

# WELL-SITE GEOLOGY AND OPERATIONS

## GEO009

### COURSE DESCRIPTION

A large amount of geological data is acquired at substantial cost during a drilling operation. Ensuring optimal quality of this data and its effective reporting plays a key role during well design and drilling operations, and later use of this data in field studies. A key requirement for success is close cooperation between geological, drilling and engineering functions. This course provides a thorough overview of well-site data acquisition and quality control. Participants will learn the techniques used by Well-site Geologists, Logging Geologists (mud loggers) and Operations Geologists functions through interactive lectures that are integrated with practical exercises. Participants will also gain an understanding of the application of well-site data in exploration and development.

### COURSE GOAL

To enhance the participants' knowledge, skills and abilities necessary in the field of operation and well-site geology from drilling & mud logging procedures to testing and well and formation evaluation.

### COURSE OBJECTIVES

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

- Differentiate between petroleum geology, operations geology, well-site geology and structural geology.
- Understand drilling operations and logging operations.
- Perform well-site roles and responsibilities
- Apply formation pressure evaluation techniques at the well-site.
- Select logs and analyze quality.

### WHO SHOULD ATTEND

- Geologists.
- Geo-scientists.
- Petroleum engineers.

### COURSE DURATION

5 Working Days

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## COURSE OUTLINES

### 1. Introduction

- What is an Operations and Wellsite Geologist?
- Exploration and Drilling Programs – Risk assessment, regional analysis, pre-drill data acquisition.
- Components of a prospect

### 2. Overview of Petroleum Geology

- The Petroleum system – elements & processes
- The Reservoir – Sedimentary Environments
- The Trap – Structure & Stratigraphy
- Mapping and Cross-Sections
- Pore Systems and Flow Units
- Reserves and Resources – classification and categories

### 3. Data Types and Management

- Wireline Data – open and cased hole, testing, LWD and MWD
- Mud Logging Data – geological, drilling, pressure
- Core Data – whole core and sidewall core

### 4. Drilling Operations

- The drilling team – who does what?
- Types of Drilling rigs
- Rig Sub-systems – power, hoisting, rotary, circulating, well control
- Drilling tools and components – including drilling fluid
- Well control – kicks causes – basic calculations – safety equipment – kill methods
- Well costs

### 5. Planning a Well

- Well Design
- Directional Drilling – methods and calculations
- Geosteering

### 6. Mud Logging

- The Logging unit – components and functions
- Services – monitoring, sampling, analysis

- Cuttings analysis and description
- The mud log
- Safety considerations – monitoring, overpressure, downtime
- Gas detection and analysis – types of gas – gas shows – equipment and methods

## **7. Pore Pressure and Wellbore Stability**

- Overburden and compaction
- Pore pressure generation – estimation – normal and abnormal pressure
- Detection from Seismic – pre-drill prediction
- Stress and Strain – wellbore failure – lost circulation

## **8. Wellsite Geologist Responsibilities**

- Sampling – types and preservation
- Quality control of acquired wellsite data

## **9. Coring and Core Analysis**

- Coring methods and equipment
- Whole Core and Sidewall Core
- Core handling and preservation
- Basic calculations – core-log integration

## **10. Wireline Logging Tools and Measurements**

- Review of basic logging tools for lithology, porosity, saturation
- Resistivity and Invasion

## **11. Wireline Log Interpretation**

- Basic concepts – quicklook workflow
- Determination of lithology
- Shale – calculation of shale volume - effects and corrections
- Determination of porosity
- Determination of water saturation – resistivity effects – formation water
- Analysis techniques - crossplots

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