This paper highlights the petrography and sedimentology study carried out for Khuff gas reservoir of Bahrain field. The topics include a review of the core analysis Electrical, Sonic, Full bore Formation Micro Imager (FMI) logs, X-ray diffraction (XRD) and Scanning Electron Microscope (SEM) studies. The study helped in explaining the mineralogy, dolomitization, diagenesis and evolution of the pore system of the reservoir.

The study indicated four different facies (a) Peloidal-lime-grainstone to Packstone, Skeletal lime grainstone facies which is interpreted as being very coarse grained, deposited relatively with a high energy, shoal environment, (b) Bioturbated-Lime- Mudstone & Lime-wackestones facies, which are interpreted to be that of lagoonal environment. (c) Dolomudstone facies, with dolomitized mud supported sediments are interpreted as shallow, restricted lagoon in a supratidal setting. (d) Dolopackstone facies, interpreted as being deposited within a shoal environment.

According to the study, depositional environment is identified as lagoonal during transgressive phase and shoal during regressive phase. The diagenesis is dominated by compaction indicated by tight textures in mud rich samples and deformation of framework grains. Porosity enhancement is seen due to the grain dissolution and rare fracturing while porosity destruction is carried by compaction of sparse calcite cement and dolomite. Calcite is the dominant mineral in some samples. The clay content is found to be very minor.

SEM analysis showed the presence of good porosity including inter-particle and inter-crystalline porosity. The average porosity is about 17% and the permeability is about 60 md and very few fractures are observed in this formation.

This integrated study helped in understanding the reservoir heterogeneity and its potential based on which current wells were completed appropriately and this would also aid in completing the future wells productively.
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