

**2010 Annual Report
Powder River Basin Controlled Groundwater Area
Technical Advisory Committee**

Introduction

The Powder River Basin Controlled Groundwater Area (PRBCGA) was established to protect existing water users from impacts resulting from coal bed methane (CBM) development. The Montana Board of Oil and Gas Conservation (MBOGC) implements the PRBCGA through regulations that require characterization, monitoring, and evaluation of ground-water conditions, and mitigation of impacts to existing water users.

A technical advisory committee (TAC) was established to oversee the ground-water characterization, monitoring, and evaluation requirements of the PRBCGA. TAC consists of five members selected by the Montana Department of Natural Resources and Conservation (DNRC) for their expertise in hydrogeology, water quality, and CBM extraction systems and operations. Two additional ex-officio members represent the CBM industry, and water user and conservation interests. In addition to overseeing monitoring and reporting requirements for individual fields, TAC is assigned to review ground-water data and scientific evidence related to the PRBCGA and make recommendations to the MBOGC regarding mitigation of impacts.

The purpose of this report is to describe the activities of TAC during 2010 and the impacts of CBM development on ground-water resources through September 2009.

Summary of TAC Annual Meeting

TAC met at the Bureau of Land Management office in Billings on March 25, 2010. Attending the March meeting were TAC members, John Wheaton, Kyle Blasch, Angela McDannel, Peter Bierbach, Tom Osborne, Terry Punt, and Russell Levens. Kyle and Terry are new members. Kyle is the Assistant Director of the USGS Water Science Center in Helena and is replacing John Kilpatrick. Terry, a rancher near Birney, was appointed as an ex-officio member to represent conservation and water user perspectives. Also attending were Chris Smith and Keith Kerbel of DNRC, Elizabeth Meredith and Kevin Chandler of the Montana Bureau of Mines and Geology (MBMG), Terry Webster representing Pinnacle Gas Resources, Inc., Lana Wilson from Hydrometrics representing Fidelity Exploration and Production Company and Pinnacle Gas Resources, Inc., and Rebecca Fischer representing the Northern Plains Resource Council. The purpose of the meeting was to discuss groundwater monitoring results, and to review a monitoring plan submitted for Pinnacle Gas Resources, Inc.

Groundwater Monitoring

Elizabeth Meredith presented a summary of the 2009 Annual Coalbed Methane Regional Groundwater Monitoring Report: Powder River Basin, Montana (2009 annual report). The 2009 annual report identifies 907 CBM wells in Montana that produced either water or gas compared to 2,647 wells in Wyoming. Total water production in Montana is reported to be 35.6 million barrels or 4,591 acre-feet compared to 1.0 billion barrels or 13,477 acre-feet in Wyoming. MBMG reports that the 20-foot drawdown contour extends a maximum distance of 1 to 2 miles from the edge of the CX Field, a shorter distance that predicted in the Final Statewide EIS. MBMG also reports that total dissolved solids of

produced water typically range from 1,000 to 2,000 and sodium adsorption ratios range from 45 to 70.

Pinnacle Gas Resources, Inc. did not provide useful data, information, or evaluations for the 2009 annual report prepared by MBMG and have not provided field- or POD-specific annual reports in lieu of the .

Pinnacle Monitoring Plan

The TAC reviewed the 2010 Groundwater Monitoring and Reporting Plan for the Coal Creek and Dietz fields operated by Pinnacle Gas Resources, Inc. and reported their findings to the Montana Board of Oil and Gas. Pinnacle's plan was approved on the following conditions:

- Pinnacle agrees to monitor and report data for all potentially affected water sources in the proposed geographic areas to be monitored as provided for in the Groundwater Monitoring and Reporting Guidelines for CBM producers (TAC monitoring guidelines).
- Submit monitoring data to the Montana Bureau of Mines and Geology (MBMG) by October 15th of each year for inclusion in a consolidated Annual CBM Regional Groundwater Monitoring Report.
- Provide individual field- or POD-specific annual report of monitoring data, information and evaluations, as provided for in the TAC monitoring guidelines, if data are not timely or adequate for inclusion in the annual report prepared by MBMG.

A letter summarizing the TAC review of the Pinnacle monitoring plan was mailed to MBOGC on May 25, 2010. Russell Levens and Pinnacle representatives attended the MBOGC business meeting on August 11, 2010 to discuss the May letter and the TAC review further.

CBM Water Production

The CX Field operated by Fidelity Exploration & Production Company near Decker Montana and the Coal Creek and Dietz fields operated by Pinnacle Oil and Gas Inc. were in production in Montana during 2009. Total water production from all CBM wells through September 2009 is listed in Table 1. MBMG monitors ground-water levels and chemistry in dedicated monitoring wells installed beginning in the 1970s to document the effects dewatering of coal-mine and for coal bed methane production. Locations of regional monitoring wells, and data and interpretations from monitoring conducted through 2009 are found in Meredith, et al (2009).

Table 1. Total water produced from CBM wells through September 2009. Well numbers include wells that produced water and/or gas.

Year / Field	# Wells	Total Water Production	
		Barrels	Gallons
2000	165	20,169,638	847,124,796
CX Ranch Field	165	20,169,638	847,124,796
2001	236	38,756,615	1,627,777,830
CX Ranch Field	236	38,756,615	1,627,777,830
2002	244	16,299,771	684,590,369
CX Ranch Field	244	16,299,771	684,590,369
2003	327	11,415,551	479,453,122
CX Ranch Field	327	11,415,551	479,453,122
2004	423	15,426,082	647,895,458
CX Ranch Field	423	15,426,082	647,895,458
2005	529	19,426,428	815,909,976
Coal Creek Field		1,665,378	69,945,876
CX Ranch Field		17,760,490	745,940,540
Dietz Field		561	23,562
2006	808	21,317,810	895,348,020
Coal Creek Field		2,653,015	111,426,630
CX Ranch Field		18,536,211	778,520,862
Dietz Field		128,584	5,400,528
2007	723	38,325,853	1,609,685,831
Coal Creek Field		3,090,469	129,799,698
CX Ranch Field		33,463,422	1,396,508,872
Dietz Field		1,771,963	74,422,446
2008	908	40,210,222	1,688,829,324
Coal Creek Field	32	1,766,946	74,211,732
CX Ranch Field	773	35,501,872	1,491,078,624
Dietz Field	102	2,763,864	116,082,288
Waddle Creek Field	1	88,770	3,728,340
2009	887	35,850,182	1,505,707,644
Coal Creek Field	32	2,087,222	87,663,324
CX Ranch Field	759	31,765,126	1,334,135,292
Dietz Field	95	1,846,468	77,551,656
Waddle Creek Field	1	151,366	6,357,372

References

Meredith, E.L., Wheaton, J.W., Kuzara, S.L., Donato, T., Bierbach, S., and Schwartz, C., 2009. 2009 Annual Coalbed Methane Regional Groundwater Monitoring Report: Powder River Basin, Montana. Montana Bureau of Mines and Geology Open File Report 591, 94 p. 6 sheets.