

## Hydrogeology of a Shallow Coalbed Methane Play – A Case Study of Ardley Coal in West-Central Alberta

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**Abstract.** Hydrogeological data compiled at an early stage of coalbed methane development can provide useful insight to exploration and production strategies including environmental regulatory issues. A detailed evaluation of the hydrogeology of the uppermost Ardley coal was undertaken in the Pembina–Warburg exploration area, Alberta Basin, Alberta.

Hydraulic measurements showed a build-up of fluid (water) pressure within the coal to approximately hydrostatic. Detailed hydrogeological testing showed that the permeability of the coal is clearly less than 5mD and likely on the order of 1 mD or less.

Formation waters sampled during the drawdown and build-up phases were Na-HCO<sub>3</sub> type with salinities of approximately 1,920 mg/L TDS (calculated). Anomalously high bicarbonate concentrations of up to 1650 mg/L ( $\delta^{13}\text{C}_{\text{DIC}}$  +22.50 ‰) and dissolved methane concentrations of up to 36 mg/L ( $\delta^{13}\text{C}_{\text{CH}_4}$  –48.32 ‰) point to the presence of secondary biogenic gas. Formation waters are non-tritiated;  $\delta^{18}\text{O}$  and  $\delta^2\text{H}$  values plot along the local groundwater line for Edmonton, Alberta indicating a meteoric origin.

Within a regional context, limited pressure and formation water chemistry data suggest that the flow system is comparatively active with topographically driven components. A decoupling of the hydraulic regime is likely within the Scollard Formation - evident from pressure test data from beds lying stratigraphically below the uppermost Scollard (Ardley) but above the base of the Scollard.

Data also were used to evaluate production / development scenarios including and evaluation of the regulatory context.

**Biography.** Shane Harrison is a professionally registered Geologist in the Province of Alberta with over 12 years of experience. His work and interests have included key hydrogeological issues pertaining to CBM development in central Alberta, southeastern British Columbia, and southwestern Saskatchewan. The detailed hydrogeological work he and his co-workers have undertaken for industry and regulatory bodies has demonstrated the unique hydrogeology that is characteristic to CBM lands including the presence of secondary biogenic gas.