

# Production Logging Techniques

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## Introduction:

Production logging refers to a suite of logs that are normally run on completed injection or production wells to evaluate the performance of the well itself or of the reservoir as a whole. Other production logs can evaluate the well completion or look behind pipe to evaluate the formation and its fluids in the near-well vicinity.

Production logs are playing an increasing role in modern reservoir management by providing the only means of identifying down hole fluid movements directly. This course will cover fluid flow in pipes both single and multiphase flow, the theoretical bases of production logging techniques, production log interpretation, and operational considerations.

## Objectives:

**By the end of this course delegates will be able to:**

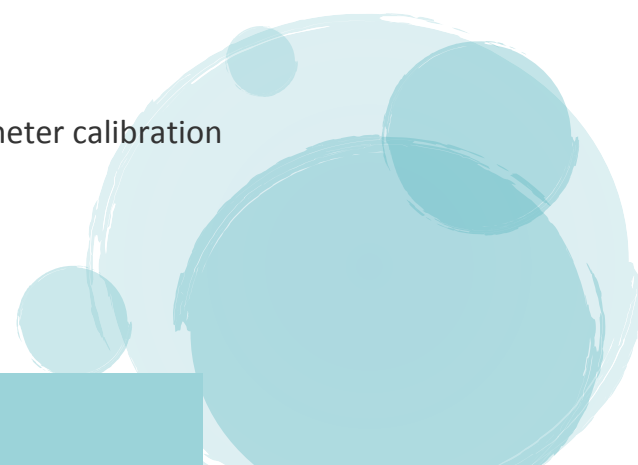
- Select the most appropriate production logging services for well diagnosis and reservoir surveillance
  - Define injection well profiles using temperature, radioactive tracer, and spinner flow meters
  - Measure zonal inflows in production wells using temperature logs
  - Locate behind-pipe channels with temperature, tracer, or noise logs
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- Apply combinations of flow meters, fluid density, and fluid capacitance logs to measure multiphase flow profiles Interpret cement bond logs and ultrasonic logs to determine cement quality
- Measure flow inside and outside casing with pulsed neutron tools
- Apply specialty tools for flow profiling in horizontal wells

## Who should attend?

Petroleum and Drilling Engineers and Managers, Reservoir Engineers, Production Engineers, Technologists, Petro physicists, Log Analysts and anyone interested in understanding what production logs and cased-hole surveys.

## Course Outline:

- Introduction
  - Overview of layered reservoir behavior in producers/injectors as measured by wire line tools
  - Flow Rate Measurement
  - Measurement of flow rate by spinner, spinner flow meter calibration
  - Fluid Identification
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- Phase hold up by pressure gradient, radioactive fluid density and dielectric (capacitance) based methods
  - Temperature Measurement
  - Main features of temperature profiles in producing and injecting wells
  - Anomalous temperature profiles
  - Pressure Measurement
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- Modern Production Logging Tool strings
  - Two Phase Flow
  - PVT properties, flow regimes, simplistic slip velocity model
  - Two-phase interpretation, shut in and flowing
  - Complicating factors
  - Well deviation misleading responses
  - Three phase flow
  - Horizontal wells: problems encountered with conventional logging sensors
  - Recent developments: probe tools, hold-up imaging, phase velocity measurement
  - Problem identification and solution with production logs
  - Temperature logs

## Best Technology Solutions (BTS)



- Fluid density logs
  - Slip velocity correlations
  - Multiphase log interpretation
  - Noise logs
  - Cement bond logs
  - Ultrasonic pulse-echo logs
  - Pulsed neutron logs for flow identification
  - Horizontal well production logs
- Radioactive tracer logs
  - Spinner flow meter logs
  - Log combinations for injection well profiling
  - Multiphase flow effects
  - Deflector or basket flow meters