

The Use of Synthetic Drill Cutting to Correlate Between Core- and Cuttings- Based Petrofacies in the Viking Formation, Wildcat Hills, Southern Alberta.

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ABSTRACT

The use of loose grain mount thin sections prepared from drill cuttings is an inexpensive and useful petrographic technique allowing for quantification of diagenetic reservoir parameters in the absence of core control, and provides a direct correlation of petrographic facies to wireline log motifs for paleogeographic reconstructions. However, petrographic data derived from drill cuttings is limited in scope by the nature of the sampling procedure. The most resistant portions of the rock fragments, such as carbonate cemented zones or parts of competent rock fragments, are often disproportionately represented in drill cuttings. In addition, porous zones are frequently under-represented in cuttings due to preferential breakage along pore boundaries leaving only the more resistant cemented portions intact. Finally, it is sometimes difficult to differentiate volumetrically minor petrographic constituents from cavings.

The Viking sands in the Wildcat Hills area are texturally and mineralogically complex, consisting of variable framework mineralogies, a wide range of grain sizes and a broad spectrum of sorting and rounding characteristics. However, there is a general stratigraphic hierarchy to these variables with the lower, informally named Viking "B" unit being slightly finer grained, more lithic, and containing common carbonaceous/argillaceous partings.

The Viking sands represent a diagenetically modified reservoir. Authigenic mineral phases are dominated by silica as incipient and discontinuous euhedral overgrowths, and ferroan calcite which occurs as a pore-filling mosaic cement. Physical compaction results in closer grain packing and deformation of labile clasts; chemical compaction is evident as pressure solution seams along carbonaceous and/or argillaceous partings or laminae. Ferroan calcite cemented chertarenites have an undercompacted fabric, which suggests that the sands were cemented prior to compaction.

In an attempt to validate the results and applicability of loose grain mount thin sections made from cuttings in the Wildcat Hills area, synthetic drill cuttings were made from an existing well-described core that covers the Viking interval. The slabbed portion of the core was cut along its length and run through a hammer mill a number of times to create drill cuttings resembling those generated by a pdc drill bit. Care was taken to avoid pulverizing any of the sample volume, and the resultant artificial cuttings are macroscopically indistinguishable from the original ditch cuttings. Composite cuttings samples

were then collected from five meter intervals equivalent to sample intervals collected at well site.