

**2008 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 DNRC for their expertise in hydrogeology, water quality, and CBM extraction systems and operations. 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 2008 and the impacts of CBM development on ground-water resources through September 2007.

Summary of TAC Annual Meeting

TAC met at the Bureau of Land Management office in Billings on March 13, 2008 and by conference call on May 8, 2008. Attending the March meeting were TAC members Peter Bierbach, John Wheaton, John Kilpatrick, Angela McDannel, Andy Bobst, Tom Osborne and Russell Levens. Also attending were Tom Richmond of the Montana Board of Oil and Gas Conservation, Elizabeth Meredith of the Montana Bureau of Mines and Geology, Terry Webster and Todd Dallegge representing Pinnacle Gas Resources, Inc., Jim Shaffer representing St. Mary's Land and Exploration, Mike Keller and Lana Wilson of Hydrometrics representing Fidelity Exploration and Production Company, Mike Scott representing the Northern Plains Resource Council and Terry Punt of Bones Brothers Ranch. The purpose of the meeting was to discuss proposed changes to MBOGC Order 99-99, proposed groundwater monitoring and reporting guidelines and a draft monitoring plan for Fidelity Exploration and Production Company.

Proposed changes to MBOGC Board Order 99-99 and proposed Groundwater Monitoring and Reporting Guidelines developed by HydroSolutions on behalf of the CBM industry representatives in Montana were e-mailed to TAC members on February 27 for review prior to the March 13 meeting. These draft reports were the starting point for discussions during the meeting. Discussion topics included protection against impairment due to methane venting in water supply wells including leakage into dwellings, protection of artesian pressure, obligations of well owners to prove impairment, steps to curtail effects detected by monitoring, mitigation agreements and protection without mitigation agreements, timing of TAC review and overall TAC process, reopening of approved monitoring plans, better definition of purpose of Board order, consolidated reporting, and Board reporting requirements. Considerable discussion focused on monitoring on the periphery of fields and a potential role of a third party such as the Montana Bureau of Mines and Geology. Funding by industry or through the coalbed methane protection

account administered by conservation districts was discussed. Following discussion of the proposed changes, Tom Osborne described a draft monitoring plan for Fidelity operations developed following the February 27, 2008 draft monitoring and reporting guidelines and presented an inventory of potentially affected water sources within five miles of proposed CBM development. At the close of the March 13, 2008 meeting, Russell Levens was tasked with revising proposed changes to the Board order and Tom Osborne and Andy Bobst were tasked with revising proposed monitoring and reporting guidelines for further consideration by the TAC. Industry representatives were asked to prepare monitoring plans for each of the plans of development.

TAC met by conference call on May 8, 2008 to finalize proposed changes to the Board order and TAC monitoring and reporting guidance. TAC members were provided with revised draft reports that included combined edits made through e-mail correspondence prior to the meeting as well as proposed purpose and goals recommended by Mike Scott. Following the May 8 meeting, Russell Levens finalized the proposed changes to MBOGC Board Order 99-99 and the Groundwater Monitoring and Reporting Guidelines and, with TAC approval, transmitted the final documents to Tom Richmond. The documents were approved by the Board at their regular meeting on May 29, 2008. The new board order that amends Order 99-99 is Order 151-2008. At the Board hearing, several people argued the need for a third party (the Montana Bureau of Mines and Geology in particular) to conduct monitoring and report results to the TAC and Board. Pursuant to this discussion Russell Levens, with the help of John Wheaton, prepared a letter to Linda Nelson, Chair of the Board, outlining the role of monitoring conducted by the Montana Bureau of Mines and Geology.

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 2007. Fidelity did not prepare a monitoring report for 2007 as they have in the past. Instead, Fidelity provided their data to the Montana Bureau of Mines and Geology for inclusion in their annual coalbed methane monitoring report. Pinnacle submitted ground water monitoring and evaluation reports for their Coal Creek, Dietz, Fork's Ranch State and Waddle Creek plans of development. Total water production from all CBM wells through September 2007 is listed in Table 1. Volumes of produced water reported for the CX Field by Fidelity is summarized in Table 2 and for Coal Creek and Dietz fields by Pinnacle is summarized in Table 3.

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 2007 can be found in Wheaton et al (2008).

Table 1. Total water produced from CBM wells through September 2007.

Field	Year	# Wells	Total Water Production	
			Barrels	Gallons
All	2000	165	20,169,638	847,124,796
	2001	236	38,756,615	1,627,777,830
	2002	244	16,299,771	684,590,369
	2003	327	11,415,551	479,453,122
	2004	423	15,426,082	647,895,458
	2005	529	19,426,428	815,909,976
	2006	808	21,317,810	895,348,020
	2007	723	38,325,853	1,609,685,831

Table 2. Water produced from CBM wells by Fidelity through September 2007.

Field	Year - Coal Seam		# Wells	Total Water Production	
				Barrels	Gallons
CX	2000	Dietz	62	9,334,416	392,045,472
		Monarch	53	5,235,357	219,884,994
		Carney	48	5,599,865	235,194,330
	2001	Dietz	85	18,089,198	759,746,316
		Monarch	75	10,237,672	429,982,224
		Carney	74	10,371,528	435,604,176
	2002	Dietz	91	7,314,850	307,223,688
		Monarch	77	4,152,860	174,420,133
		Carney	75	4,831,076	202,905,178
	2003	Dietz	133	4,496,207	188,840,693
		Monarch	89	2,998,966	125,956,551
		Carney	86	3,920,378	164,655,878
	2004	Dietz	159	7,038,114	295,600,799
		Monarch	90	3,943,355	165,620,897
		Carney	107	4,408,829	185,170,811
		Roberts	2	6,844	287,448
		King	2	28,938	1,215,396
		Monarch, Carney	1	13,660	573,720
	2005	Dietz	249	7,261,177	304,969,428
		Monarch	123	4,287,534	180,076,414
		Carney	132	5,822,537	244,546,545
		Roberts	2	94,229	3,957,597
		King	2	260,164	10,926,896
		Wall	4	22,526	946,094
		Monarch, Carney	1	12,323	517,566
	2006	Dietz	359	8,260,961	346,960,362
		Monarch	217	4,662,714	195,833,988
		Carney	159	5,495,980	230,831,160
Wall		14	65,894	2,767,548	
Monarch, Carney		1	8,425	353,850	
Dietz, Carney, Wall		1	11,088	465,696	
Carney, Wall, Carlson		1	31,149	1,308,258	

Table 2. continued.

Field	Year - Coal Seam		# Wells	Total Water Production	
				Barrels	Gallons
	2007	Dietz	260	13,333,131	559,991,503
		Monarch	164	9,138,661	383,823,746
		Carney	119	6,179,247	259,528,355
		Monarch, Carney	1	9,730	408,676
		Monarcy, Carney, Wall	1	37,013	1,554,544
		Dietz, Carney, Wall	1	213,210	
		Carney, Wall	68	4,389,801	184,371,627
		Carney, Wall, Carlson	1	108,770	4,568,328
		Dietz, Monarch, Carney, Wall	3	53,859	2,262,093
Totals	2000		165	20,169,638	847,124,796
	2001		236	38,756,615	1,627,777,830
	2002		244	16,299,771	684,590,369
	2003		327	11,415,551	479,453,122
	2004		423	15,426,082	647,895,458
	2005		516	17,760,489	745,940,538
	2006		752	18,536,211	778,520,862
	2007		618	33,463,421	1,405,463,687

Table 3. Water produced from CBM wells by Pinnacle through September 2007.

Field	Year - Coal Seam		# Wells	Total Water Production	
				Barrels	Gallons
Coal Creek	2005	Wall	9	1,418,193	59,564,106
		Flowers-Goodale	2	247,185	10,381,770
	2006	Wall	23	2,327,275	97,745,550
		Flowers-Goodale	7	325,740	13,681,080
	2007	Wall	32	2,785,022	116,970,924
		Flowers-Goodale	20	263,720	11,076,240
Canyon, Cook, Wall		1	41,727	1,752,534	
Dietz	2005	Wall	1	426	17,892
		Cook	1	135	5,670
	2006	Wall	6	19,072	801,024
		Cook	4	25,516	1,071,672
		Canyon	2	29,792	1,251,264
		Canyon, Cook	8	23,935	1,005,270
		Cook, Wall	5	12,939	543,438
		Monarch	1	17,330	727,860
	2007	Anderson	3	25,841	1,085,322
		Dietz	3	227,076	9,537,192
		Wall	11	85,898	3,607,716
		Cook	33	389,494	16,358,748
		Canyon	8	267,590	11,238,780
		Canyon, Cook	14	385,358	16,185,036
		Canyon, Cook, Wall	2	52,027	2,185,134
		Canyon, Wall	1	207	8,694
		Dietz, Cook	1	2,190	91,980
Totals	2005		13	1,665,939	69,969,438
	2006		56	2,781,599	116,827,158
	2007		105	4,862,432	204,222,144

References

Wheaton, J.J., Reddish-Kuzara, S., Meredith, E., Donato, T. A. , 2008, 2007 Annual coalbed methane regional ground-water monitoring report: Northern portion of the Powder River Basin, Montana Bureau of Mines and Geology: Open-File Report 576, 99 p., 6 sheet(s).