

**Borehole Image Lithofacies Characterization of the Swan Hills Member, West Central Alberta.**

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Carbonate porosity typing is difficult in even the best wellbore conditions. In low porosity reservoirs, the cementation exponent “m” will vary significantly with facies, incorrect “m” selection will have significant impact on the water saturation’s determined, and more importantly, the potential reserves assigned to the find. Historically, distinct depositional facies have been identified based on core examination. Using this information, core-log relationships are then determined through a variety of methods, the most common method being the cross-plot techniques. With the capabilities of borehole acoustic and resistivity borehole imaging, core-borehole image relationships are now being developed. The lateral partitioning of core-image fingerprinting to non-cored offset locations has proven successful in carbonate reservoirs in the Western Canadian Sedimentary Basin from both exploration and completion perspectives. The authors will examine several of these cases.

Within the Swan Hills Member of west-central Alberta, gas and gas liquid production from low porosity limestones is present. The production rate is driven by rock facies type. Using only open hole logs, the classification of the reservoir rock according to depositional texture is nearly impossible. However, with the incorporation of wireline imaging devices, subdividing limestone’s into mudstones, wackestones, packstones and grainstones is possible, enabling a fine tuning of petrophysical results, casing decisions, and selection of perforation intervals.

Current borehole technology not only allows an image to be viewed, but also to be statistically evaluated. Based on calculations of numerical image descriptors, a quantitative image facies can be performed. These numerical image descriptors are related to the composition, the texture and the fabric of the penetrated formation which form the visual properties of the borehole images. Applications of computer techniques to facies recognition have obvious advantages and will be examined in this discussion.

Using core photo’s, a detailed core description, open hole logs, and acoustic and resistivity borehole imaging, lithofacies typing to multiple offset wells will be shown. A summary of the initial and refined petrophysical results will also be reviewed.

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