

## Large-Scale Tectonics, Oil-Window Fairways, and Localized Hydrothermal Dolomite: Windfall's Exshaw Wabamun Combination

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Despite prolific hydrocarbon production from age-equivalent rocks in the United States (Barnett, Woodford, and Bakken Formations), Alberta's Exshaw Formation remains challenged from an unconventional perspective. However, exploration for charged reservoir units, adjacent to oil-window mature Exshaw shale, has been successful. For example, the Tangent field, a fault-controlled hydrothermal dolomite reservoir within the Wabamun Gp (Stoakes, 1987), was discovered decades ago.

Hydrothermal dolomite has been observed within the Wabamun and Banff formations at other areas where significant basement-controlled lineaments exist (Davies, 2001), suggesting the potential for analogous discoveries elsewhere. To this end, areas of potential reservoir development adjacent the oil-window maturity fairway of the Exshaw formation were studied. In one locale, structural mapping revealed a potential left-lateral releasing fault system (Mitra and Paul, 2011), where localized extensional stress had the potential to provide a conduit for hydrothermal fluids to migrate and dolomitize overlying carbonates.

To test the concept, a vertical well was drilled, cored, and tested. Sampling confirmed source rock maturity, hydrothermal dolomitization, and open fractures; suggesting an extensional stress regime associated with a releasing fault system. Principle stress directions at the Exshaw level were found to be rotated counter-clockwise relative to the expected regional orientations. Oil recovered during testing confirmed the viability of a charged hydrothermal dolomite reservoir fairway.

A reservoir build-up pressure was taken at the cored well to extrapolate a virgin reservoir pressure. Applying local hydrodynamic data to this point suggests the existence of a large oil column. When these parameters were applied regionally to assess extent, similarities in hydrodynamic regime were observed. This suggests an extensive fairway of analogous pools are yet to be discovered.