CHILTAN LIMESTONE AT ZIARAT NALA SECTION AND ITS RESERVOIR POTENTIAL IN WESTERN SULAIMAN AND KIRTHAR RANGES: AN ELEMENTARY APPRAISAL

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The Chiltan Limestone of Jurassic age has been penetrated by some wells with not so encouraging results. Most of these wells are believed to have drilled in lagoonal / shelf facies of Chiltan Limestone. This paper attempts to demonstrate that Chiltan Limestone has still significant reservoir potential in the western part of Sulaiman and Kirthar Ranges as suggested by the presence of reefs, secondary porosity by dolomitization, dissolutions, fracturing, and formation of ferricrete on the top of Chiltan Limestone in some areas. It is an attempt to make an elementary assessment of the reservoir potential of Chiltan Limestone mainly in the Sulaiman and Kirthar Ranges. It is primarily based on the analysis of outcrops at Ziarat Nala Section, detailed laboratory studies, and integration of the results with regional well data. Chiltan Limestone at Ziarat Nala section exhibits more than eleven microfacies, which represent deposition over platform in middle to outer shelf with an elevated rim of reefs in about northsouth orientation along the western margin of Indian Plate; a unique feature of this age in Pakistan. Corals and sponges are the dominant faunal assemblage of these reefs, which make these analogous to the upper Jurassic reefs of Germany.

Development of secondary porosity in Chiltan Limestone by dolomitization is relatable to at least two phases, which predate and postdate phases of fracturing. First phase of dolomitization occurred by the mixed marine and meteoric phreatic solutions generated because of humid climate (prevalent in middle Jurassic). These solutions formed replacement dolomites with inclusions rich inner core. Subsequent dissolution should have led to generation of significant moldic and vuggy porosities.

The dolomites generally tend to resist compaction and retain porosity developed by dissolution. Fracturing may reduce any adverse effect on porosity by compaction with burial and the dolomites may form porous reservoirs even at considerable depth. In Chiltan Limestone, effective porosity appears to have further enhanced by various phases of fracturing, which provided interconnections and thus promoted permeability. Mesogenetic alteration leading to the formation of Baroque or limpid dolomite, ferroan dolomite and organo-genic dolomites might have created additional porosity and enhanced reservoir potential to Chiltan Limestone. However, this needs to be confirmed by further investigations.

The top of Chiltan Limestone is marked by an unconformity with overlying Sembar Formation suggesting its sub-aerial exposure. Additional porosity in Chiltan Limestone should have also been created by fracturing, dissolutions and de-dolomitization during and after exhumation. All these porosity enhancing processes took place in telogenetic zone. Another important result of of alteration in telogenetic zone is the formation of porous ferricrete on the top of Chiltan Limestone in some areas, which have the potential to become a prolific reservoir.