Reservoir and Production Challenges in Complicated Tight Carbonate Reservoir in the Bahrain Field

Rabab Abdulla[1], Mike Dowen[1], and Khamis Al Abdali[1]

[1]Tatweer Petroleum

ABSTRACT

The Ostracod and Magwa reservoir is the Upper Member of the Rumaila Formation in the Bahrain Field. The Ostracod-Magwa zones consist of inter-bedded limestone and argillaceous limestone layers. The matrix has very low permeability, well below production permeability. Estimated STOIIP is more than one million barrel of oil.

Ostracod and Magwa reservoirs were previously treated as secondary targets when deeper wells were salvaged for completion in the Ostracod/Magwa zones. Tatweer launched a drilling program for dedicated Ostracod and Magwa wells in late 2010. While the initial production response was good, production from those wells declined rapidly. By 2013, it was realized that the Ostracod-Magwa wells had a large range of production performance and were generally not performing as well as it was initially expected.

The objective of this paper is to highlight current petrophysical and geological understanding of Ostracod Magwa carbonate reservoir and identify challenges associated with increasing reservoir productivity. The workshop will be utilized as a venue to discuss with petrophysical expertise the following challenges faced in the Ostracod Magwa development:

- The reservoir has low reservoir permeability with production behavior reflects possible contribution from fractures, however, recent image log reviews do not support presence of fractures – could be other type of secondary permeability?
- Understanding production conformance is challenging in Ostracod Magwa due to the low production (below production logging resolution). How can we understand the contribution of the 56 units in this inter-bedded tight limestone?
- Completion strategy is to perforate all net pay, therefore there is an opportunity for improving cost efficiency if production contribution is clearly understood. The workshop will help to understand the production behavior of Ostracod Magwa. It is also expected to define technical solutions for understanding production conformance and therefore, better define opportunities for future development.