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The Early Miocene Deep Marine Turbidities of Burqan Formation: Facies Characteristics and Reservoir Quality, Midyan Region, Saudi Arabia

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The Early Miocene Burqan Formation turbidite sequences were deposited in a synrift setting associated with the rifting of the Red Sea and the Gulf of Aqaba. These rift-related sequences and their stratigraphic equivalents in the Red Sea and Gulf of Suez are known for their hydrocarbon occurrence. In Lisan basin in Midyan region of NW Saudi Arabia the Burqan Formation subsurface equivalents are known reservoir rocks. In this study facies analysis was carried out on the outcropping rocks bordering the Gulf of Aqaba to characterize the facies and depositional environments and stratigraphic hierarchy of Burqan Formation. The Burqan Formation was deposited in a deep marine submarine fan setting that shows generally a coarsening and thickening upward succession. Stratigraphically, two members are recognized namely the sandstone-dominated Nutaysh member and the mudstone and shale-dominated Subayti member. The Nutaysh member occupies the western and north western part bordering the Gulf of Aqaba is characterized by conglomerate and sandstone channel and sheet turbidites which show mainly a repeated fining upward alteration of sharp-based conglomerate and sandstone facies with subordinate mudstone/shale facies. Facies vary from pebble and cobble conglomerates, pebbly and medium, coarse to very coarse grained sandstone and laminated siltstone, mudstone/shale facies. In contrast, the Subayti member is characterized predominantly of laminated mudstone and shale interbedded with subordinate fine grained sandstone facies. The facies association and their vertical and lateral stacking pattern indicate that Nutaysh member was deposited within proximal to medial submarine fan turbidite channels and sheets. While the Subayti member represents more distal submarine fan lobe environment. Paleocurrent analysis indicates that the flow direction was mainly from N to S and also with some minor directions to SW and SE suggesting that the Late Proterozoic Basement rocks as the sediment source for Burqan. Various factors appear to have controlled the evolution of Burqan Formation including tectonics, sea level change, sediment sources and supply, climate and weathering history. Different scales of depositional and post depositional heterogeneity seems to have affected the reservoir quality and architecture of Burqan Formation.