AAPG International Conference
Barcelona, Spain
September 21-24, 2003

Mubarak Al-Hajeri[1], Swapan K. Bhattacharya[1], Awatif Al-Khamis[1] (1) Kuwait Oil Company, Ahmadi, Kuwait

Characterization of Najmah Source Potential - A Basic Input for Evaluation of Mesozoic Petroleum System in Kuwait

Najmah Formation comprises of thin algal/micritic limestones at the upper and lower boundaries separated by a thick black laminated calcareous mudstone (BLM) of Upper Jurassic age and has been described as the major source rock in Kuwait to feed all the Cretaceous, Tertiary and even the Middle to Lower Jurassic reservoirs. Chemically this BLM facies shows high TOC (total organic carbon) and HI (hydrogen index) together with good oil-source biomarker correlation to justify the good source potential and is also substantiated by high gamma log response with favourable sapropelic palyno-facies.

But pyrolysis-gas chromatograph (py-GC) results do not qualify oil prone kerogen, the oil-source correlation using other parameters except biomarkers are not favourable (Jurassic oils are more matured, more saturates in de-asphaltene fraction and isotopically heavier in aromatic fraction than Najmah extracts). The system efficiency (percentage ratio of hydrocarbon expelled to established reserves) shows abnormal high value over 60%.

In this situation an assessment is made to see if this high TOC and HI are geologically related to sedimentation or if this TOC together with HI are externally added to calcareous mudstone of Najmah Formation to ultimately make it to carbonaceous marl facies. This has been possible by studying the interrelationship of each of TOC, S2 (generative potential) and HI for individual closely spaced samples of Najmah core. The study indicate although the total amount of carbon deposition is not impossible but TOC, S2 and HI variations of consecutive closely spaced samples are not geologically related with sedimentation suggesting Najmah Formation to be a probable pseudo source and any future exploration based on this system would increase the exploration risk.