Brecciation and hydrothermal dolomitization of the Middle Devonian Dunedin, Keg River, and Slave Point formations of northeastern British Columbia.

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INTRODUCTION
The Devonian paleogeography of northeast British Columbia was influenced by several rifting events, forming a miogeocline with deep troughs and marginal platforms (Cecile et al. 1997). One of these platforms, the Macdonald Shelf, was the site of deposition for some of the largest carbonate reservoirs in the Devonian of the Western Canadian Sedimentary Basin (Moore 1989). Most petroleum in northeastern British Columbia is found in hydrothermally dolomitized reservoirs associated with the Keg River-Slave Point barrier. Middle Devonian strata in northeast British Columbia include the platform deposits of the Dunedin and lower Keg River formations and the reefs of the upper Keg River and Slave Point formations. These formations were examined from seventeen localities in the Rocky Mountains and twenty cores from the adjacent subsurface to the east of the outcrop belt (Figure 1).

Hydrothermal saddle dolomite is the host of numerous sulphide and petroleum deposits worldwide. Saddle dolomite generally occurs in a complex mineralogical and fabric association (the hydrothermal dolomite reservoir facies, or HTD) including host limestone, matrix dolomitization, brecciation and fracturing with saddle dolomite cementation, bitumen, sulphide minerals, and late calcite and quartz cements. Fluid inclusion data indicate that globally saddle dolomites precipitate from highly saline brines at high temperature, and have a characteristic stable isotope signature for oxygen and carbon (Berger and Davies 2000).

There are currently three models in use to explain the genesis of extensive subsurface hydrothermal dolomite reservoir facies. The first model, topographic recharge and regional subsurface dolomitization, proposed by Garven and Freeze (1984), utilizes the hydrodynamic potential of elevated topography within thrust belts to drive deep groundwater circulation, creating stratabound HTD's. The second model was first proposed by Oliver (1986), and is currently known as the tectonically driven compaction flow model. In this model, tectonic compression and loading during orogenies act as a squeegee, pushing formational fluids into the foreland basins and creating stratabound HTD's. The third model, hydrothermal convection, (e.g. Morrow et al. (1986)) requires a critical basal heat flow to initiate subsurface fluid convection.