



## Basic Petroleum Geology & Log Analysis

### Training Program

### Introduction:

Geology is the science that deals with the history and structure of the earth and its life forms, especially as recorded in the rock record. A basic understanding of its concepts and processes is essential in the petroleum industry, for it is used to predict where oil accumulations might occur. It is the job of the petroleum geologist to use his/her knowledge to reconstruct the geologic history of an area to determine whether the formations are likely to contain petroleum reservoirs. It is also the job of the geologist to determine whether the recovery and production of these hydrocarbons will be commercially profitable. The physical characteristics of a reservoir, how petroleum originated and in what type of rock, what types of fluids exist in the reservoir, how hydrocarbons become trapped, and basic well log analysis are some of the concepts vital to the production and recovery efforts of any exploration or energy service company.

### Who Should Attend?

Geologists, Geophysicists, Petrophysicists, Stratigraphers , Reservoir, Petroleum, Wellsite Geologists, Petroleum Engineers, Drilling Engineers, Reservoir Engineers, Production Engineers, Operations Engineers, Technologists, Log Analysts, E&P Personnel, Exploration & Development Personnel, Geologists, Reservoir Engineers, Seismic Interpreters, E&P Managers, Oil & Gas Personnel

### Course Objectives:

**By the end of this course delegates will be able to:**

- Define Geology and how it applies to the petroleum industry
- Define and describe the three basic layers of earth
- Differentiate between weathering processes and erosional processes
- Name the three rock types & List the components of the rock cycle
- Explain the three basic principles of relative age dating

- Define and explain a rock formation
- Explain the origin of hydrocarbons
- Define porosity & list the controls on porosity
- Define permeability & define a reservoir
- List the 2 most common reservoir rock types and their characteristics
- Explain fluid distribution in a petroleum reservoir
- List and describe the basic hydrocarbon traps
- Name the different geological mapping techniques used in petroleum exploration
- Explain the difference between surface and subsurface exploration
- Explain the basic concepts of well log analysis

### Course Outline:

- An introduction to basic petroleum geology and log analysis
- Geology basics
- Three basic rock types, the rock cycle
- Geologic time & age dating
- Basic age dating principles
- Geologic time scale
- Basic classification and types of sedimentary rocks
- The two main groups of sedimentary rocks are classified on the basis of their origin
- There are five types of sedimentary rocks that are important in the production of hydrocarbons
- Source rock and hydrocarbon generation
- Migration of hydrocarbons
- Basic hydrocarbon chemistry
- Five major types of hydrocarbons of interest to petroleum exploration
- Kerogen/bitumens, Crude oil, Asphalt, Natural gas
- Condensates & temperature gradient
- Pressure gradient
- What is a reservoir, and how does it develop over time
- Abundance and production of sedimentary formations
- Physical characteristics of a reservoir

- Depth & area and thickness
- Porosity & Resistivity
- Controls on porosity
- Permeability
- Water saturation
- Fluid distribution within a reservoir
- The “fluids first” revolution
- Reservoir fluid mechanics
- Capillary pressure
- Irreducible water saturation
- Basic geological conditions that create petroleum traps
- Structural traps
- Stratigraphic traps
- Exploration and mapping techniques
- Subsurface mapping
- Geophysical surveys, Seismic surveys, Magnetic surveys, Gravity surveys
- Structural contour maps
- Cross-sections
- Isopach maps
- Lithofacies maps
- Subsurface geology and formation evaluation
- Well cuttings & cores
- Logging while drilling
- Formation testing
- Wireline well-logging techniques
- Borehole environment
- The basis of log analysis
- Log data
- Important terminology and symbols
- A note on water saturation
- Review of permeability
- Reserve estimation
- How much hydrocarbon can be recovered from the reservoir?
- Chemical properties of hydrocarbons