists between irrigation water quality on the one hand and root zone salinity and crop productivity on the other. Therefore, we conclude that the Tier 2 and Tier 1 methodology as set forth in Appendix H section C (vi) (B) is not reasonable nor scientifically valid for determining the Ec of water that can be discharged into an ephemeral drainage in Wyoming so that degradation of the receiving water will not be of such extent to cause a measurable decrease in crop production”.

They state further that the use of the current approach has caused a rise in ground water tables that has resulted in “water logging, and most likely increased soil salinity. The damage done by Tier 1 and Tier 2 starts by creating water logging conditions in the drainages; the true problem is the quantity of coalbed methane (CBM) waters rather than its quality”.

The Wyoming Pollution Discharge Elimination System (WyPDES) permitting system may be insufficient to ensure that the Chapter 1, section 20 water quality standard is met in ephemeral and intermittent drainages where coalbed methane produced water discharges are occurring. WyPDES is the primary regulatory tool used to regulate the quality of this water at the point of

discharge. However, the protection of crop production involves many other variables such as soil chemistry, water volumes, management practices, etc. It has been suggested by soil scientists that a simplified “end-of pipe” limit for the two key quality parameters, sodium adsorption ratio (SAR) and electrical conductivity (Ec), cannot be assumed to be effective unless these other factors are considered.

Thus, the Wyoming Department of Environmental Quality (WDEQ) has withdrawn the proposed rule making that would codify its Agricultural Use Protection Policy and will undertake an examination of the issues in order to develop a revised policy approach. As a part of the DEQ’s examination process, its director, John V. Corra along with facilitator Dr. Steve Smutko of the Ruckelshaus Institute at the University of Wyoming, formed a stakeholder group to assist with the development of a CBM permitting strategy.

Coalbed Methane Produced Waters Working Group Members

In late 2009, in an effort to identify issues and stakeholder interests in the Powder River Basin (PRB), the WDEQ assembled the Coalbed Methane Working Group (hereafter referred to as the CBMWG or “Working Group”). The CBMWG consists of stakeholders who represent various interests and uses of the waters and related natural resources of the Powder River Basin. Included on the Working Group are landowners, producers, representatives from state and federal agencies, and a limited number of other interested individuals.

A formal charter that was drafted and accepted by Working Group members governed the CBMWG (see appendix A). The charter specified the purpose and the scope of the CBMWG, responsibilities of members and facilitators, decision processes, and how the Working Group would interact with the public and the media.

Purpose

The purpose of the Coalbed Methane Produced Water Working Group is to assist in the development of a CBM permitting strategy in a way that recognizes the serious and substantial interests of landowners, industry and the state of Wyoming so that the Chapter 1, Section 20 standard is met. This will be done through robust and honest discussions focused on the issues and challenges associated with the management of produced water from coalbed methane operations in the Powder River Basin. WDEQ is committed to reaching a lasting agreement resolving the major issues related to CBM permitting that is acceptable to as many Working Group members as possible. In order for this process to work effectively, all Working Group members must be willing to engage in interest-based discussions.

There are three major goals of the Working Group process: 1) to provide Working Group members with a process of discovery, information sharing and education; 2) to provide Working Group members with a direct role in shaping agreements that resolve the issues and balance the interests relative to coalbed methane produced water according to the decision process described in Section 10 of this charter, and 3) to take measures to inform the public about the topics being addressed in the process.

Scope

This effort will be limited to developing a strategy for permitting CBM produced water discharges in the Powder River Basin of northeastern Wyoming.

Stakeholder Groups and Participants

The Working Group consisted of a broad range of stakeholders who represent various interests and uses of the waters and related natural resources of the Powder River Basin. Each team member had the option to select an alternate of his/her choosing to substitute for the member if necessary. Alternates were encouraged to attend CBMWG meetings along with the Working Group member, and were to be fully briefed before attending any meetings as the sole representative. For organizational purposes each team member and alternate have been assigned to a primary interest category described below. The participant roster is contained in Appendix B.

Landowner Interests

This category included individual property owners with land affected by or potentially affected by coalbed methane development. The property owners were from various parts of the PRB and included one member from the Bighorn Basin. The landowners represented were made up of property owners who owned both surface and mineral rights and those with just surface rights. A representative of the Mountain West Farm Bureau Company, represented ranching and agricultural interests generally. Interests of this group were varied, but primarily focused on the effects that coalbed methane produced waters had on their lands and how the WDEQ permitting process for CBM produced waters affected their lands.

Conservation Interests

The interests of Working Group members of this category were centered on resource protection, enhancement, and mitigation throughout the PRB. CBMWG representative

organizations in this category were The Powder River Basin Resource Council (PRBRC) and the Wyoming Outdoor Council (WOC). Some landowners present on the Working Group were also members of the PRBRC.

State Agencies

Several state agencies jointly regulate various aspects of the coalbed methane industry in Wyoming. Therefore, several agencies were represented on the CBMWG; including the Wyoming Oil and Gas Conservation Commission (WOGCC), the Wyoming Bureau of Land Management (BLM), the Wyoming Department of Environmental Quality, and the Wyoming State Engineer’s Office (SEO).

Industry Concerns

Industry concerns were represented by various companies involved in CBM production and an industry organization. Devon Energy Corporation, Marathon Oil Company, Williams Production Company, and the Petroleum Association of Wyoming were all represented on the CBMWG.

General Local Government

A constituency from the Bighorn Basin of Wyoming was present at the CBMWG meetings. They specifically were there to make sure that any potential new regulations that would come out of the Working Group recommendation’s applied solely to the Powder River Basin and not anywhere else in the state. For that reason the Working Group had a landowner from the Bighorn Basin, as was already mentioned, and a Washakie County Commissioner present for all meetings.

Table 1. Coalbed Methane Working Group Members, Alternates, and Organizations by Primary Interest Category

Primary Interest Category	Organization	Team Member	Alternate
Landowner Interests	Adami Ranch	Steve Adami	
	Barlow Ranch	Eric Barlow	
	Brug Land and Livestock	Robert Brug	Michelle Cook
	Harriet Land and Livestock	Tom Harriet	
	Prospect Land and Cattle	Jim Hillberry	Dee Hillberry
	Swartz Ranch	Ed Swartz	
	West Ranch	Bill West	Marge West

Conservation	WY Outdoor Council	Steve Jones	
	PRBRC	Bob LeResche	Bill Benzel
	PRBRC	Jill Morrison	
	PRBRC	Ashley Roberts	
State Agencies	WY O&GCC	Craig Eggerman	
	BLM	Bill Hill	
	State Engineer's Office	Harry LaBonde	
	Director DEQ	John Corra	
	DEQ WQD	Bill DiRienzo	
	DEQ WQD	Jason Thomas	
	Administrator DEQ WQD	John Wagner	
Industry	Devon Energy Corporation	Rebecca Byram	Tim Kalus
	Anadarko Petroleum	David Gomendi	
	Marathon Oil Company	David Hill	
	Williams Production Company	Joe Olson	Eric Sandberg
	Petroleum Assoc. of Wyoming	John Robataille	
Local Government	Washakie County Commissioners	Terry Wolf	

Facilitators

The CBMWG was convened in December of 2009. At that time Steve Smutko, faculty of the Ruckelshaus Institute, along with Institute staff, assumed responsibility of providing facilitation services to the CBMWG, under contract to the Wyoming DEQ. The primary task of the facilitators was to guide the meetings to stay within the bounds set by the Working Group's charter. The responsibilities included managing the Working Group's agenda, keeping written records of the meetings, helping the group stay on task and on process, protecting team members and their ideas from attack, and helping members reach consensus. The facilitators did not express their views on any substantive issues and were solely concerned with the process of the group.

Technical Advisory Team

During the May Working Group meeting the group agreed to establish a Technical Advisory Team (TAT). The TAT was lead by Dr. Jerry Schuman, former director of the USDA-ARS High Plains Grasslands Research Station, Dr. George Vance of the University of Wyoming, and Dr. Bill Schafer of Montana. Jason Thomas of the Wyoming DEQ water quality division served the group as a regulatory resource to advise the TAT to the administration and implementation of the Working Group's recommendation(s).

The TAT served at the request of the DEQ and the Wyoming DEQ will pay for their time and expenses. The TAT was asked to provide its comments to the Working Group's recommendation(s), as well as provide insights on the overall issues. The Working Group had an opportunity to comment of the TAT's final work product.

Chronology

The CBMWG was convened by John Corra, the director of the Wyoming Department of Environmental quality, during November of 2009. The Working Group held its initial meeting December 2, 2009 and met on six occasions with its final meeting May 13, 2010. The TAT met 4 times. All of the meetings were facilitated by Steve Smutko of the Ruckelshaus Institute and his staff. The chronology of the Working Group meetings is given in detail below.

December 2, 2009

The first meeting was spent giving an overview of the CBM produced water regulatory issue. The WOGCC, BLM, WYDEQ, SEO, and EPA all gave presentations. Steve Smutko presented an overview of the collaborative process to the Working Group members. The Working Group also reviewed their draft charter.

January 7, 2010

During this meeting the Working Group reviewed and discussed their charter. They then identified Working Group member's interests, in regards to the CBM produced water issue. The Working Group also identified a set of goals that they wished to see met as a result of Working Group meetings.

February 1, 2010

During the February meeting the Working Group adopted a single set of goals from the previous meeting's discussion and identification of goals. The Working Group discussed and

then adopted a list of issues they felt were pertinent to the CBM produced water issue. The Working Group also identified a list of options that could potentially help to solve the issues that the Working Group previously identified.

March 4, 2010

The focus of this meeting centered on the discussion of issue measures. The Working Group also reviewed and discussed its list of options, attempting to pare it down into a list of the most feasible options.

April 1, 2010

Review and discussion continue around issue measures this meeting. The Working Group also reviewed and discussed options. They ended by discussing the next steps needed for preparing the Working Group's recommendation to the WYDEQ.

May 13, 2010

This was the Working Group's final scheduled meeting. They continued to review and discuss options for the CBM permitting strategy for much of the day. They also discussed the Technical Advisory Team (TAT) and how it should be convened. The meeting wrapped up with discussion surrounding the next step for the Working Group; the creation of a writing team that would condense what the Working Group wanted the TAT to consider in its meetings.

Stakeholder Goals, Interests, Issues and Options

When the Working Group was convened, they were asked to create four lists: 1) Goals or outcomes of the process, 2) Issues to be deliberated and resolved, 3) Stakeholder interests, 4) Options or alternative that meet the goals, address the issues, and satisfy stakeholder interests.

Goals

The Working Group created two goals they had for the process:

- Responsibly develop CBM and manage associated water discharges in ways that honor property rights and legal obligations, protects agricultural uses, CBM gas production, water conservation, and ecosystems.
- Develop a system for permitting CBM produced water discharges that meets the requirements of state and federal law and is predictable, flexible, efficient, and effective in achieving water quality standards and meeting stakeholder interests.

Issues

Next, the Working Group members compiled a list of specific issues that were important to them, along with measures to guide potential resolution.

Issues	Measures
Avoid damage to soils from salt loading to rangeland, irrigated areas, and native vegetation throughout the PRB watershed caused by CBM discharge water quality	Soil salinity and sodicity
Avoid damage from excess flooding and stream “perennialization”	Acres where there has been a measurable decrease in ag production
Conserve groundwater	Amount of groundwater that is not being put to beneficial use
Protect economic interests of all stakeholders	Loss of income for all stakeholders
Maintain flexibility for landowners and operators	Choice of methods and approaches to meet permit requirements
Account for the variability in individual drainages in the PRB	Historic uses of lands, geologic and soil conditions in each watershed

Interests

This category consists of the varied interests of the stakeholders that make up the Working Group.

- Protection of water rights and property rights
- Ability to use produced water
- Enhancement of beneficial use of water
- Economic profitability of gas production
- Economic profitability of agricultural production
- Protection of land resources
- Protection of water resources
- Regulatory flexibility and predictability
- Regulatory consistency
- Regulatory primacy

Options

The discussion of options was postponed until the Working Group members had an understanding of what was important, this was done to deter alternative-focused decision making.

Initial brainstorming sessions were held regarding the formulation of options. During these initial sessions 64 options were identified, naturally however, some options were better than others. Facilitators next narrowed the task to options that could feasibly be included in a permitting strategy (options that were within the authority of DEQ to include and enforce through a WYDES permit).

The facilitators allowed the Working Group to divide into coalition groups, which met separately to propose no more than five options that: met their own interests, had a high potential to meet others' interests, addressed at least one of the six issues, and could be included in a permitting strategy. Out of this effort, nine candidate options arose, all but one were deemed eligible for a permitting strategy (one was questionable given delegation of enforcement authority).

The options were evaluated on an individual basis based on three general criteria: how well the option satisfied each of the ten interests, how well the option addressed each of the six issues, and the potential for improvement. A Feasibility/Desirability matrix was used to evaluate the options.

The options presented a complex mix of ideas and strategies. In order to rank the options they were disaggregated to allow a full exploration of the individual ideas. Each member then ranked the options by allocating 100 points among 18 components.

Next, the facilitators assigned the Working Group members into four small, heterogeneous groups to reassemble the components into viable options. The general agreement among the four groups about which components should be included in (and conversely, which should be excluded from) a permitting strategy.

Draft Recommendations

A writing committee with representatives from each interest group met to blend the components into a set of recommendations for a permitting strategy. The committee drafted the following recommendations, which were eventually approved by the working group:

Introduction. The CBM Produced Water Working Group recommends that DEQ incorporate the following provisions into its WYPDES permit program for CBM produced water discharges in the Powder River Basin.

Permitting Basis

- A. Permits shall protect historically existing (pre-CBM) indigenous plant or crop communities. Such communities shall remain capable of survival and maintenance under the conditions of increased soil moisture, salinity, and alkalinity from CBM discharge.

- B. Permits shall be based on drainage-specific factors, such as soils, water quality, crop species, irrigation, channel capacity, multiple operators, flow conditions, topography and water table factors.
- C. Permits shall be based on vetted, credentialed science, be preventative not reactive and include meaningful and timely enforcement. Permits should prevent harm to lands and require the permittee to demonstrate compliance.
- D. If the quantity of the water is causing unacceptable water quality or has the potential to cause unacceptable water quality, then the EQA gives DEQ the authority to regulate water quantity. (AG Formal Opinion No. 2006-001)
- E. Within each drainage, where no economically feasible technical solutions exist to prevent salt loading and flooding problems, the permit shall require a water management or irrigation plan jointly developed by landowners and the permittee.

Definitions

- A. Define what constitutes a measurable decrease in crop or livestock production due to CBM discharged water. (This would involve development of the metrics and methodology for measuring whether or not such a decrease has occurred or would be likely to occur due to CBM discharged water.)

Monitoring

- A. Require baseline measurements of soil quality, plant communities, and shallow groundwater quality & depth before issuing a discharge permit. In the absence of baseline data on plants and soils due to CBM discharges, certification or documentation of baseline plant and soil inventories from landowners, aerial surveys, NRCS data, or other historical information should be used.
- B. Require monitoring of surface water quality & flow and shallow groundwater quality & depth to ensure compliance with Chapter 1 – Section 20.
- C. Require on-going monitoring of soils, crop yields, etc. at the point of use during the period of CBM discharge.

After the recommendations from the committee were compiled, a Technical Advisory Team (TAT) was appointed to review the recommendations and develop a monitoring program that could be integrated into a permitting policy.

Technical Advisory Team (TAT)

The TAT was appointed by the Wyoming Department of Environmental Quality (WDEQ). The TAT was comprised of soil scientists Gerald E. Schuman, George F. Vance and William Schafer to provide recommendations concerning agricultural uses of coal bed methane (CBM) produced waters on the lands that are protected by Wyoming water quality statutes. The WDEQ asked for specific guidance on the kinds of broad scientific monitoring programs that would provide data needed to identify potential impacts and prevent or reduce degradation of soils and crop/forage production. The intent of the TAT's report was to address possible water quality

and quantity issues relating to CBM produced water discharge that have the potential to degrade the natural resources (soil, water, and plant communities) of the State.

The specific tasks given to the TAT were to provide the Working Group with the following:

1. Advice and recommendations concerning the soils and irrigation aspects of WDEQ's permitting policies for CBM produced water in the Powder River Basin; and
2. Advice and recommendations on all other soils and/or irrigation technical issues referred to it by the Working Group.

Following the TAT's recommendations, the WDEQ developed a draft CBM permitting plan, which was reviewed by the Working Group. Following a comment period, the DEQ submitted their CBM permitting plan to the Wyoming Environmental Quality Council for approval. They were approved in May 2011.