

Hydrogeology of an Alpine Valley, southeastern British Columbia – Implications for Coalbed Methane Exploration and Development

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A detailed evaluation of the hydrogeology of an alpine valley in southeastern British Columbia provides a framework from which to evaluate the origin, occurrence, and development potential of coalbed methane from coals of the Mist Mountain Formation.

Regional trends in $\delta^2\text{H}$, $\delta^{18}\text{O}$, tritium, and TDS define two distinct groundwater groups (A and B) and a third of intermediate composition. An active, shallow, local flow component (group A) is recharged in beds cropping out along subdued ridges and discharges as seeps along lower and mid-slope positions in the southern part of the study area. The waters are tritiated, relatively enriched in $\delta^2\text{H}$ and $\delta^{18}\text{O}$, and are characterized by low TDS. A deeper regional flow component (group B), which originates at a higher altitude and which discharges to the Elk River valley bottom, is characterized by non-tritiated groundwater with relatively depleted $\delta^2\text{H}$ and $\delta^{18}\text{O}$, and higher TDS coupled with comparatively high bicarbonate (DIC) and dissolved methane levels for which the carbon geochemistry points to a biological origin.

The regional flow system is numerically modeled in three-dimensions to assist in evaluating flow and system response to depressurizing. Estimated reservoir conditions for the coal-seam gas targets lying within the Upper Jurassic–Lower Cretaceous Mist Mountain Formation indicate that the coalbeds must be depressurized by up to approximately 350m to attain the critical gas desorption pressure. Model data are reasonably consistent with pumping test data which shows that a relatively steep drawdown cone develops with depressurizing. Results also suggest that depressurizing the system, at least on a local scale, will not adversely affect flow within the Elk River.

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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 coalbed methane (CBM) development in central Alberta, southeastern British Columbia, and southwestern Saskatchewan. He and his co-workers have published work on the hydrogeology of CBM lands in peer-reviewed scientific journals.

In addition to coalbed methane, Mr. Harrison has extensive experience in Phase I - III investigations, groundwater resource evaluation, and siting studies in Alberta, British Columbia, and Saskatchewan.