N448: Practical Reservoir Performance Analysis

Instructor(s): Alun Griffiths

5 Days	Competence Level: Skilled
Classroom Course	

Summary

This course describes the tools used by Petroleum Engineers to analyse and predict the performance of hydrocarbon reservoirs. It covers methods for interpreting well and reservoir performance; estimating recovery factors from primary, secondary and tertiary recovery processes; predicting flowrates from oil and gas wells; assessing the performance of both fractured and non-fractured reservoirs.

Learning Outcomes

Participants will learn to:

1. Appraise the principles that govern hydrocarbon flow in the subsurface.
2. Assess qualitatively the dynamic performance of hydrocarbon reservoirs.
3. Estimate the production rate from a well based on its performance characteristics.
4. Evaluate the principles of well test analysis.
5. Estimate the recovery factor under primary, secondary and tertiary recovery.
6. Predict the performance of oil and reservoirs using a variety of simple models.
7. Characterise the limitations behind the techniques described during the course and ways in which they may be improved.

Duration and Training Method

This is a 5-day course consisting mainly of lectures, supplemented by integrated class exercises which apply the techniques described to typical subsurface data-sets in order to solve petroleum engineering problems of practical interest. Two data-sets are used: one for a field in the pre-development phase and another for a field already in production.

Who Should Attend

The course is ideal for geoscientists and other non-petroleum engineers seeking a more detailed knowledge of Reservoir and Petroleum Engineering and its application to real-life problems. The course is also for suitable for Reservoir and Petroleum engineers who require a refresher in this area.

Prerequisites and Linking Courses

Participants should be comfortable with the use of Excel and should have a basic understanding of Petroleum Engineering.   A pre-read document will be provided that summarises the basic knowledge assumed by this course.

Course Content

The course is structured as follows:

Day 1 (introduction)
-Introduction
-Basic principles
-Decline curve analysis
-Reserves

Day 2 (well performance)
-An introduction to the radial flow equation
-Practical solutions to the radial flow equation (PI, well testing, aquifers)
-Inflow performance (oil & gas)
-Outflow performance (including stimulation & artificial lift)
-Well testing and well test analysis

Day 3 (primary drive reservoirs)
-Phase behaviour recap
-The Black oil model
-Sampling & lab experiments
-Other sources of PVT data (simple flash calculations, compositional modelling, correlations)
-Material balance (incl. prediction of RFs)
-Aquifer modelling

Day 4 (secondary and tertiary drive reservoirs)
-Relative permeability & capillary pressure recap
-Laboratory measurements
-Vertical sweep efficiency (the fractional flow equation)
-Areal sweep efficiency (streamlines)
-Relative permeability curves for real reservoirs (pseudo curves)
-Introduction to EOR techniques
-Fractured reservoirs

Day 5 (production forecasting)
The q vs Q curve
Production profiles based on exponential decline
Introduction to tank models
Introduction to reservoir simulation