Fluid Inclusion Records of Hydrocarbon Migration and Charge in Paleozoic Basins, Eastern Canada

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Hydrocarbon fluid inclusions have been found in four Paleozoic tectonostratigraphic successions in eastern Canada: the Lower Paleozoic St. Lawrence Platform and Humber Zone, the Middle Paleozoic Gaspé Belt, and the Upper Paleozoic Maritimes Basin. They are entrapped in various diagenetic minerals, and represent the unique direct record of hydrocarbon migration events and, in one case, the charge of a reservoir.

Oil inclusions in the Romaine Formation and methane inclusions in the Beekmantown Group (Early Ordovician), both from the St. Lawrence Platform, are hosted by calcite, barite or quartz that postdate major porosity-generating dolomitization events, implying significant reservoir potential for these units.

Methane inclusions are dominant in the Humber Zone (Cambrian to Middle Ordovician). High temperatures and pressures indicated by fluid inclusions in various deformed quartz-carbonate veins suggest that major gas migration events took place before or during the Taconian Orogeny, although minor, post-Taconian migration is indicated by relatively low-density methane inclusions.

Oil, light hydrocarbon, and methane inclusions are hosted by carbonate and quartz veins in the Gaspé Belt succession. Hydrocarbon migration events are related to the Salinic Disturbance and the Acadian Orogeny.

In the Maritimes Basin, oil inclusions occur in several Zn-Pb deposits hosted by carbonates of the Windsor Group (Early Carboniferous). In the Jubilee deposit, the abundance of oil inclusions in breccia-cementing calcite and sphalerite, coupled with very low $\delta^{13}C$ values of calcite, suggests the formation of an oil reservoir before base mineralization. Brecciation and hydrocarbon charge were likely related to detachment faulting between the carbonate and overlying evaporites.