CHAPTER 6 - MITIGATION OF IMPACTS TO WATER RESOURCES

Impacts to water resources can be reduced through the use of mitigation technologies. Mitigation may include project-scale permitting, protection of water rights, produced water management, and monitoring techniques.

MITIGATION

CBM production in the Montana PRB will certainly impact groundwater. Impacts to groundwater resources may however be mitigated through the use of water well agreements, limits placed on discharge and monitoring programs. Furthermore, a predictive model may be helpful as an approximation of future impacts. Groundwater rights will be protected through the use of spring/water well mitigation agreements and an approved monitoring plan to aid in the identification of potentially significant drawdown impacts. Surface water resources can be protected by limiting discharge through alternative management techniques.

Project planning will include protection of adjacent water rights and CBM rights through mitigation agreements and monitoring. Administration of CBM projects is the jurisdiction of the MBOGC with guidance from the MDNRC and the CBM Technical Advisory Committee. A monitoring plan will be required that may involve dedicated monitoring wells or systematic gauging of private water wells.

WATER MITIGATION AGREEMENTS

Water rights and mitigation agreements can be used to protect groundwater wells and springs. Both the MDNRC and the MBOGC advocate the use of agreements in areas surrounding CBM development as a way of protecting surrounding ranchers and farmers from damage from the inevitable drawdown. Water well mitigation agreements will be the cornerstones of CBM development in Montana. The contract simplifies relief for the aggrieved party (usually the landowner) to file claims without need for counsel. The contract further allows the operator to proceed with aquifer pump-down that is necessary for CBM development. If and when groundwater supplies are impacted, the operator will be required to deliver the same quality of water as that being impacted. The operator can then choose the water replacement option that bests suits his operating plan. Water well and spring mitigation agreements required by the MDNRC are listed in Appendix E and requirements of the MBOGC are described in Appendix F. Currently, CBM operators are required to offer mitigation agreements to residents within at least one-half mile of the edge of development. If any of these wells or springs are impacted, then agreements will be offered to land owners one-half mile beyond.

WATER RIGHTS

Water rights in Montana are guided by the prior appropriation doctrine, that is, first in time is first in right. A person's right to use a specific quantity of water depends on when the use of water began. The first person to use water from a source established the first right; the second person could establish a right to the water that was left, and so on. During dry years, the person with the first right has the first chance to use the available water to fulfill their right. The holder of the second right has the next chance. Water users are limited to the amount of water that can be beneficially used. Water rights in Montana are managed by three entities: the Department of Natural Resources and Conservation (DNRC), the Montana Water Court, and the district courts. DNRC administers the portions of the Montana Water Use Act that relates to water uses after June 30, 1973. DNRC trains water commissioners and teaches water-measuring techniques. DNRC also provides technical information and assistance to the Water Court, which is responsible for adjudicating water rights that existed before July 1, 1973. The Water Court decides any legal issues certified to it by DNRC that may arise in connection with permit or change applications, or in disputes filed in the district courts. The district courts can issue injunctive relief while it certifies water right issues to the Water Court for decision. DNRC maintains a central records system for all permits, changes, and certificates issued after June 30, 1973, and for all existing water rights filed as part of the statewide adjudication.

An individual or company does not need to apply for a permit to develop a well or a groundwater spring with an anticipated use of 35 gallons per minute or less, not to exceed 10 acre-feet per year. A person must have possessory interests in the property where the water right is put to a beneficial use or written notification 30 days prior to the

intent to appropriate groundwater. Also, a person must have exclusive property rights in the groundwater development works or written consent from the person with the property rights. Upon approval of the application, a Certificate of Water Right will then be issued to the owner for the specified use. Anyone anticipating to use more than 35 gallons per minute or 10 acre-feet per year of groundwater is required to obtain a Permit to Appropriate Water before any development begins or water is used. A permit may be required to appropriate groundwater in an area designated as a controlled groundwater area.

Specific to CBM development in the PRB, the Montana Department of Natural Resources issued a Final Order: "In the Matter of the Designation of the Powder River Basin Controlled Groundwater Area". The order appears as Appendix E at the end of this Technical Report. The order establishes that a CBM well does not require a MDNR Permit to appropriate water but the order sets out requirements for CBM wells and developments.

PRODUCED WATER MANAGEMENT

CBM water production will vary considerably in volume and quality and must be effectively managed during development. As has been seen in the CX Ranch field, water production rates can be expected to fall during the life of a new CBM field but the applicability of this data to other producing areas of the PRB is unknown. Produced water regulations must allow management alternatives so that costs will be kept low to promote wide CBM development. On the other hand, water management options must protect the full range of environmental resources. The choice of alternatives can depend on economics, regulatory burden, produced water quality, and local geographic conditions. The following are typical produced water management alternatives that are used in other CBM basins and in conventional oil and gas production:

- Discharge to impoundments: As is done in parts of the PRB in Wyoming, produced water can be discharged directly to ponds and tanks. In Montana these ponds require MBOGC permits and if the water is in excess of 15,000 mg/l TDS the pond or impoundment must be lined with an impermeable liner (ARM 36.22.1227). Such discharges will require a general produced water discharge MPDES permit from the MDEQ (ARM 17.30.1341).

- Discharge to surface water. Produced water can be discharged to waters of the state with an appropriate permit from the MDEQ. New discharges are subject to Non-degradation Rules (ARM 17.30.700). These rules prohibit increases in the discharge of toxic and deleterious materials to state waters, unless it is affirmatively demonstrated to the MDEQ that a change is justifiable as a result of necessary economic or social development and will not preclude present and anticipated use of these waters. Discharge rates will be calculated on the basis of the quality of the produced water and quantity and quality of the receiving water.

- Disposal to shallow aquifers. It is possible to dispose of produced CBM water into shallow, drinking water aquifers. For example, produced water could be pipelined to a nearby area where coal aquifers do not produce methane and are not connected to productive coal seams. The produced water could be so injected with the required permit from the US EPA Region 8. Injection wells would be described as Class V aquifer recharge wells permitted under 40 CFR 146 Subpart F. If the injectate (CBM water) exceeds primary drinking water standards, the permit may require an aquifer exemption petition to the EPA. Shallow injection has the advantage of preserving the CBM water resource at the same time that surface waters and surface soil is protected.

- Disposal into deep zones. Operators can inject CBM produced water into deeper reservoirs that are not classified as USDWs. Montana contains many of these reservoirs scattered across the state. The reservoirs' ability to accept large volumes of injected water and their depths are highly variable. Deep injection requires a permit from the MOBGC and could require a permit from the US EPA if Indian Tribal Land is involved. Deep injection can be limited by economics if suitable injection zones are too deep or cannot accept sufficient fluid relative to the volume of water produced by CBM development. Deep injection has the advantage of protecting surface water resources but the CBM water resource is lost. In addition, injection wells are dedicated facilities that can be extremely expensive to drill and operate.

- Industrial beneficial uses. Oil and gas and CBM development will require large quantities of water during drilling, completion, and testing. Coal mining can require large volumes of water for dust control, slurry mining, and slurry pipelining. Other industries such as manufacturing and meat processing may have uses that are compatible with CBM produced water.

- Agricultural beneficial uses. Montana ranchers and farmers require large volumes of water to irrigate crops and water livestock. Irrigation uses have a narrow range of acceptable water quality depending upon soil type and crop selection but some reported coal aquifers contain suitable water. Soils and crops have a particular sensitivity to sodium and its concentration relative to calcium and magnesium in the water. Livestock have a somewhat wider range of quality acceptance depending upon the types of animal being raised. Livestock also has sensitivity to other contaminants in the water. Within the planning period, agricultural uses of the produced water from CBM operations may become more prevalent across the state.
- Pre-Disposal treatment. Produced water can be treated prior to being discharged or disposed. Treatment such as reverse osmosis (RO) can be targeted at a single ion such as sodium, rendering the processed water more compatible for a beneficial use. Skid-mounted RO units can be installed near "pod" manifolds or at single high-delivery wells. RO units can be powered by natural gas or electricity including wind turbines. Economics will vary on a site by site basis.