Facies and Depositional Environments of the Lower to Middle Eocene Dammam Formation in Kuwait

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ABSTRACT

The Lower to Middle Eocene Dammam Formation is the youngest carbonate unit developed in Kuwait. It is about 650 feet thick with a pronounced unconformity at its top. The data for this study included subsurface cores study and observations from its exposures in Al-Ahmadi Quarry. Seven lithofacies were recognized in it, which in ascending order are; Dark grey and brown limestone, Dark grey to black shale, Nummulitic limestone, Parallel laminated limestone, Chalky dolomicrite, Yellowish-brown dolomite, and Karstified dolostone with chert. The Dammam Formation sedimentation started as a result of sea transgression above the evaporitic basin of the underlying Rus Formation. The invading sea water filled the preexisting lowlands in marginal area where basal dark grey muddy limestone was deposited. The overlying brown limestone is shallow water deposits with an undulatory and erosive base likely a TSME surface. Continued rapid transgression developed into a stratified intrashelf basin where semi-anoxic to anoxic conditions prevailed where dark colour shale facies were deposited. Maximum flooding surface Pg20 of the Arabian Plate is suggested to lie within this zone. A Nummulites bank was developed, over likely a paleohigh, depositing Nummulites filled limestone facies. In the back bank boundstone consisting of calcareous sponge, Lockhartia and Nummulites was developed in a protected setting. Upwards, the environments further shallow up resulting into the deposition of parallel laminated bioclastic limestone in intertidal environments. Overlying chalky dolomicrite in its upper part has grey colour mud prone algal lamination and local fenestral structures. This facies was deposited in quite water lagoonal setting with intertidal influence in its upper part. The proceeding yellowish brown dolomite facies has common fenestrae structures and rubbled zones within it along with chert nodules and stringers. This facies is very porous and was deposited in intertidal to supratidal environments. The uppermost dolostone has common chert stringers and bands and common rubbled zones developed by collapsed dissolution cavities likely related to exposure surfaces. The Dammam Formation thus displays a transgressive-regressive depositional sequence. The formation has excellent reservoir characteristics in the form of overall high porosity which exceeds 40% in some zones. Hydrocarbon shows in the form of bitumen remains and oil staining are observed within the formation.