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Sedimentologic studies of upper sands of lower Goru Formation based on well cuttings and wireline logs from wells of X Field in the subsurface of Sindh Monocline, Southern Indus Basin, Pakistan

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Detailed studies of lithologic successions of upper sands of Lower Goru Formation in the subsurface of X Field of Sindh monocline were investigated by zoom stereo binocular examination and thin section study of well-cuttings in conjunction with the wireline log studies to understand the depositional environment. The gamma ray log response and sonic (DT) logs have been used to identify and successfully correlate the sand bodies with lithologic logs prepared from well-cuttings analysis.

The detailed sedimentological studies of the well cuttings samples of each of the main bodies resolved various lithofacies of meter scale thickness based on their textural signatures (grain size, shape, and sorting). Within the sand unit B a number of distinct coarsening and fining upward sequences can be identified which reflect frequent sea level fluctuations. Textural investigations, particularly of those samples composed predominantly of sand size fractions, show that the mean grain size in the study area is fine to medium grained and vary between 1.8φ and 2.5φ. The samples are moderately- to well-sorted and well-rounded to sub-angular in shape. Mineralogically, the samples comprise mostly of 60-85% quartz grains and only occasionally contain any feldspar grain. Only the fine-grained sandstones of the study area exhibit a slight increase in the amount of feldspar. A few grains of dark colored minerals can occasionally be seen in thin sections. The results further indicate that the sandstones are fairly mature.

The presence of a number of coarsening and fining upward cycles indicates frequent shift in the depositional environments influenced by the sea level changes. Based on overall results, it can be interpreted that the upper sands of the Lower Goru Formation of Lower Cretaceous age in Sindh monocline were deposited in moderate to high energy nearshore sedimentary environment largely influenced by frequently fluctuating sea level.