

Advanced Well Test Analysis & Design



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Introduction:

This course covers well test analysis and design along with the underlying principles, dealing with various situations encountered in actual well test analysis and interpretation. It emphasizes well performance analysis and reservoir description within the context of reservoir geology and operational history.

Operational issues in well test design and preparation are also addressed. Manual problem solving is used to understand the basic engineering principles applied. It is designed to provide the candidates with a working knowledge of well test analysis and design for engineers working in the areas of reservoir engineering, production operations, drilling and completion.

This course will focus on the different types of tests and techniques, both analytical and graphical, for data representation and analysis of well tests. Types of techniques covered will include diagnostic plots-derivative for draw down, and buildup tests. The candidates will learn about the interpretation of complex data, such as those from well test in naturally fractured reservoirs, hydraulically fractured wells, horizontal wells, along with gas and gas condensate reservoirs.

Objectives:

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

- Analyze drawdown and buildup tests in oil and gas wells
 - Identify flow regimes using the log-log diagnostic plot
 - Describe characteristic pressure behavior for common bounded reservoir geometries
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- Identify well test data affected by various wellbore and near-wellbore phenomena
 - Design a well test to meet desired objectives
 - Estimate average drainage area pressure
 - Analyze well tests in hydraulically fractured wells, horizontal wells, and naturally fractured reservoirs

Who should attend?

Geologists, Petro physicists, reservoir engineers, production engineers, laboratory researchers, and gas field operators, engineers and geoscientists who want to understand well testing principles and interpretation techniques to design, analyze, report, evaluate results or intelligently participate in the well testing process

Course Outline:

Introduction

- Purpose & Use of Well Tests

Types of Well Tests

- Single Well Tests - Drawdown, Buildup others
- Multi-Well Tests - Interference, Pulse Tests

Basic Well Testing Concepts

- Basic Fluid Flow Equation, Use of Dimensionless Variables
- Wellbore Effects - Storage and Skin Effect
- Transient & Pseudo Steady-State Flow
- Radius of Investigation & Drainage, Discussion of Flow Regimes & Models

Drawdown Testing & Reservoir Limit Testing

- Equations for kh , Skin, Reservoir Size etc.
- Effect of single & Multiple Boundaries

Principles of Superposition

- Both in Time and Space

Pressure Buildup Testing

- Horner & Equivalent Time, Equations for kh, skin etc.

Multiple-Rate Testing

Analytical & Type Curve Analysis Methods

Well Test Design

Gas Well Testing

Effect of Variations in Gas Properties

- Plot Pressure, p-square, or Pseudo Pressures
- Use of Pseudo Pressure and Pseudo Time

AOF & Deliverability Testing

Introduction to Decline Curve Analysis

Horizontal Wells

- Discussion of Flow Regimes, Analysis Methods for Each Flow Regime.
- Effect of various boundaries on Response.
- Impact of Key Parameters on Test Response.
- Impact of storage & Damage on Testing, Design.

Injection Well Testing

Step-Rate Testing & Two Rate Testing

Drill Stem Test (DST)

- DST key features, DST design and analysis, Interference tests
- Reservoir limit tests, Well test design

Multiple-Well Testing

- Interference Testing & Test Design, Introduction to Pulse Testing

Effects of Multiple Phases on Testing

Effects of Reservoir Heterogeneity on Testing