CONCEPT

Production Logging (PLT) Interpretation: Multiphase Flow Profiles and Zonal Allocation

11 – 15 July 2027
Jeddah - Corniche four-star



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Introduction:

Production logging tells an operator where each barrel of oil, water and gas enters the wellbore, yet many PLT surveys are run without clear objectives, logged at the wrong rates or interpreted with a single-phase mindset, so water shut-offs and recompletions target the wrong zones. This Core Concept course trains engineers to plan production logging programmes, check sensor data, calibrate spinners, resolve multiphase holdups and allocate flow zone by zone, then link the answer to well tests and reservoir models. Participants finish with a PLT Interpretation and Workover Recommendation Report for a multiphase well.

Course Objectives:

- Define production logging objectives that separate completion problems from reservoir problems before a survey is ordered
- Predict multiphase flow regimes, phase segregation and holdup in vertical, deviated and horizontal wells from rates and fluid properties
- Specify a PLT sensor string and logging programme of passes, cable speeds, stations and shut-in or flowing conditions for a stated question
- Validate PLT data through depth matching, repeat pass and sensor consistency checks and derive velocity profiles from in-situ spinner calibration
- Allocate oil, water and gas rates zone by zone and diagnose water entry, gas entry, crossflow and casing leaks from spinner, holdup, temperature and noise responses
- Reconcile PLT results with well test and reservoir model data and recommend a remedial workover with a verification logging plan

Target Audience:

- Production engineers who monitor well performance and select water shut-off, re-perforation or stimulation candidates
- Reservoir engineers who use zonal inflow and injection profiles to update sweep and history-matched models
- Petroleum and well surveillance engineers who order cased-hole surveys and define their objectives and acceptance criteria
- Log analysts who process and interpret spinner, holdup, temperature and noise data for operators
- Workover and well intervention engineers who plan zonal isolation jobs based on logged flow profiles

Course Outline:

Day 1: Production Logging Objectives, Well Flow Behaviour and Multiphase Regimes

- Production Log Objectives: Zonal Allocation Versus Problem Diagnosis
- Completion Problem Versus Reservoir Problem Screening from Surface Rate Data
- Bubble, Slug, Churn and Annular Flow Regime Maps for Vertical Wells
- Phase Segregation and Recirculation in Deviated and Horizontal Wellbores
- Slip Velocity, Holdup and Superficial Velocity Relationships

Day 2: The PLT String: Sensor Physics and Multi-Sensor Array Tools

- Fullbore and Continuous Spinner Flowmeter Response and Threshold
- Gradiomanometer and Nuclear Fluid Density Measurement with Deviation Correction
- Capacitance and Electrical Probe Holdup Sensors for Water Fraction
- Temperature, Pressure, Noise and Multi-Finger Caliper Sensor Roles
- Multi-Sensor Array Tools for Horizontal Well Phase Mapping at Overview

Day 3: PLT Job Planning, Data Quality Control and Spinner Calibration

- Logging Programme Design: Up and Down Passes, Cable Speeds and Stations
- Shut-In Versus Flowing Surveys and Rate Stabilisation Checks
- Depth Matching, Repeatability and Sensor Consistency QC Checklist
- In-Situ Spinner Calibration Plots: Slope, Intercept and Threshold Shifts
- Apparent to Average Velocity Correction Factors and Velocity Profile Build

Day 4: Multiphase Interpretation, Zonal Allocation and Problem Diagnosis

- Zonal Flow Allocation from Holdup and Slip Model Solutions
- Water Entry, Gas Coning and Channelling Behind Casing Signatures
- Interzonal Crossflow Detection During Shut-In Surveys
- Temperature Anomaly and Noise Spectrum Interpretation for Leaks
- Reconciling PLT Rates with Well Test Results and Reservoir Model History Match

Day 5: Multiphase PLT Case Work and Workover Recommendation

- Guided Case: Three-Phase Producer with Rising Water Cut
- Guided Case: Injector Profile and Thief Zone Identification
- Remedial Option Screening: Water Shut-Off, Re-Perforation and Zonal Isolation
- Workover Cost-Benefit Case and Post-Job Verification Logging Plan
- PLT Interpretation and Workover Recommendation Report Presentation and Peer Review

Skills You Will Gain:

- Multiphase Flow Regime Prediction
- PLT Sensor String Specification
- Logging Programme Design
- Spinner Calibration Analysis
- Holdup and Slip Modelling
- Zonal Rate Allocation
- Downhole Leak and Crossflow Diagnosis
- Remedial Candidate Selection

Why Attend This Course:

- Leave with a PLT Interpretation and Workover Recommendation Report built on a multiphase data set and challenged by peers
- Order production logs that answer the question asked, instead of paying for surveys that cannot resolve the water or gas source
- Challenge contractor flow profiles by checking spinner calibration, holdup solutions and temperature evidence yourself
- Compare surveillance practice with engineers working on oil producers, gas wells and water injectors

Conclusion:

A production log is only as useful as the question it was run to answer and the care taken to turn sensor readings into zonal rates. The week moves from logging objectives and multiphase flow behaviour to the PLT sensor string, job planning and data quality control, then to spinner calibration, zonal allocation and diagnosis of water entry, gas entry, crossflow and leaks. The final day applies this to multiphase case data and produces a PLT Interpretation and Workover Recommendation Report.