

Pore Pressure Prediction and Geopressure Analysis: from the Source to the Wellhead. (5 day course / workshop)

The course / workshop focuses on knowing **how to calculate** and run your own pore pressure prediction and analyses, based on a geo-scientific foundation, rather than software setup. Pore pressure software is a “**one size fits all**” product. This course applies geological and rock-physics driven methods for calculating pore-fracture pressure and also discusses some of widely used applications. **Spread sheets (Microsoft Office Excel) are used for the PP-FP calculations and graphic plots.**

This course will give you the knowledge to tailor your interpretations to adjust for the geological setting, subsurface compartmentalization and expected hydrocarbon zones. **The excel input data can be exported to any PPP software.**

The course proceeds from the known (measured pp) to the unknown (predicted pp). Moreover, the training sessions explain the development of the subsurface geopressure compartments with depth and their implication on exploration – exploitation risk assessment. The hydrocarbon entrapments and drilling prognoses – challenges are the outcomes of the subsurface pore pressure profile build up. Supra and sub-salt models, fault seals, Strat-geopressure fairways, and geopressure impact on AVO assessment are some of the main topics of this course.

Who should attend?

Geologists, geophysicists, drilling and reservoir engineers, mud loggers, well log analysts, basin-model specialists, managers, and supporting staff involved in exploration, development and drilling.

Learning outcomes

1. Understand the source, causes, conceptual models and pore-fracture pressure graphic representations.
2. Gain a full knowledge of the different methods of subsurface pore - fracture predictions and some of the pitfalls.
3. Predict pore pressure before drilling using seismic velocity and calibrate pore-fracture pressures model during and post drilling using measured data and well logs.
4. Comprehend the importance of geopressure analysis' impact on evaluating trap seal integrity, salt basins exploration, post drilling borehole completion, etc.
5. Understand the effect of pore pressure – geomechanics interrelation on bore hole stability, caving, tight holes, lost circulation and kicks.
6. Assess Drilling Safety, especially in Deepwater such as SWF, narrow DTW, Kicks, LOC, Dual Gradient Drilling, and Managed Pressure Drilling.
7. Hands on measurement and prediction data and their applications for E & P in case histories formats.

Course outline:

- The importance of geopressure analysis to the Oil and Gas Industry.
- The geology of subsurface pore pressure build up.
- New approach to causes, conceptual models and definitions.
- Static and hydrodynamic vs. geopressure subsurface systems.
- Pore pressure plots (PSI and PPG MWE), including some of their pitfalls *

Measurements of PP-FP direct and pertinent data *

- Transgression, regression, pressure decay, Centroid ?, and hydrocarbon effect *

Prediction of PP-FP and data needed for:

- Models and Methods used for PP prediction
 - Overburden vs. PS, especially in Salt Basins
 - Defining Top of Geopressure
 - Compaction Trend (CT) delineation, calculation and pitfalls
- Assigning a model for PP-FP prediction
- Different conventional methods with emphasis on the **Effective Stress Models**
- PP predictions calibration methods

Practice of PP and FP prediction

- ✓ **Pre-drilling:** Building the geological blocks
 - Seismic velocity-Qualification for PP predictions *
 - Prediction model from seismic and offset wells *
 - Limitations and pitfalls
- ✓ **While drilling:** Calibration using direct measurement and pertinent data *
 - Model amendment for the purpose of MW and Csg depth adjustment
- ✓ **Post-drilling:** Compartmentalization, risk assessment and appraisal

Analysis and applications for Lead and Prospect evaluation

- Compartmentalization, seal effectiveness and retention capacity *
- Transgression and regression * compartmentalization vs. hydrocarbon entrapment *
- Build 2D and 3D geopressure models
- Fault's sealing capacity in relation to excess pressure and hydrocarbon type *
- Reserve and reservoir management
- AVO assessment due to subsurface geopressure profile
- Strat-Geopressure Fairways analysis
- Appraisal of the un-drilled offset structural segments on the prospect
- Pore pressure conversion from psi vs. ppg mwe: its application and pitfalls

Salt basins

- Salt's stresses and PPP models (above / within / below the salt)
- Trapping integrity of sediment's closures in salt environments
- Dirty vs. Clean drilling challenges.
- Salt displacement to emplacement and the impact on supra-sub salt prospects

Drilling

- Drilling prognoses for proposed wells such as casing and mud programs
- Anticipated drilling challenges due to compartmentalization
- Deepwater SWF causes and prevention
- Challenges in Deepwater and HTHP environments
- Overview of Managed Pressure Drilling (MPD) and Dual Gradient Drilling (DGD)
- Challenges due to narrow DTW (drilling tolerance window) / with Deepwater Horizon case history
- Causes of lost circulation (LOC)

Global case histories and their implications:

- Gulf of Mexico, N. America, Trinidad
- Mediterranean, N. Sea, West Africa
- Australia, Far East.

Attendees need laptop with Microsoft Office Excel and imaging application (for example: Paint or Imaging for Windows etc). Exercises, interpretations and analyses are conducted using case histories from the shelf and deep water in **analog** and **digital** formats.

A strong mathematical and Excel backgrounds IS NOT necessary.

** Sessions followed by exercises.*