Applied Reservoir Petrophysics and Characterization

Course general description:

The course aims to increase the knowledge of the geologists, geophysicists and the others who are working in the field of oil and natural gas production. This course covers the whole range of applied core analyses and open hole log tools and their applications. This is a wide-ranging course that effectively covers all the logging techniques in open boreholes. The course starts with an overview of the reservoir rock properties and reservoir fluids. This is an essential factor as a background to the various logging techniques and their interpretations. Applied core analyses and logging tool principles will also be presented. The attendees will feel that they became more professional, and know more about the geologic description and exploration of the underground rocks/reservoirs using the well logging techniques. They will be able to evaluate the reservoirs and assess their performance. The comprehensive course documentation has been designed as a useful guide for future reference.

Audience:

This course is designed for:

1. Geologists
2. Petroleum Geologists
3. Geophysicists
4. Wellsite geologists
5. Drilling engineers
6. Stratigraphers
7. Geochemists,
8. Petroleum engineers
9. Production Engineers
10. Petrophysicists.

Course objectives:

By end of the course participants will learn:

1. Identify the different rock types.
2. Identify the porosity and permeability for reservoir rocks.
3. Know the factors controlling the porosity and permeability.
4. Know the different porosity-permeability relationships and Models.
5. Know the electric properties of sedimentary rocks.
6. Know more about resistivity of rocks and measuring Archie's parameters.
7. Know more about relative permeability and wettability.
8. Know more information on the MICP test.
9. Know what is the X-ray computer tomography (X-ray CT scan)?
10. Know more about the Porosity Logs.
11. Know more about the Radioactive Logs.
12. Know more about the SP Logs.
13. Know more about resistivity of rocks and measuring Archie's parameters.
14. Know more about the resistivity logs.
15. Calibration of well logs and integration with core data.
16. Know more about Advanced logging tools.
17. Formation Evaluation using well logging.
18. Know more about Dipmeter, RFT and FMI techniques.
19. Know more about NMR and MDT logs.

Course duration:

5 days

Course Location:

Dubai

Course Contents:

Day 1: Pore Volume and conductivity; Measuring and characterization (RCAL)

- Coring and Sample Preparation for Petrophysical measurements and petrographical studies.
- Studying the petrography of porous rocks and their diagenetic history.
- Porosity and the different classifications of pore spaces.
- Measuring porosity and density.
- Factors governing porosity values.
- Permeability and classification of Permeability.
- Measuring Permeability.
- Factors affecting the magnitude of permeability values.
- Specific and relative Permeability.
- Porosity-Permeability relationships and Models.
- Estimation of oil reserves.
- Apparent and true electric resistivity.
- Formation resistivity factor.
- Factors controlling the electric properties.
- Determination of Archie's parameters, a, m and n.
- Electric Pore Fabrics.
- Case Study.

Day 2: MICP, Wettability and Relative Permeability (SCAL)

- Relative Permeability measurements.
- Wettability.
- Mercury Injection Tests (MICP); theory and applications.
- X-ray computer tomography (X-ray CT scan).
- NMR.
- Case Studies.

Day 3: Porosity and Lithology logs

- Neutron Log.
- Gamma ray (GR) and Gamma-spectrometry logs (SGR).
- Geological applications of GR and SGR.
- Density and sonic logs.
- Combination Neutron-Density Log.
- Pe curve.
- Interpretation, Porosity and shale volume calculation.
- Correlation between core analysis and well logging.
- Well log calibration and corrections.
- Spontaneous Potential log.
- Resistivity and Induction Electric log.
- Dual Induction Focused and Laterologs.
- Dual Laterolog-Microspherically Focused log.
- Shale and Sw evaluation.
- Determination of a, m and n from the logs.
- Case study.
- Workshop; Formation evaluation using the conventional logs and core analyses.

Day 4: Imaging bore hole and NMR Logs

- Electrical Formation imaging logs (Dipmeter, FMS and FMI).
- Acoustic Televiewers 'ATV' Tools.

- Conjunctive acoustic and electrical imaging Tools.
- Slim-hole imaging televiewers Tools
- Lithologic and structural interpretation.
- Case studies.
- Nuclear Magnetic Resonance (NMR).
- NMR diffusion for fluid-type discrimination using T1, T2 relaxations.
- Case studies

Day 5: Integrated Reservoir Characterization and Formation evaluation

- Repeat Formation Tester measurements (RFT).
- Moduler Dynamic Tester (MDT) logs.
- Permeability Determination from Logs & Pressure Measurements:
- Quick Look Interpretations.
- Workshop: Integrated Reservoir Characterization using advanced techniques.
- Case studies
- Closing session.

Methodology:

- 50% lectures & concepts
- 10% Videos
- 20% Case studies
- 10% Exercises
- 10% Discussions

Course code: (TEXP003)