

Chemostratigraphy and Sequence Stratigraphy of the Transition Zone Between Minjur Sandstone Formation and Marrat Carbonates Formation, Outcrop Approach, Central Saudi Arabia

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ABSTRACT

The late Triassic succession in Saudi Arabia is represented by the deposition of the Minjur sandstone Formation, while, the whole Jurassic successions are mostly pure carbonates. Minjur Formation is known as the main aquifer in central Saudi Arabia and as oil reservoir deep in the subsurface in eastern Saudi Arabia. The early Jurassic is represented by the deposition of Marrat Formation which contains hydrocarbon reservoir in the subsurface. Minjur and Marrat Formations are well exposed in central Saudi Arabia in outcrop section of about 90 m. The lower boundary of Minjur was not identified in the study area but the upper boundary clearly defined in outcrop. The lower boundary of Marrat formation is well exposed as well as the transition zone between Minjur and Marrat Formations. The aim of this study was to characterize the transition zone in term of sedimentology, sequence stratigraphy and chemostratigraphy. In the study area, the transition zone was about 20 m in thickness and 50 % of this zone was partially covered by talus. Fresh samples were collected at one-meter interval by digging until reaching the fresh rock samples. Thin sections were prepared for all samples, also, part of the samples were powdered and analyzed by (XRD) and (XRF) techniques. Outcrop gamma-ray measurement tool was utilized also in the field to measure the natural radioactivity for the transition zone. The results of this study revealed that there is a good correlation between the chemical signatures, lithostratigraphy and sequential stratigraphy. Radioactivity increased in the transition zone in comparison to that in the lower and upper zones of Minjur and Marrat Formations respectively. Glauconite increases upward in the transition zone which indicates shifting from inter-continental setting to continental shelf marine setting. The upper part of the zone shows interbedded clastics and carbonates lithofacies which also was clear in the field hand specimens and petrographic thin sections. Some of the geochemical variations within the transition zone could be attributed to energy level, lithofacies change and sea level fluctuations. The results of this study could be useful in constraining and correlating mixed transition zones between siliclastic and carbonate succession could be used as a guide for stratigraphic correlations in the subsurface within Minjur and Marrat reservoirs and other similar equivalent stratigraphic successions in the Arabian Peninsula.