Alberta Environment/Energy Resources Conservation Board Response to the Report "Potential for Gas Migration Due to Coalbed Methane Development"

"Potential for Gas Migration due to Coalbed Development" is a summary of the science related to potential coalbed gas migration in a natural environment and in response to coalbed methane development. It provides useful information on the factors contributing to coalbed gas occurrence and migration. The report concludes that gas migration due to natural pathways is unlikely to occur for the areas of active or anticipated CBM development (the dry and/or under-pressured coals in the Horseshoe Canyon and deeper Mannville formations). It also highlights the potential higher risk for gas migration where there are very shallow coals (e.g., the Ardley formation), where coals approach the surface or outcrop, and along near wellbore pathways in energy or water wells that have inadequate or decaying seals.

Energy Wells and Near Wellbore Pathways

The importance of proper well design and long-term integrity of oil and gas wells is recognised and reflected in a series of enhanced or new regulatory requirements for drilling, completion and abandonment issued by the ERCB since 1970. Additional requirements have also been added to address liability management. Most of the technical requirements are included in ERCB Directives 8, 9, 10, 20 and 27:

- Directive 8 – Surface Casing Depth Minimum Requirements
- Directive 9 – Casing Cementing Minimum Requirements
- Directive 10 – Minimum Casing Design Requirements
- Directive 20 – Well Abandonment Guide
- Directive 27 – Shallow Fracturing Operations-Restricted Operations

Directive 10 has been recently updated and Directives 8, 20 and 27 are under review. The ERCB introduced shallow fracturing controls in 2006 (Directive 27) and the need for changes was reviewed with a multi-stakeholder committee in 2008/09. The initial controls were considered by the committee to be effective with one amendment. An updated Directive 27 is expected shortly.

CBM development has generally occurred after the ERCB expanded the technical requirements for well construction and abandonment. This report notes that pre-1970 conventional wells have a greater risk of providing near wellbore pathways. A key component of all ERCB regulatory enhancements is the requirement for existing wells to be abandoned to the current standards. For example, a well drilled in 1947 but abandoned in 2009 is abandoned to 2009 standards.

The information available on the failures of downhole containment (e.g. leaking cement plugs) and isolation of porous formation suggests that wellbore or near wellbore failures in energy wells are very small (less than 0.1 per cent). Often these problems can be readily identified at the ground surface near the wellhead and can be corrected.

The ERCB continues to gather information on the probability of problems and how best to manage the risks. In this regard, the ERCB has recently commissioned a modelling study to evaluate and rank abandoned well risks. Starting in 2009/10, planning will begin on a program for field-truthing the results. The ERCB has also begun a project to witness abandonments and report on industry compliance with abandonment requirements.

Wellbore integrity is critical to ensuring formation containment for injection and disposal operations including future carbon capture and storage. Careful review of existing wells and subsurface geology is an important part of reservoir screening by industry and application review by ERCB staff.

Shallow Coals

Where coal formations are shallow or near the surface, there is greater potential for gas migration into aquifers. In situations where coal beds are shallow (e.g., Ardley formation), production of non-saline groundwater may occur. The additional risks and potential for impacts on groundwater quantity are addressed in a separate diversion application to Alberta Environment. The ERCB is currently assessing risks related to potential gas migration from the Ardley formation to aquifers within the overlying Paskapoo formation. The assessment tools developed from this project will help reduce the risk of gas migration during CBM development.

Where coal approaches the surface, there is very little gas present in the coal. If these coalbeds were to be developed, the ERCB's completion controls for shallow well fracturing would likely apply, and Alberta Environment's water diversion application process would continue to apply. These economic and technical constraints make CBM development unlikely where coal formations approach the surface.

Alberta Environment has investigated numerous complaints regarding possible CBM impacts on groundwater quality; however, to date there has been no confirmed instance of an impact related to CBM development. While water wells may offer a near wellbore pathway for gas migration, changes in water well quality are much more likely to be related to poor well maintenance or well construction. In this regard, Alberta Environment has partnered with other government agencies and the Alberta Water Well Drilling Association to offer increased public information and education on water well construction, maintenance and abandonment. The *Working Well* program offers workshops in communities to deliver the messages directly to well owners. Since the program was initiated in 2008, 41 workshops have been held across Alberta reaching about 700 people in 27 municipalities, one summer village and one First Nations community.

Information Gaps

This report identified several challenges related to collection and storage of groundwater and gas information as part of the province's baseline water well testing (BWWT) program. These challenges were raised concurrently by the CBM BWWT Science Panel, and are addressed here (http://environment.alberta.ca/3430.html).