

# Fault Seal Analysis and Trap Integrity Assessment Training Course

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## Overview

Fault Seal Analysis and Trap Integrity Assessment Training Course is a one-week advanced course for exploration, structural, reservoir, geophysics, petroleum systems, geomodeling, and assurance functions who leave with a Fault Seal and Trap Integrity Assessment File. Participants integrate fault framework, juxtaposition analysis, shale gouge ratio, clay smear, fault-rock properties, capillary seal capacity, pressure calibration, transmissibility, reactivation, and prospect risking. Agile Leaders Training Center presents fault seal analysis and trap integrity assessment.

## Who Should Attend

- Exploration functions responsible for prospect definition, trap validation, and geological chance of success
- Structural geology functions responsible for fault interpretation, geometry, kinematics, and reactivation risk
- Reservoir geology functions responsible for compartmentalization, pressure communication, and development uncertainty
- Geophysics functions responsible for fault mapping, throw extraction, and structural-quality control
- Petroleum systems and geomodeling functions responsible for migration, containment, and fault properties
- Subsurface assurance functions responsible for technical challenge, evidence traceability, and risk decisions

The course assumes participants already interpret seismic, well-log, pressure, structural, or reservoir data at work, and it leaves out introductory structural geology, seismic processing, full-field flow simulation, and software administration.

## Departments and Industries

The course supports departments and industries that assess fault-controlled containment, communication, and subsurface risk.

- Oil and gas exploration, appraisal, and field development
- Carbon storage screening and containment assessment
- Geothermal exploration and fractured-reservoir evaluation
- Structural geology, geophysics, and geomodeling
- Reservoir characterization and petroleum systems
- Technical assurance, subsurface risk, and research services

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## Learning Objectives

By the end of this course, participants will be able to:

- Build quality-controlled fault frameworks and trap-closure maps
- Apply juxtaposition, shale gouge ratio, and clay-smear methods
- Evaluate fault-rock properties and capillary seal capacity
- Analyze pressure communication and fault transmissibility evidence
- Diagnose reactivation, leakage, and geomechanical risk
- Prioritize uncertainty, calibration, and prospect-risk decisions

## Course Agenda

### Day 1: Define Fault Framework and Trap Geometry

- Fault Interpretation and Throw Quality-Control Checklist
- Fault Growth, Segmentation, and Linkage Architecture Map
- Trap Closure, Crest, Spill-Point, and Leak-Point Register
- Displacement Profile and Structural Consistency Review
- Fault Framework Assumption and Uncertainty Log

### Day 2: Analyze Juxtaposition and Fault Rock

- Allan Diagram and Fault Juxtaposition Mapping Method
- Sand-on-Sand Contact and Reservoir Connectivity Matrix
- Shale Gouge Ratio Calculation and Sensitivity Grid
- Clay Smear Potential and Continuity Assessment
- Fault-Rock Type, Composition, and Permeability Register

### Day 3: Quantify Seal Capacity and Fluid Flow

- Capillary Threshold Pressure and Seal Capacity Workflow
- Hydrocarbon Column-Height Conversion and Calibration Chart
- Across-Fault Pressure Difference and Communication Plot
- Along-Fault Leakage Pathway and Migration Assessment
- Fault Transmissibility Multiplier Evidence Matrix

### Day 4: Test Integrity and Prospect Risk

- Fault Reactivation and Critical-Stress Screening Method
- Top-Seal and Lateral-Seal Failure Mode Register
- Pressure-Depth Calibration and Compartment Diagnosis
- Multi-Fault Dependency and Breach Scenario Tree
- Trap Integrity Chance and Uncertainty Risking Matrix

## Day 5: Practice Fault-Seal Assurance

- Suggested Exercise: Quality-Check a Fault Framework and Trap Closure
- Suggested Exercise: Build Juxtaposition and Shale Gouge Ratio Maps
- Suggested Exercise: Estimate Column Height and Calibrate Pressure Evidence
- Suggested Exercise: Challenge Reactivation and Leakage Scenarios
- Capstone Exercise: Complete the Fault Seal and Trap Integrity Assessment File

## Practical Exercises

The course uses suggested activities to connect structural interpretation, fault-rock prediction, pressure evidence, geomechanics, and risk decisions.

- Suggested activity: audit fault picks, throw, segmentation, closure, spill points, and alternative structural interpretations.
- Suggested activity: construct an Allan diagram, calculate shale gouge ratio, and compare clay-smear continuity scenarios.
- Suggested activity: convert capillary threshold pressure to column height and test the result against pressure communication.
- Suggested activity: integrate reactivation, leakage, transmissibility, calibration, and uncertainty into a prospect-risk recommendation.

## FAQs

### Who suits fault seal analysis and trap integrity training, and what does it assume?

Fault seal analysis and trap integrity training suits exploration, structural, reservoir, geophysics, petroleum systems, geomodeling, and assurance functions. It assumes practical experience with seismic, well, pressure, geological, or reservoir evidence.

### How does fault seal analysis differ from basin modelling training?

Fault seal analysis evaluates fault geometry, juxtaposition, fault rock, capillary capacity, pressure communication, reactivation, and local trap integrity. Basin modelling reconstructs burial, thermal maturity, generation, migration, and charge history across a wider geological system.

### How does shale gouge ratio support fault seal analysis?

Shale gouge ratio estimates the proportion of shale displaced past a point on a fault surface. It supports fault-rock prediction when combined with stratigraphy, displacement, calibration, uncertainty, and evidence from known pressure or fluid contacts.

## How is hydrocarbon column height estimated from seal capacity?

Hydrocarbon column height is estimated by relating capillary threshold pressure to fluid-density contrast and gravitational effects, then checking assumptions against fault-rock type, pressure data, contacts, analogs, and uncertainty ranges.

## What evidence tests trap integrity and fault reactivation risk?

Trap integrity evidence includes closure and spill geometry, juxtaposition, fault-rock predictions, pressure differences, fluid contacts, capillary capacity, stress orientation and magnitude, fault friction assumptions, leakage indicators, and calibration from nearby traps or compartments.

## Conclusion

Participants take back a Fault Seal and Trap Integrity Assessment File linking geometry, juxtaposition, fault rock, seal capacity, pressure calibration, transmissibility, reactivation, uncertainty, and risk. The file changes separate structural and reservoir observations into one traceable containment assessment. It supports clearer prospect decisions, development scenarios, and technical assurance.

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