The Jurassic Petroleum System of Kuwait

Shahad A. Al-Enezi[1], Salem AlAli[1], and Awatif AlKamiss[1]

[1]Kuwait Oil Company, Ali Sabah Al-Salem, Kuwait.

ABSTRACT

The Jurassic petroleum system and its elements are established in most parts of the Arabian Peninsula, and is well understood in Kuwait due to the abundance of exploration data. It was investigated using source rock characterizations and basin modeling techniques. Jurassic can be considered as a closed petroleum system where the Najmah is the major source rock for main Jurassic reservoirs like Najmah, Sargelu and Middle Marrat. In general, Najmah is an excellent source rock with richness (average TOC value is 7%) across the whole of Kuwait Area in present day. This organic-rich source beds comprises bituminous shales, bituminous limestones and pelloidal wackstones and packstones. Najmah has produced light oil and condensate from North Kuwait and medium oil from West and South Kuwait. A multi well 1D modeling was used to assess the time of generation and migration of the source rock. In addition constructing a petroleum system event chart. Regarding the calibration modelling results, observed data such as subsurface temperature and vitrinite reflectance helps to check the quality of BPSM (basin petroleum system modelling), there was a good match between calibrated and observed data. 1D petroleum system modeling shows that Najmah source rock started to generate hydrocarbons at 115 Ma and has reached the expulsion phase at 0.65% vitrinite reflectance and 30% transformation ratio (medium oil window). Furthermore, the petroleum system event chart shows when the essential elements and processes took place, as well as the preservation time and critical moment of the system with an estimation of approximately 75 Ma. The significance of this study is to understand Jurassic petroleum system by integrating source rock characterization and basin modeling workflows.