Petrography of Lower Shaunavon Formation carbonate reservoirs in Leitchville/Bone Creek pools and adjacent areas, southwest Saskatchewan, Canada

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Petrographic analysis of the carbonate reservoirs of the Lower Shaunavon Formation in the Leitchville/Bone Creek pools and surrounding area in southwestern Saskatchewan is based on the examination of core and thin sections from twenty wells, as well as geophysical log data from wells penetrating the formation. The Lower Shaunavon Formation is primarily comprised of limestone, with variable minor dolomite and anhydrite, that was deposited in a tropical peritidal environment on a carbonate platform. The reservoir within the Lower Shaunavon Formation is found within coarsening upward peloidal/oolitic wackestone-grainstone shoals.

Based on the study of core, thin sections, and geophysical well logs a deposition model can be developed to understand how/where oil has been trapped within the reservoir, and also to facilitate the development of future drilling prospects. Detailed petrographic analysis also enables the reconstruction of the diagenetic history of the Lower Shaunavon Formation, and its impact on porosity and permeability within these reservoirs. The main diagenetic process within reservoirs of the Lower Shaunavon Formation is the development of primary blocky-sparry calcite cement. Other diagenetic features include: dolomite primarily replacing calcite within shell fragments; anhydrite replacing coral stuctures as a cement, and; intragranular, mouldic/vuggy porosity (8-17%) resulting in variable permeability (0.1 to 10.0 mD). Thus, the spatial distribution of reservoirs within the Lower Shaunavon Formation is primarily related to depositional environment; reservoir quality, however, is strongly influenced by the diagenetic history of this strata in the Leitchville/Bone Creek pools and surrounding area.

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