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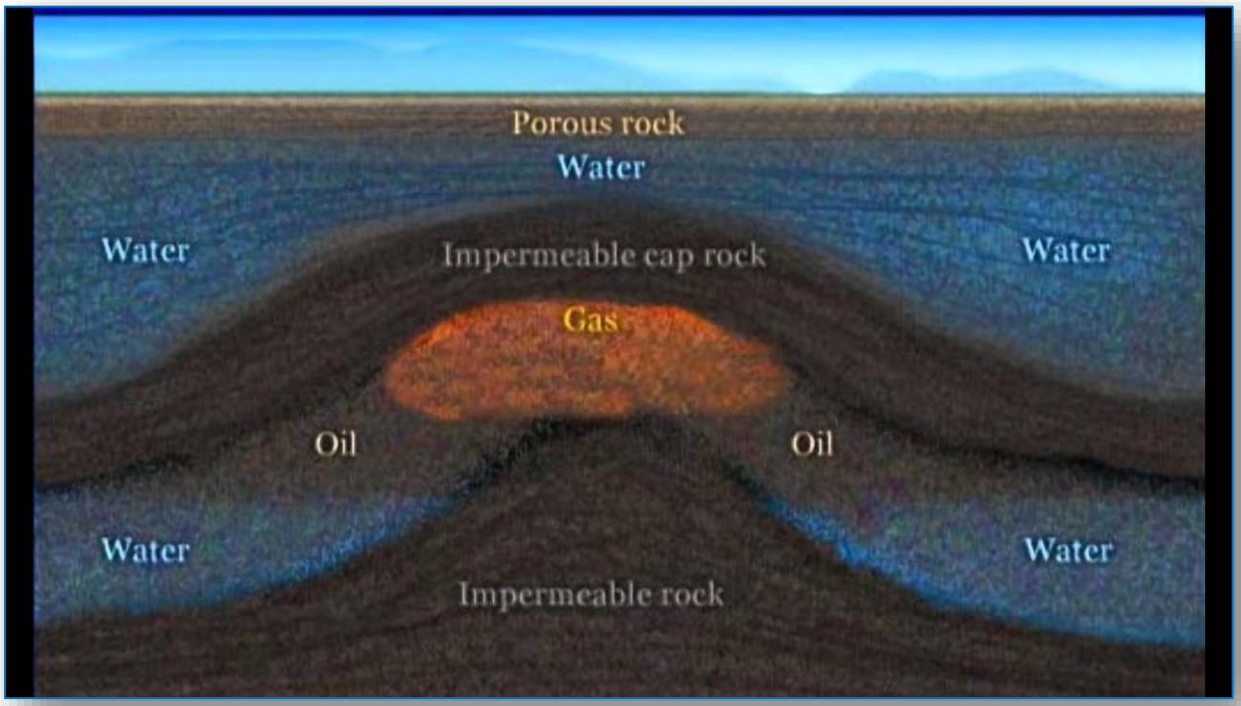
المركز العالمي للتدريب والتطوير
International Centre For Training & Development



DE111
The Practice of Reservoir Engineering

Course Introduction:

The Practice of Reservoir Engineering has been designed for those in the in the oil industry requiring a working knowledge of how the complex subject of hydrocarbon reservoir engineering can be applied in the field in a practical manner.

Reservoir engineering is a complex subject for two reasons. In the first place, we never see enough of the reservoirs we are trying to describe. Therefore, it is difficult to define the physics with any degree of certainty. The second problem is that even having selected a sensible mathematical model there are never enough equations to solve for the number of unknowns involved. The latter problem extends across the broad spectrum of the subject, from material balance application to well test interpretation and leads to an inevitable lack of uniqueness in describing reservoirs.

Course Objectives:

Upon successful completion of this course, the delegates will be able to:

- ✓ Gain an up-to-date knowledge on advanced pressure transient testing
- ✓ Identify the various analysis methods used in pressure transient testing
- ✓ Recognize the various wellbore conditions and as well as the effect of reservoir heterogeneities on well responses
- ✓ Analyze the effect of reservoir boundaries on well responses
- ✓ Acquire knowledge on the process of multiple well testing
- ✓ Determine the application of pressure transient testing to gas and multiphase reservoirs
- ✓ Gain knowledge on the features of the special tests applicable such as DST, impulse test, constant pressure test and vertical interference test
- ✓ Discuss the practical aspects of well test interpretation

Who Should Attend?

This course is intended for production, operations, petroleum and reservoir engineers, geologists, analyst's field personnel, senior technicians and field supervisors with an engineering background and analysts involved with the design, supervision and interpretation of well tests who need to obtain a better understanding of the advanced practices used in pressure transient tests and its advanced interpretation models.

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Course Outline:

Day 1:

INTRODUCTION TO RESERVOIR ENGINEERING

- Activities in reservoir engineering
- Basic themes of the text
- The role of reservoir engineers
- Technical responsibilities of reservoir engineers
- The physical principles of reservoir engineering

Day 2:

THE APPRAISAL OF OIL AND GAS FIELDS

- Pressure-volume-temperature fluid properties for oil
- Calculation of the stock tank oil initially in place
- Field unitization/equity determination
- Calculation of gas initially in place
- Pressure-depth plotting
- Application of the repeat formation tester
- Pulse testing using the repeat formation tester
- Appraisal well testing
- Extended well testing

MATERIAL BALANCE APPLIED TO OIL FIELDS

- Derivation of the cumulative material balance for oil reservoir
- Necessary conditions for application of material balance
- Solving the material balance
- Comparison between material balance and numerical simulation modelling
- The opening move in applying material balance
- Volumetric depletion fields
- Water influx calculations
- Gascap drive
- Compaction Drive

Day 3:

OIL WELL TESTING

- Essential observations in well testing
- Well testing literature
- The purpose of well testing

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- Basic, radial flow equation
- Constant terminal rate solution of the radial diffusivity equation
- The transient constant terminal rate solution of the radial diffusivity equation
- Difficulties in application of the constant terminal rate solution of the radial diffusivity equation
- Superposition of CTR solutions
- Single-rate drawdown test
- Pressure build up testing
- Miller, Dyes, Hutchinson (MDH) pressure buildup analysis
- Horner pressure buildup analysis
- Some practical aspects of appraisal well testing
- Practical difficulties associated with Horner analysis
- The influence of fault geometries on pressure buildups in appraisal well testing
- Application of the exponential integral
- Pressure support during appraisal well testing
- Well testing in developed fields
- Multi-rate flow testing
- Log-log type curves

Day 4:

WATERDRIVE

- Planning a water flood
- Engineering design of waterdrive projects
- The basic theory of waterdrive in one dimension
- The description of waterdrive in heterogeneous reservoir sections
- Waterdrive under segregated flow conditions
- Waterdrive in sections across which there is a total lack of pressure equilibrium
- The numerical simulation of waterdrive
- The examination of waterdrive performance
- Difficult waterdrive fields

Day 5:

GAS RESERVOIR ENGINEERING

- PVT requirements for gas-condensate systems
- Gas field volumetric material balance
- The dynamics of the immiscible gas-oil displacement
- Dry gas recycling in retrograde gas-condensate reservoirs

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Course Certificate:

International Center for Training & Development (**ICTD**) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionaires
- Group Work
- Discussion
- Presentation

Course Fees:

To be advised as per the course location. This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session