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**Identification Of Flow Units In Carbonate Reservoir Using Karstification Theory: Neelam Field A Case Study**

Fluid movement in the carbonate reservoirs is much more complex than in sandstone reservoirs, where the porosity and permeability development is quite predictable. In carbonate reservoirs fluid movement is much more guided through the secondary porosity. The secondary porosity is generated through the process of dissolution of carbonate rock by meteoric water. The rainwater dissolves atmospheric carbo-dioxide forming carbonic acid that reacts with the limestone country rock to form various type of solution-induced features. It invades the rock through the cracks, fissures and joints present, widening and enlarging them by dissolving along the walls. Some of the solution-induced features are solution channels, vugs, sinkholes, roof collapses and breccia.

Neelam, a carbonate reservoir in Western Offshore India, is an oil field with a daily oil production of 30000 bpd. In 1994, the field was put on full-fledged production as well as on water injection (peripheral). The front row of producers facing injectors started producing with high water-cut due to early water breakthrough. Efforts to combat this situation met with only partial success. The situation warranted a thorough review of the geo-scientific data and fluid dynamics of the reservoir. Detailed core studies were carried out, which revealed that being associated with an unconformity, the reservoir had undergone extensive diagenetic changes and the invading meteoric waters had generated a lot of secondary porosity in the form of vugs and solution channels. An integrated study of cores and logs has helped in identifying eight major facies in the reservoir. Further, geo-statistical technique has been used for identifying the distribution of facies all over the field to understand the porosity pattern and fluid dynamics inside the reservoir.