

# Naturally Fractured Reservoir Characterization

## Course Description

The behavior of Naturally Fractured Reservoirs (NFRs) is distinctly different from that of matrix-dominant “conventional” reservoirs. In this course we review NFR production characteristics and how to use them to help recognize and describe NFRs. Fluid flow within fractures is addressed, to understand both the impact of fracture permeability and the processes associated with fracture-controlled drainage of a reservoir. Outcrop analogs provide a reference and basis for the fracture systems encountered in the deep subsurface. The course addresses various procedures used in characterizing NFRs, including geological (fracture orientation, density, spacing, etc.) and engineering (PLT, PTT tests), plus considerations and corrections to apply when sampling within a heterogeneous, discontinuous fracture system. Finally, we will review synthesizing these data in order to construct a geologic reservoir model.

A separate field trip course, to be led by Dr. Atilla Aydin, will complement the material covered in this NFR Characterization short course.

## Topics

Recognition of NFRs

Characteristics of natural fracture systems (static and dynamic)

Understanding the causes and effects of fracture-dominated production behavior

Integrating geologic and dynamic flow data to characterize subsurface fracture systems

Introduction to geological modeling NFRs for simulation

## Level

All levels - for petroleum engineers and geologists, especially those working on NFRs

## Course Length

One day

## Why attend?

Fractures can dominate the flow behavior of a reservoir. Characterization of fracture-dominated flow, and prediction of reservoir production, require an approach that differs distinctly from the processes we normally use with conventional reservoirs. For anyone working on an NFR it is important to understand how and why NFR behavior differs from that of conventional reservoirs, and to understand the tools and processes that can be used to characterize this challenging type of reservoir.

## Instructor

Wayne Narr is an independent consultant and a member of SPE. He recently retired from Chevron Energy Technology Company where he was a Senior Research Consultant and leader of many NFR characterization projects and schools. Narr is a structural geologist interested in characterization and modeling of naturally fractured reservoirs. He is lead author of the book *Naturally Fractured Reservoir Characterization* published by the SPE in 2006. He has written research articles on NFRs and on natural fracture systems, and he spoke about them as an SPE Distinguished Lecturer. Wayne has a Ph.D. from Princeton University, an M.Sc. from University of Toronto, and a B.S. from Pennsylvania State University.