COALBED METHANE REGIONAL GROUND-WATER MONITORING PROGRAM: 2005 STATUS[1]

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Extended Abstract. Southeastern Montana supports a rural economy based mainly on agriculture along with several major coal mines and emerging potentially important coalbed methane (CBM) industry. The principle aquifers for wells and springs in this semi-arid area are the subbituminous coalbeds of the Fort Union Formation. The Powder River Basin (PRB), extending from northeastern Wyoming into southeastern Montana, is the dominant hydrogeologic control in the area. Coalbed methane production requires that ground water be pumped from the coalbed aquifers to reduce hydrostatic pressure for the life of the project. This reduced pressure allows methane to be released from the coal. However, the reduced pressures may reduce or eliminate flow to wells, springs, streams, or coal mine reclamation projects within and adjacent to CBM fields. Coalbed methane production began in Montana in 1999; in 2005, there were 516 producing CBM wells.

In order to evaluate possible ground-water impacts, a monitoring of a network of wells and springs was initiated to document baseline hydrogeologic conditions in current and prospective CBM areas in southeastern Montana. The network is intended to determine actual ground-water impacts and recovery, to dispel rumors of impacts, and to provide data and interpretations to aid environmental analyses and permitting decisions. The current network consists of a combination of pre-existing monitoring wells installed during the late 1970's and early 1980's related to coal mining and recently installed wells specific to CBM impacts. The U. S. Bureau of Land Management, U.S. Forest Service, U.S. Department of Energy, and Big Horn and Rosebud county conservation districts support the network through funding.

Water levels in monitored coal seams have been lowered more than 150 feet within some areas of production. After 6 years of CBM production, the 20-foot drawdown contour extends about 1.5 miles beyond the edges of the CX production field, which is somewhat less than originally predicted. The distance to the 20-foot drawdown contour is expected to increase as the duration of production increases; however, little change in this distance was noted during 2005 monitoring. Based on computer modeling and review of current data from mines and other CBM production fields, drawdown of 20 feet is expected to eventually reach as far as 4 miles beyond the edges of large production fields. Less drawdown will occur at greater distances, and drawdown of 10 feet was predicted to reach as far as 5 to 10 miles beyond production fields after 20 years (Wheaton and Metesh, 2002). Water levels will recover, but it may take decades for them to return to the original levels. The extent of drawdown and rates of recovery will mainly be determined by the rate, size, and continuity of CBM development as well as the site-specific aquifer characteristics.

There were 18 new wells drilled in 2005 to expand the monitoring network. At two of the new well sites, free gas appears to be migrating to the coal outcrops along the Powder River valley. The first site, number 6, is approximately 8 miles west of the Canyon coal outcrop near the Powder River. The shut-in gas pressure in the Canyon coal at this site was measured at 60 pounds per square inch (psi). At the second site, number 7, about 3 miles west of the Canyon coal outcrop, shut-in gas pressure was measured at 17 psi. The difference in gas pressure at these wells, relative to their respective distances from the outcrop, suggests gas depletion by migration of methane to the outcrop.

During 2006, monitoring sites outside of active production (generally north of township 8 north) will be measured semi-annually or quarterly depending on distance to production and amount of background data collected to date. Near production areas monthly water-level monitoring will continue. Data loggers or continuous recorders will be installed at two alluvial sites. The three meteorological stations currently deployed in the project area will be maintained. A stream measuring station will be installed on the Ashland Ranger District. Water-quality samples will be collected semi-annually from selected alluvial sites. Monitoring priorities will be adjusted as new areas of production are proposed or developed.

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