Well Test Analysis: Pressure Transient Interpretation and Test Design

15 – 19 November 2027
Paris - Right Bank business hotel



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Introduction:

Well test analysis turns shut-in and flowing pressure records into permeability, skin, reservoir limits and deliverability, yet many tests are run too short, gauged poorly or interpreted with the wrong flow regime, so field decisions rest on weak numbers. This Core Concept course is devoted entirely to pressure transient interpretation and test design: from diffusivity concepts and derivative diagnostics to gas deliverability, data quality control and fluid sampling. Each day participants interpret example data sets, and they finish with a Well Test Interpretation Report ready for peer review.

Course Objectives:

- Design drawdown, buildup, drill stem, interference and injection falloff tests with defined objectives, durations and gauge programmes
- Apply the diffusivity equation, dimensionless variables and superposition to predict and correct transient pressure responses
- Diagnose flow regimes from log-log pressure and Bourdet derivative plots and select a matching reservoir and boundary model
- Estimate permeability-thickness, skin, average pressure and distance to boundaries from transient data and quantify their uncertainty
- Interpret gas well tests using pseudo-pressure and establish deliverability and absolute open flow from multi-rate tests
- Validate gauge, rate and fluid data and compile a Well Test Interpretation Report that defends every model choice

Target Audience:

- Reservoir engineers who specify well tests and use their results in reservoir models and forecasts
- Production engineers who plan shut-ins and use test-derived skin and deliverability to select well interventions
- Well testing and completions engineers who supervise test strings, gauges and surface test equipment at the wellsite
- Petroleum engineers who review contractor test interpretations before results enter field studies
- Surveillance engineers who run permanent downhole gauge and injection well falloff programmes

Course Outline:

Day 1: Well Test Objectives, Test Types and Transient Flow Theory

- Productivity Versus Descriptive Test Objectives and Data Requirements
- Drawdown, Buildup, Drill Stem, Interference and Injection Falloff Test Sequences
- Diffusivity Equation Assumptions and Dimensionless Pressure and Time
- Line-Source Solution and Exponential Integral Pressure Behaviour
- Radius of Investigation Estimate for Minimum Shut-In Duration

Day 2: Diagnostic Plots, Flow Regimes and Superposition

- Log-Log Pressure Change and Bourdet Derivative Construction
- Wellbore Storage Unit Slope and Downhole Shut-In Effect on Early Data
- Infinite-Acting Radial Flow Stabilisation and Semi-Log Straight-Line Analysis
- Linear, Bilinear and Spherical Flow Derivative Signatures
- Rate History Superposition and Pressure-Rate Convolution for Variable Flow

Day 3: Permeability, Skin and Reservoir Limits Estimation

- Permeability-Thickness and Mechanical Skin from the Radial Flow Plateau
- Skin Decomposition: Partial Penetration, Perforation and Rate-Dependent Terms
- Sealing Fault, Channel and Closed Drainage Boundary Derivative Responses
- Average Reservoir Pressure from Extended Buildup Data
- Type-Curve Matching with Dual-Porosity and Radial Composite Models

Day 4: Gas Well Testing, Deliverability and Data Quality Control

- Real Gas Pseudo-Pressure and Pseudo-Time Transformations
- Flow-After-Flow, Isochronal and Modified Isochronal Deliverability Tests
- Absolute Open Flow Estimation and Non-Darcy Flow Coefficient
- Gauge Drift, Resolution, Phase Segregation and Tidal Noise Checks
- PVT Sampling Conditions and Fluid Properties Required for Interpretation

Day 5: Hands-On Interpretation and Well Test Interpretation Report

- Test Design Exercise: Duration, Rate Sequence and Gauge Placement for a Planned Well
- Buildup Data Set Interpretation from Diagnostic Plot to Final Model
- Deconvolution and Multi-Buildup Consistency Check on a Long Test Record
- Well Test Interpretation Report Structure, Uncertainty Ranges and Recommendations
- Report Presentation and Peer Challenge on Model Choice

Skills You Will Gain:

- Well Test Programme Design
- Derivative Diagnostic Interpretation
- Flow Regime Identification
- Skin and Permeability Estimation
- Boundary Model Matching
- Gas Deliverability Analysis
- Pressure Gauge Data Validation
- Interpretation Report Writing

Why Attend This Course:

- Leave with a Well Test Interpretation Report on an example data set, challenged by peers before you use the method on your own wells
- Specify tests that are long enough and gauged well enough to answer the question before rig or production time is committed
- Challenge contractor interpretations by checking derivative signatures, model choices and fluid inputs yourself
- Compare testing practice with engineers from operators and service companies working on oil, gas and injection wells

Conclusion:

Every well test is an expensive experiment whose value depends on the design, the data and the model chosen to explain it. The course moves from test objectives and transient flow theory to derivative diagnostics, superposition, permeability, skin and boundary estimation, then to gas pseudo-pressure, deliverability, gauge quality control and fluid sampling. Daily data sets build interpretation habits, and the final day brings them together in a Well Test Interpretation Report that participants can use as a template for future tests.