

## ***Facies analysis, diagenetic properties, environmental condition of the Zakeen Formation in the central part of Persian Gulf***

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### ***Abstract***

The clastics Paleozoic Era deposits especially the Zakeen and Faraghan formations in some locations of the Arabian Plate host hydrocarbon reservoirs, but reservoir potential of these formations has never studied been in north of this plate and the central part of Persian Gulf. The Zakeen Formation (Givetian to Famennian) is completely studied for the first time in one exploration well in the Persian Gulf Basin. The studied section is located on the north-east of the Arabian Plate and is the thickest reported section of the Zakeen Formation. It rests unconformably on Sarchahan Formation (Silurian) and it is covered by clastics of the Faraghan Formation (Lower Permian). This study has investigated petrofacies and microfacies, diagenetic properties and depositional environments of the Zakeen Formation by studying thin sections prepared from cuttings in one well in the central part of Persian Gulf. Results show that the Zakeen Formation is composed of quartz arenite, sub-arkose, arkose, siltstone, claystone, mudstone petrofacies and carbonate mudstone microfacies. Based on sedimentary properties and Palynofacies results, the Zakeen Formation was deposited on clastic shallow marine environment consists of beach plain, shoreface and offshore sub-environments. Main diagenetic processes include compaction, cementation (silicic, carbonate, pyrite and iron oxide), feldspar alteration, sericitization, neomorphism and dolomitization. Heterogeneity of the Zakeen lithology and variety of environmental conditions and diagenetic features created favorable conditions for reservoir feasibility studies.

**Keywords:** Zakeen Formation, Paleozoic Facies analysis, Environmental condition, Persian Gulf