PETROPHYSICS
ADVANCED

arctic
SOLUTIONS DMCC

GEP002

COURSE DESCRIPTION

The course will introduce the participants to the Advanced Interpretation Methods of Petrophysics and Formation Evaluation, which is an indispensable discipline in petroleum exploration and production, in particular the integration of Petrophysical data with conventional core data as well as with seismic data for Reservoir Modelling and Reservoir Characterization.

COURSE GOAL

To enhance the participants' knowledge, skills and abilities necessary to undergo a basic review of the logging tools as well as the measurements made by the logging tool, and the transformation of the measured data into useful reservoir parameters such as Porosity, Permeability, Water saturation for hydrocarbon reserves estimations and also to understand the link and/or relation between Petrophysics and seismic interpretation, seismic reservoir characterization and static reservoir modelling.

COURSE OBJECTIVES

By the end of the course, participants will be able to:

- Familiarize participants with logging methods and measurements in formation evaluation.
- Develop the skills to transform logging data into reservoir parameters like porosity, permeability, and water saturation.
- Understand the integration of petrophysical data with core data and seismic data for reservoir modeling and characterization.
- Gain knowledge of the fundamentals of formation evaluation and the borehole environment.
- Learn about various logging methods including electric, electromagnetic, acoustic/sonic, nuclear, and imaging methods.
- Acquire the ability to interpret and analyze log data for reservoir characterization and identification of permeable zones.
- Explore advanced interpretation methods such as clay/shale determination, porosity determination from different logs, and saturation determination.
- Develop skills in interpreting dipmeter and wellbore image logs for structural analysis.
- Gain insights into pitfalls and challenges in formation evaluation.
- Understand the application of petrophysics in seismic reservoir characterization and its relevance to reservoir modeling.
- Learn about AVO (Amplitude Variation with Offset) and AVA (Amplitude Variation with Angle) as they relate to petrophysics.

WHO SHOULD ATTEND

- Geologists
- Well Data Managers
- Geophysicists
- Petrophysicists
- Geotechnicians
- Others who use log data on a daily basis

COURSE DURATION

5 Working Days

COURSE OUTLINES

1. Introduction to Logging Methods

   - Empirical methods of Formation Evaluation
   - Petrophysical properties of reservoir rocks.
   - Reservoir rocks and types.
   - Porosity ranges.
   - Permeability.
   - Capillary pressure (Pc).
   - Water saturation (Sw) Archie method.
   - Water saturation (Sw) Dual-water method.
   - Fundamentals of Formation Evaluation.
   - The borehole and its environment.
   - Open-hole and cased-hole logging methods.
   - Electric and electromagnetic methods - Resistivity, Conductivity, Induction.
   - Picket Plots.
   - Spontaneous Potential (SP logs).
   - Acoustic / Sonic methods.
   - Velocity surveys.
   - VSP data acquisition (2D, 3D).
   - Nuclear methods (FDC).
   - Nuclear Methods (CNL).
   - Nuclear Magnetic Resonance (NMR) methods.
   - Petrophysical Imaging methods.
   - LWD and MWD techniques.
   - Dip Meter methods.

- Gamma Ray (GR methods).

- Coring and core investigations.

- Core-to-log data integration.

- Log analysis & Formation Evaluation.

- Reservoir characterisation.

2. **Statistical Curvature Analysis Technique - SCAT**

- Introduction to Dipmeter and wellbore Image logs.

- Curvature models.

- Dip components.

- Uniform dip analysis.

- Folded geological structure analysis.

- Faulted geological structure analysis.

- Tangent diagrams.

3. **Basic Interpretation Methods**

- Clay / Shale type determination.

- Volume of Shale (Vsh) & Volume of Clay (Vcl) from GR.

- Volume of shale (Vsh) & Volume of Clay (Vcl) from FDC logs.

- Porosity (φ) from Sonic logs (Slowness or ITT).

- Porosity (φ) from Density logs (FDC).

- Porosity (φ) from Neutron logs (CNL).

- Water saturation (Sw) from Resistivity and SP logs.

- Pitfalls of Formation Evaluation.

- Permeable zones (qualitative interpretation).

4. **Advanced Interpretation Methods**

- Combined determination of porosity and rock composition.

- Logging charts.

- Cross-plot methods.

- Introduction shaly-sand interpretation.

- Fractured reservoir characterisation.

- Saturation determination.

- Movable fluids determination.

- Permeability estimationThin-bed evaluation.

- Seismic reservoir characterization for Reservoir Modelling.

- AVO & AVA as it relates to Petrophysics.