CONCEPT

Pore Pressure Prediction and Drilling Geomechanics: Fracture Gradient and Wellbore Stability

26 – 30 July 2027
Amsterdam - Zuidas business district hotel



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Ref: 457_14266 **Date:** 26 – 30 July 2027 **Location:** Amsterdam - Zuidas business district hotel **Fees:** 23500 SAR

Introduction:

Pore pressure prediction errors surface on the rig as kicks, losses, stuck pipe, collapsed hole and casing points set too shallow or too deep, and they usually start with a prognosis built on a single log or an untested compaction trend. This Core Concept course trains geoscientists and wellsite engineers to estimate pore pressure, fracture gradient and in-situ stress from seismic, log and test data, define a safe mud-weight window, track pressure while drilling and calibrate the model after the well. Participants produce a Pre-Drill Pore Pressure and Wellbore Stability Prognosis.

Course Objectives:

- Build overburden, hydrostatic and pore pressure profiles and explain the overpressure mechanism behind each pressure regime
- Estimate shale pore pressure from sonic, resistivity and seismic interval velocity data with the Eaton, Bowers and equivalent-depth methods
- Interpret leak-off and formation integrity tests to derive fracture gradient and minimum horizontal stress
- Assemble an overview mechanical earth model and define the mud-weight window between collapse, pore and fracture limits
- Monitor pressure while drilling from d-exponent, gas, cuttings and cavings and flag transition zones to the rig team
- Calibrate predictions after the well and prepare a Pre-Drill Pore Pressure and Wellbore Stability Prognosis

Target Audience:

- Exploration and development geoscientists who prepare pre-drill pressure and stability prognoses for well proposals
- Geophysicists who convert seismic velocities into pressure predictions for undrilled locations
- Operations and wellsite geologists who track formation pressure indicators while drilling
- Drilling and well planning engineers who set mud weights and casing points from the pressure window
- Pore pressure and geomechanics staff in operators and service companies who calibrate models after each well

Course Outline:

Day 1: Pressure Fundamentals, Stress Regimes and Overpressure Origins

- Hydrostatic, Overburden and Pore Pressure Gradients: Units, Datums and Equivalent Mud Weight
- Overburden Stress from Density Logs, Shallow Density Extrapolation and Water-Depth Correction
- Effective Stress Principle and Normal Compaction Trends in Shale
- Disequilibrium Compaction and Rapid Burial Beneath Low-Permeability Seals
- Fluid Expansion, Clay Diagenesis, Hydrocarbon Generation and Lateral Transfer Mechanisms

Day 2: Pore Pressure Estimation from Well Logs and Seismic Velocities

- Shale Point Selection from Gamma Ray and Caliper Quality Screening
- Normal Compaction Trend Fitting on Sonic Transit Time and Resistivity
- Eaton Ratio Method: Exponent Calibration and Sensitivity Testing
- Bowers Effective Stress Method with Loading and Unloading Curves
- Equivalent Depth Method and Seismic Interval Velocity Conversion for Undrilled Locations

Day 3: Fracture Gradient, In-Situ Stress and the Mechanical Earth Model

- Leak-Off and Formation Integrity Test Plots: Leak-Off Point, Closure and Test Quality
- Minimum Horizontal Stress from Extended Leak-Off Tests and Fracture Gradient Correlations
- Maximum Horizontal Stress Orientation from Breakouts and Drilling-Induced Fractures on Image Logs
- Rock Strength Inputs: Young's Modulus, Poisson's Ratio, Friction Angle and Log-Derived UCS
- Mechanical Earth Model Assembly Overview: Stress, Pressure and Rock Property Profiles

Day 4: Wellbore Stability, the Mud-Weight Window and Real-Time Pressure Surveillance

- Mohr-Coulomb Shear Collapse and Tensile Breakdown Pressure Around the Borehole
- Mud-Weight Window Construction and Trajectory Sensitivity for Deviated Wells
- Corrected d-Exponent Trends, Rate of Penetration and Torque Indicators
- Connection Gas, Background Gas, Cavings Morphology and Flowline Temperature Signals
- Managed Pressure Drilling Overview: Constant Bottom-Hole Pressure for Narrow Windows

Day 5: Pre-Drill Prognosis Case Work and Post-Well Calibration

- Case: Offset Well Pressure Database and Analogue Selection for an Exploration Prospect
- Case: Pore, Fracture and Collapse Pressure Profile with Low, Mid and High Uncertainty Cases
- Case: Real-Time Prognosis Update from Drilling Parameters, Gas and Cavings Data
- Post-Well Analysis: Calibration Against Measured Formation Pressures, Kicks and Losses
- Pre-Drill Pore Pressure and Wellbore Stability Prognosis Drafting and Peer Review

Skills You Will Gain:

- Normal Compaction Trend Analysis
- Overburden Gradient Calculation
- Seismic Velocity-to-Pressure Conversion
- Leak-Off Test Interpretation
- Borehole Failure Analysis
- Mud-Weight Window Design
- Real-Time Pressure Surveillance
- Post-Well Pressure Calibration

Why Attend This Course:

- Return with a Pre-Drill Pore Pressure and Wellbore Stability Prognosis built from offset well and seismic data
- Cut kicks, losses and hole collapse by narrowing the gap between predicted and encountered pressure
- Share one vocabulary for pressure and stress with drilling, geoscience and wellsite teams before and during drilling
- Compare pressure prediction practice across clastic and carbonate settings with peers from operators and service companies

Conclusion:

Pressure surprises are rarely random; they follow from untested trends, missing stress data and signals ignored while drilling. The one week move from pressure gradients and overpressure origins, through log and seismic prediction methods, fracture gradient and in-situ stress, to borehole failure, the mud-weight window and real-time surveillance. The final day applies these methods to prospect and development well cases, calibrates predictions against post-well data and produces a Pre-Drill Pore Pressure and Wellbore Stability Prognosis ready for the well proposal.