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A Petrographic Comparison of Sandstones from the Hibernia Formation, Missisauga Sands and the Avalon Formation

Petrographic analysis of the Hibernia Formation suggests that the diagenetic sequence in the Hibernia sandstones includes, i) the precipitation of finely crystalline grain rimming siderite, grain rimming clays and pyrite as early diagenetic phases, ii) precipitation of poorly developed quartz overgrowths, separated by thin dark ("dust") rims of clay from the rounded detrital monocrystalline quartz "host" grains, partially filling primary intergranular pore spaces, iii) cementation of intergranular pore spaces by calcite and local patches of barite, iv) development of secondary porosity, and "oversized" pore spaces (larger than adjacent grains), as a result of partial to total leaching of calcite and feldspars, v) kaolinite precipitation after dissolution.

The sedimentary succession of the Missisauga Sands is characterized by an upward fining, bioturbated, poorly sorted, very fine to coarse grained, ferroan carbonate cemented argillaceous quartz arenites/sublitharenites. Matrix consists of abundant brown detrital clay and sideritized clay fines concentrated towards the upper portion of the lower zone, as delineated in the core gamma response. Diagenetic minerals include minor to abundant ferroan calcite, ferroan dolomite, common replacive pyrite, plus traces of vermicular kaolinite. Abundant carbonate cement is associated with samples of greater sideritized clay content.

The thick sedimentary sequence of sandstones penetrated in the Avalon Formation are mineralogically very similar and predominantly texturally mature. The sandstones are dominated by very fine to fine grained, predominantly very well sorted sublitharenites with lesser quartz arenites, subarkoses and litharenites, with massive to faint parallel laminae textures visible in thin section. Diagenetic minerals, distributed throughout the samples, include ubiquitous poor to well developed quartz overgrowths, epitaxial poorly developed to poikilotopic ferroan calcite, traces of pore-filling well developed ferroan dolomite, barite partially filling tension gashes, rhombic siderite, replacive pyrite and grain rimming chlorite.