



Arabian Institute For Training

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# Open and Cased Hole Log Interpretation

## INTRODUCTION

- This interactive, applications-driven 5-day Open and Cased Hole Log Interpretation training course will highlight the techniques and principles of the main open and cased hole logging tools used in the oil industry for professionals who needs to deal with wireline logs in their daily job.
- This training course will explore the tools response explained from their physical principles as well as their relationship with the rock and fluid properties, most common open and cased hole logging technologies will be covered explaining their main applications and limitations. Interpretation methods will be discussed with examples and exercises.

This training course will feature:

- Discussions on open hole tools physical principles and applications
- Tool limitations on different borehole environments
- Tips and examples to identify and understand common logging issues
- Explanation of petrophysical concepts and techniques for basic log interpretation
- Cement and corrosion evaluation tools principles and applications
- Cased hole resistivity, porosity and saturation tools
- Application of interpretation methods in some examples and exercises

## OBJECTIVES

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

- Understand the physical principles of main open and cased hole logging tools
  - Know the main applications and limitations of the different tool readings
  - Perform a quantitative formation evaluation on a simple lithology
  - Understand the uses and interpretation of open and cased hole logging tools
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## TRAINING METHODOLOGY

- This Open and Cased Hole Log Interpretation training course will utilise a variety of proven adult learning techniques to ensure maximum understanding, comprehension and retention of the information presented, the sessions will include visual, auditory and kinesthetic elements to cover the three different learning modalities. The daily sessions will be highly interactive and participative. This involves regular discussion of applications as well as hands-on exercises that will be solved manually and/or using Microsoft Excel.

## ORGANISATIONAL IMPACT

The organization will benefit because:

- Having their personnel trained on log interpretation will help reduce human mistakes and improve efficiency
- The cement evaluation training provided will enable the participants to properly interpret cement bond logs allowing for more informed decisions on casing and well integrity issues
- Their personnel will be able to better assess data quality and integrity
- Their personnel motivation will increase as they understand better some critical data that is needed for their daily job

## PERSONAL IMPACT

Attendees will gain by participation in this training seminar as a result of:

- Obtaining a full understanding of logging tools principles and applications
- Learning the principles and key indicators for log quality assurance and quality control
- Learning basic and advanced methods and techniques for log interpretation
- Getting awareness of the safety policies involved on operations with explosives

## WHO SHOULD ATTEND?

This training course is suitable to a wide range of professionals but will greatly benefit:

- Engineers in exploration and production departments
  - Geologists, Geophysicist and Petrophysicist
  - Petroleum, Reservoir and Drilling Engineers
  - In general, all other oil & gas industry professionals who are involved in logging data interpretation and validation
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## Course Outline

### Basic Concepts Review, Resistivity and Conductivity Tools

- Basic Well Logging Concepts
- Auxiliary Measurements, Applications and Common Issues
- Basic Measurements: Gamma Ray and Spontaneous Potential
- Resistivity Theory, Principles and Applications of Laterologs
- Microresistivity Devices, Principles and Applications
- Conductivity Tools, Uses and Limitations
- RT and Invasion Profile Determination

### Nuclear, Acoustic and Geological Logging Tools

- Formation Density Tools - Principles and Applications
- Neutron Tools Principles and Applications
- Porosity Determination from Density and Neutron Logs
- Lithology Determination and Calibrations
- Basic Sonic Tools - Borehole Compensation
- Dipole Sonic Tools - Applications
- Mechanical Properties - Determination and Uses
- Dipmeter Interpretation Principles
- Geological Image (resistivity and ultrasonic) Logging Tools
- Structural and Stratigraphic Interpretation Principles
- Facies Analysis for Reservoir Characterization with Image Logs

### Advanced Logging Tools and Formation Testers

- Nuclear Magnetic Resonance - Applications and Limitations
  - Relaxation Mechanisms and their Association with Fluid and Rock Properties
  - Porosity, Irreducible Water Saturation and Permeability Determination
  - Advanced Fluid Determination Methods: 3D map T1-T2-Diffusion
  - Dielectric Tools Principles and Applications
  - Saturation Determination Parameters,  $m$ ,  $n$  and CEC
  - Geochemical Logging Tools - uses and limitations
  - Reservoir Pressure Determination Tools
  - Pre-test Interpretation - common issues
  - Pressure Gradient Interpretation and Examples
  - Fluid Sampling, Optical and Composition Fluid Analyzers
  - Advanced Orobos for Special Well and Reservoir Conditions
  - Permeability Determination
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## Cased Hole Logging Tools

- Cement Evaluation Logs: CBL-VDL. Interpretation and LQC
- Ultrasonic Cement Evaluation Tools
- Corrosion Logging Tools
- Saturation Determination in Cased Hole
- Pulsed Neutron and Carbon / Oxygen Tools
- Cased Hole Resistivity and Porosity Tools
- Comparison with Open Hole Logs
- Formation Testers in Cased Hole
- Basic Production Logging Sensors
- One and Two-phase Fluid Analysis
- Multi-phase Fluid Analysis with Advanced Sensors

## Well Perforating and Basic Formation Evaluation Techniques

- Well Perforating Principles and Techniques
  - Formation Evaluation Principles
  - $R_w$  Determination Methods
  - Crossplots Utilization, Hingle and Pickett Plots
  - Graphical Interpretation Techniques for Porosity and Lithology
  - Saturation Determination Equations and Techniques
  - Complete Formation Evaluation for Simple Lithology
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