

The Emerging Play in Highstand Systems Tract of Burgan Formation in North Kuwait

Azim, Saikh A.¹; Hassan, Yahya¹; Najeh, Hamad M.²; Al-Otaibi, Basel¹; Mousawi, Ahmad²; Al-Saad, Bader¹ (1) Growth Study Team (NK), Kuwait Oil Company, Ahmadi, Kuwait. (2) Fields Development Team (RA), Kuwait Oil Company, Ahmadi, Kuwait.

A Highstand systems tract, during Albian stage, is the dominant non-siliciclastic litho-unit in North Kuwait. Named as Middle Burgan, it occurs between two low frequency Lowstand systems tracts of Burgan Formation and is represented by marginal quality mud prone rocktypes. In the quest of finding oil from difficult reservoirs, the Middle Burgan was given due focus in Raudhatain area of North Kuwait. A detailed study followed by a sustained production from five wells have moved it to the forefront of activity in North Kuwait.

Our study involves regional mapping of the Middle Burgan and a detailed reservoir characterization which integrates geological, geophysical and log data, builds Static models, estimates deterministic and probabilistic in-place oil and establishes production potential.

Regionally, the sequence was deposited in a shoreface to marine environment with fine grained and glauconitic sandstones of shoreface and shelfal origin with moderate reservoir quality containing hydrocarbon. Log and core motifs indicate the Middle Burgan to consist of stacked progradational parasequence sets within a highstand systems tract as relative sea level rose after the deposition of the Lower Burgan.

The study identified 7 parasequence sets from the flooding surfaces. The layering scheme has incorporated core description and log signature within a sequence stratigraphic framework. Three broad progradational packages with 8 layers were identified and correlated throughout the field. The uppermost package contains most of the oil bearing sand within low frequency cycles of shoreface to shelfal deposits. The other two packages have very fine grained sands, sometimes capped by thin nodular limestone. Most part of the packages contain structure-less mudstones.

Higher resolution Static models appropriate for estimating in-place oil have layerings to honor the depositional settings. Different log interpretations were used in the models to get a range of results under diverse scenarios.

The uncertainty associated with the traditional log evaluations is reflected in huge variations in in-place oil with different cutoffs. Reinterpretation of logs, coring, sampling, core-log calibration and well testing were carried out to minimize the uncertainty associated with identifying and evaluating thin glauconitic shaly sands. The paper describes the value of the play, challenges of evaluating the marginal reservoir and the process adopted for delineation and development