

Water Flooding in AFPC

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1. Introduction

Al Furat Petroleum Company (AFPC) is a joint venture company located in Syria. It operates some 40 oil fields located in the Euphrates Basin in Eastern Syria. The reservoirs are mainly sandstone and contain light oil. They show a wide range of complexity from marine massive sandstones to fluvial channel networks. Water injection has been applied at early stages in most of the fields so after about 15 years of production under water flooding, this provide a very good set of case histories, reservoir analogues and benchmarks for waterflooded fields. In this paper, we will try to present how water flooding has been implemented and reservoirs managed to reach to relatively high recovery factors.

2. Justification

Water injection has been applied in fields where the natural water drive is not sufficient to maintain pressure and production with the objective to maximize the ultimate recovery from these fields. Initial reservoir studies predicted that if we had continued production depending on the available natural drive mechanisms, the recovery factors would have ranged from 5 – 30 %, which is considered too low given the nature of fields' reservoirs and oils.

3. Patterns

3.1 Peripherally: This pattern has been applied mainly in the Rutbah formation, which is a thick marine sandstone relatively homogeneous reservoir.

3.2 Line Drive: This pattern has been applied mainly in the Mulussa F formation, which is fluvial channels, low N/G relatively more complex compared to the previous Rutbah reservoirs.

4. Benefits

4.1 Maximize Recovery Factors

Field	RF without WI	RF with WI
Abu Hardan	25	50
Al Ayya	17	50
Azraq	31	54
El Isba	0.2 - 0.3	0.4 - 0.5
Galban	35	50
Jarnof	25	50
Jazeih	16- 29	40 - 50
Jido	15	50
Omar	0.1 - 0.25	0.3 - 0.5
Saban	19 - 28	35 - 45
Sijan	18 - 35	50 - 60
Tanak	36	53
Tayyani East	9	27

One big benefit of applying water injection in AFPC fields is reflected in the obvious increase in recovery factors. Table (1) shows a big range in recovery factors which is mainly a result of the geological complexity. The formations show a wide range of complexity from marine massive sandstones to fluvial channel networks and therefore also a wide range in recovery factor.

Table (1) Recovery Factor Comparison with and without Water Injection

gathering activities in support of Reservoir Surveillance and Management of the waterflood progress.

7. Conclusions

- Water flooding has generally shown very good performance in AFPC fields with recovery factors reaching to over 60 %.
- Any disappointing results are mainly related to the complexity and heterogeneity of some reservoirs.
- Reservoir monitoring and management are key tools to guarantee and maintain good water flooding performance.
- There are always challenges against successful water flooding projects, however, identifying these challenges as early as possible will help solving them on time and minimize their impact on the total expected reward from water.

8. References

- ARPR 1.1.2007 AFPC
- Field FDPs
- AFPC Well Service Reports
- AFPC HSE handbook



Mohammad holds a Bsc degree in Petroleum Engineering from Homs University in Syria since 1995. He worked as a field engineer in Syrian Petroleum Company from 1995 to 1996.

In 1996, he started work in AFPC as a Reservoir Engineer and currently he is Deputy Reservoir Engineering Discipline Head and also the EOR Focal Point.