TETRA TECH RPS ENERGY | TRAINING

EC013: Foundation Petrophysics

Format and Duration
Self-Paced - 6 Hours

Summary

The course introduces the fundamental principles and concepts of traditional petrophysical analysis. The objective is to familiarize learners with the dominant language and concepts used in the field of petrophysics. Topics covered include the use of complementary data from mudlogging and core analysis, the influence of rock characteristics on fluid distribution in the subsurface, and an introduction to total and effective porosity concepts.

Learning Outcomes

Participants will learn to:

1. Describe the main concepts underpinning the field of petrophysics and open hole logging.
2. Explain how mudlogging and core analysis complement open-hole logging in petrophysical analysis.
3. Identify the role of downhole pressure measurements in the downhole data suite and their contribution to petrophysical analysis.
4. Interpret the factors that influence fluid distribution in a porous and permeable rock.
5. Describe the processes involved in the formation and evolution of porosity in rocks.
6. Recognise the significance of the concepts of Total and Effective porosity, and their role in the petrophysical analysis.

Training Method

This is a self-paced e-learning course. Learning materials are structured into short sections, each including interactive text and image content, animations, video, and audio. An end of course quiz is scored to provide the learner with their learning progress. Approximately 6 hours learning time.

Who Should Attend

This course is designed for geoscientists and engineers wishing to familiarise themselves with the fundamentals of petrophysics. It is the first of a programme of Petrophysics courses available in self-paced e-learning format - Petrophysical tools (EC014), Petrophysical tools for Geoscience (EC015), Petrophysical tools for Reservoir Engineers (EC016) and Formation Evaluation (EC018)

Course Content

Introduction to Petrophysics

In this module, we will explore the basics of petrophysics and delve into open-hole logging and the subsurface borehole environment. We will start with an in-depth look at the hydrocarbon initially in place equation and discuss the use of petrophysical models to describe a formation or reservoir.

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Open-Hole Logs

This module provides additional background information on typical open-hole logs and how they can be influenced by rock properties.

Mud Logging and Core

This module will focus on some important complementary measurements and observations to downhole logs, as well as the factors supporting the migration of hydrocarbons into the reservoir. Mudlogging forms a critical part of drilling an exploration well, while core data from routine and special core analysis provide important constraints on our interpretation of downhole logs. Wettability and capillary pressure control the distribution of fluids in the reservoir and the process by which hydrocarbon accumulates, while downhole pressure measurements complement the integration of core and log data in providing a complete petrophysical picture.

Rock Properties

This module will explore the petrophysical model and how rock characteristics influence the distribution of fluids in the subsurface.

Porosity Fundamentals

This module will start by defining porosity and will discuss two alternative models (Total and Effective) that are used in petrophysics. These alternatives arise because of the strong interaction of water with many of the solid minerals that make up sedimentary rocks, and we will deviate slightly to discuss the reasons and consequences of these interactions. It will then move on to discuss how porosity is initially formed and how it subsequently evolves as sediments are buried in the subsurface. The final part of this module will look at how porosity can be measured on core plugs (and other samples) and the generalities of using logs to estimate it in situ.