



LAND SEISMIC ACQUISITION, THEORY AND TECHNIQUES COURSE OUTLINE

- ❖ **Introduction**
 - The Fundamental Seismic Principle
 - Resolution and Bandwidth
 - Energy Loss Mechanisms
- ❖ **The Energy Source**
 - Desired source qualities
 - Dynamite
 - Conventional, Poulter
 - Other surface charges
 - Vibroseis
 - Structure of a typical vibrator unit
 - Servo-valve power stage
 - Ground force signal, Correlation
 - Airgun
 - In water, On land
 - Others
 - P-Shooter, Hydra-Pulse, Vacu-Pulse
 - Betsy, Mini-Sosie, Marthor
- ❖ **The Receiver**
 - Desired receiver qualities
 - The geophone
 - Frequency, Damping, Coupling
 - The geophone string
 - Electrical advantage
 - Statistical advantage
 - Superposition advantage
 - Spatial anti-alias filter
 - Determination of coherent noise
- ❖ **CDP Method and Stacking Charts**
 - The superposition principle
 - The Multi-channel record
 - Calculation of nominal fold
 - Stacking charts
 - Bent lines
- ❖ **Analogue, Digital and Aliasing**
 - Analogue signal recording
 - Digital signal recording
 - Aliasing in time
- ❖ **Seismic Instrumentation**
 - Need for greater dynamic range
 - Basic structure of IFP instruments
 - Distributed telemetry systems
 - Cables losses, Advantages, Disadvantages
 - Delta Sigma systems
 - Delta Sigma and noise shaping
 - 2nd order modulator
 - Delta Sigma and decimation filtering
- ❖ **Spatial Sampling and Aliasing**
 - The seismic record in space
 - F-K plots and geophone intervals
 - Geophone arrays as spatial anti-alias filter
 - F-K filtering
- ❖ **Review of the Seismic Record**
 - Direct wave, refractions and other linear events
 - Reflections and multiples, velocity analysis
 - Other noise events
 - Offset considerations
- ❖ **Trapped Mode**
- ❖ **Evaluation of Noise**
 - Assorted noise
 - Ghost
 - Charge seize and depth tests
 - Random noise and determination of fold
 - Analysis of coherent noise
 - Array Theory
 - Signal to noise ratio in the wave number domain
 - Simple linear array design
 - Effective array length
 - Array response
 - Spatial convolution of linear arrays
 - Vibrator arrays
 - Estimating signal wavelengths
 - Apparent wavelength vs offset plus frequency
 - 3D Response In Line, Cross Line, Combined
 - Ghosting in the dynamite signature
- ❖ **What to do in the Field Visit**
 - In the dog-house
- ❖ **½ Day Workshop**
 - Parameter determination