Facies controls on the quality of the Glauconitic sandstone reservoirs in the Hoadley and adjacent fields: predicting permeability from compositional and diagenetic trends

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A potential recoverable reserve 86 billion cubic meters of gas was estimated for the Hoadley bar complex. Hydrocarbons are not uniformly distributed but the challenge of the nineties is how to maximize gas recovery from the Glauconitic sandstone and geological characterization can contribute to understanding and efficiently developing these complex reservoirs.

The Glauconitic is composed of four locally correlatable parasequences(informally named G1, G2, G3 and G4), each bounded by marine flooding surfaces and their correlative shoreface ravinement surfaces. Each parasequence contains an array of depositional facies(foreshore, upper shoreface, lower shoreface, channels). Permeability trends related to the mean grain size as well as the mineralogy of the framework grains.

Stratigraphically there is a change in mineralogy through the sections from quartz-rich in the G1 to detrital dolomite-rich in the G2, chert-rich in the G3 and quartz/chert-rich for the G4 is apparent. Within parasequences, however, framework composition varies according to depositional facies.For example, in the G2 sands, a change from dolomitic litharenite to a sublitharenite representing a vertical shift in depositional facies from the upper shoreface to the foreshore was observed. In these sands where intergranular porosity has been obliterated by deformation of labile rock fragments, the presence of secondary porosity could be the difference between a reservoir and non-reservoir facies. In the foreshore facies of the relatively coarser grained(fine to medium) sands of the G4, leaching has significantly increased the secondary porosity. This is evident from the dominance of microporous chert over dense chert and the presence of dissolution remnants of argillaceous rock fragments. However, in the G2 sands, where the foreshore and shoreface are characterized by significant detrital dolomite, permeabilities are relatively low (less than 0.1mD). Where the high energy structureless foreshore facies (*macaronichnus* burrrows) is preserved, an increase in detrital quartz is almost always the case.

The result is a complex series of pods of relatively high permeability and low permeability rocks throughout the Hoadley trend. The pods are arranged along depositional strike but vary according to depositional facies. Permeability variations along depositional dip are controlled by framework composition and grain size.

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