

Integrating Production and XPT analysis for field development in Complicated Carbonate Reservoir

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ABSTRACT

For mature oil fields with complicated reservoir architecture, reservoir surveillance is a key to track the reservoir performance. The reservoir surveillance may include various monitoring tools from complicated horizontal production logging tools down to regular well tests. One of the key surveillance is running formation pressure measurement tools such as PressureXpress (XPT) or as historically known to the industry, RFT. This paper describes the use of this important tool integrated with production data to understand the reservoir production and depletion behavior and hence support the field development plan.

This paper describes a study done on the Ostracod and Magwa reservoirs; complicated carbonate reservoirs in Barhain Field. Ostracod Zone is a sequence of inter-bedded limestone and shales in the upper Rumaila formation of the middle Cretaceous Wasia group. It is over 200ft thick and consists of three main units B0, B1 and B2. Magwa reservoir is the lower member of the Rumaila Formation. It is 120 ft thick conformably underlies the Ostracod reservoir. It consists of three main units M1, M2 and M3.

This study had four main objectives:

- 1) Evaluating the pressure depletion from the initial reservoir pressure for each unit in both reservoirs. This defined the existence of flow barriers in this inter-bedded complicated carbonate.
- 2) Evaluating the relationship between pressure depletion in each unit and the spacing between offset wells to XPT location.
- 3) Evaluating the Ostracod / Magwa pressure depletion per unit with time.
- 4) Linking the pressure depletion to the cumulative production from the area offset the XPT data.

The results of this study helped define the depletion risk on the future infill opportunities in such complicated reservoirs. It also helped on locating the highly depleted units and determining the optimal locations for the new infill wells.