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## Play Concept Evolution and Exploration Success for the Marrat Formation in Kuwait

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Prior to Jurassic exploration efforts over the past seven years in Kuwait, a simple carbonate ramp model (based on sparse, generally poor quality data) was envisaged for the Marrat Formation with basinal facies across the northern part of the country. Hence, north Kuwait was long considered non-prospective for the Marrat. Ongoing sedimentological and petrological studies of ditch cuttings and newly acquired conventional cores, coupled with interpretation of newly acquired seismic and wireline logs, now suggest a broad embayment with ramp margins which extends Marrat prospectivity northward.

The Early Jurassic is marked by the transgressive lowermost Marrat which unconformably overlies the Minjur Formation. Cyclic deposition of mud-dominant carbonates and grain-dominant carbonates locally with interbedded anhydrites resulted in a ramp morphology for the Marrat (?Sinemurian-Toarcian). To date, Middle Marrat reservoirs are structurally-controlled primarily, and typically are associated with inner ramp highstand shoal systems. Cyclicity and diagenesis are critical elements to the ongoing assessment of Marrat stratigraphic traps. Dolomitization plays a key role in reservoir development in middle to outer ramp mud-dominant facies. The Middle Jurassic Dharuma (Bajocian-Bathonian) shale lies unconformably over the Marrat as the top seal.

Aggressive drilling has resulted in a highly successful Marrat exploration play in northern Kuwait involving a low to moderate matrix porosity system enhanced by fracturing. With individual short term and long term test rates of 2400-5700 BOPD of light gravity crude and 4-18 MMSCFD, the Marrat exploration program has confirmed Marrat prospectivity across Kuwait and is adding substantial commercial reserves.

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