



Fundamentals of Seismic for Non-Geophysicists

Training Program

Introduction:

This course provides an introduction to seismic surveys, how they are justified, acquired, processed and interpreted. Throughout the course, the candidates will gain an understanding of the strengths and limitations of the seismic method, the meaning of seismic sections, maps and other products, and an overview of the latest developments in seismic technology. This course is designed to provide an overview of one of the most important factors that determine the success or failure of an oil & gas project, this highly interactive program will equip you with a fundamental understanding of:

- The terminology, jargon and procedures used in seismic geophysics
- The strengths and limitations of the seismic method in Oil & Gas operations
- How 2D, 3D and 4D surveys are economically justified, acquired, processed and interpreted
- The construction, meaning and use of seismic maps and sections
- An overview of the latest technological developments in seismic geophysics

Who Should Attend?

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

Course Objectives:

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

- Obtain an understanding of the strengths and limitations of the seismic method, and the costs and risks involved, and how to reduce these
- Be able to communicate more effectively with petroleum geophysicists
- Understand the meaning of seismic maps and sections and know how to judge the quality and limitations of these important exploration tools
- Gain an overview of the latest developments in seismic technology
- Apply new-found knowledge to a series of simple illustrative exercises to aid understanding and gain confidence in use
- Know what types of questions to ask in order to assess the quality of a seismic project

Course Outline:

Key Elements of Petroleum Geology & the Role of Seismic

- Composition of the Earth's crust and rock types
- Sedimentary basins and depositional environments
- Fundamentals of oil and gas accumulations
- Characteristics of hydrocarbon traps
- Role of seismic in the exploration cycle

Fundamentals of Seismology

Basic Principles

- Modes of sound energy propagation
- Compressional and shear waves
- Acoustic impedance and reflection coefficients

- Interval and average velocities
- Characteristics of the seismic wavelet
- Bandwidth
- Vertical and lateral resolution

Essential Characteristics of Seismic Sections

- Types of displays and scales
- Shotpoints
- CDPs and traces
- Inlines and crosslines
- Time slices
- Chair displays

Fundamentals of Seismic Acquisition

Energy Sources

- Desired source qualities
- Conventional sources
- Unconventional sources

Receivers

- Desired receiver qualities
- Geophone and hydrophones
- Receiver arrays

Limitations on Seismic Imaging

- Types and sources of noise

Geometrical Principles

- The Common Depth Point (CDP) method
- Normal Moveout (NMO)
- Fold, stacking and binning

Survey Planning and Execution

- 2D and 3D field operations

Fundamentals of Seismic Processing

Basic Processing Routines

- Pre-stack processing
- Geometry and stacking charts
- Amplitudes in time and offset
- Primary reflections and multiples
- Deconvolution
- Normal moveout
- First breaks and statics
- Gathers and stacking
- Velocity analysis
- Post-stack processing
- Migration – pre- and post-stack
- Migration – depth and time
- Filtering and scaling
- True amplitude processing

Case Histories & Examples