



N647: Shale & Tight Oil for Technical Professionals

Tutor(s): Steve Hennings

3 Days

Competence Level:
Awareness



Classroom Course

Summary

This three-day course focuses on the technologies currently being applied in evaluating and developing oil and wet gas from shale and other tight reservoirs. The course material is intended for engineers and geologists who are familiar with conventional oil and gas evaluation concepts and are seeking information on the unique aspects of shale evaluation and development. Included in the sessions are the unique concepts, data collection methods, evaluation techniques, development processes and completion technologies. Participants will be asked to complete class problems and case studies using data from existing and emerging shale plays.

Learning Outcomes

Participants will learn to

- Characterize and rank-order the key reservoir properties for successful shale development.
- Define how production rates correlate to specific well completion and hydraulic fracturing options.
- Assess the geologic features that create sweet spots and development tiers in specific plays.
- Characterize and quantify the hydrocarbon volumes contained in various shale plays using measurements related to absorption, adsorption, pyrolysis, maturity, yields, and source rock kinetics.
- Assess geologic factors creating variability in hydraulic fracturing mechanics, objectives and effectiveness.
- Define the unique terms, abbreviations and concepts applied in unconventional reservoir development.
- Apply basic equations to quantify the appropriate fracture design, fracture spacing and well spacing.
- Evaluate methods to analyze and quality-check pyrograms, isotherms, desorption data, and log data.
- Understand the unique methods to forecast rates and drainage volumes for shale, and their limitations.
- List the recent and emerging technologies in the shale industry and their potential benefits.
- Evaluate case study information to define the unique attributes of selected shale plays.

Duration and Training Method

Three classroom days providing 2.4 CEU (Continuing Education Credits) or 24 PDH (Professional Development Hours)

Who Should Attend

The course is intended for engineers and geoscientists familiar with conventional oil and gas evaluation concepts who are seeking information on the unique aspects of shale and tight rock evaluation and development. The course is also appropriate for managers and technical support staff experienced in the technical aspects of evaluating, monitoring or developing plays.

Course Content

Day One

- I. Overview
 - a. Development Overview
 - b. Geology Overview



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- c. Development Teams
- d. Slang and Symbols
- 2. Wet Gas Concepts
 - a. NGL Yields
 - b. NGL Revenue Analysis
 - c. Phase Changes
- 3. Hydraulic Fracturing
 - a. Five Objectives
 - b. Mechanics
 - c. Stages
 - d. Terminology
- 4. Fracture Implementation
 - a. Planning and Procedures
 - b. Required Equipment
- 5. Insitu Stresses
 - a. Impacts on Completion Design
 - b. Max Stress from Field Tests
- 6. Case Studies (cover 2 or 3)
 - a. Monterey (California)
 - b. Duvernay (BC, Canada)
 - c. Marcellus (Northeast U.S.)
- 7. Electric Log Analysis
 - a. Key Concepts
 - b. Impacts of Organics
 - c. Eagle Ford Oil-in-Place
- 8. Source Rock
 - a. Hydrocarbon Sources
 - b. TIC & TOC

Day Two

- 9. Source Rock
 - a. Gas and Oil Windows
 - b. Geologic Terms
 - c. Source Rock Kinetics
- 10. Adsorption & Absorption
 - a. Concepts
 - b. Langmuir Isotherm
 - c. Adsorption Analysis
 - d. Free GIP
- 11. Source Rock Analysis
 - a. GC Core Analysis
 - b. SI Core Analysis
 - c. Pyrogram Analysis
- 12. Reservoir Characterization
 - a. Natural Fractures



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- b. Locating Sweet Spots
- c. Structural Terms
- 13. Reservoir Characterization
 - a. Core Testing
 - b. OOIP from SI
 - c. Permeability Analysis
 - d. Seismic Attributes
- 14. Development
 - a. Development Planning
 - b. Net Pay Analysis
 - c. Quick-look Economics
 - d. Development Cycles
- 15. Case Studies (cover 2 or 3)
 - a. China Shale Basins
 - b. Horn River (BC & NWT)
 - c. Barnett Development
- 16. Horizontal Wells
 - a. Evolution
 - b. Fracs in Horizontals
 - c. Completion Options

Day Three

- 17. Completion Comparisons
- 18. Fracture Monitoring
 - a. Nolte Plot
 - b. Microseismic
 - c. DTS & DAS
 - d. Surveys
- 19. Fracturing Design
 - a. Proppant Transport
 - b. Multi-Stage Frac
 - c. Proppant Design
 - d. Nprop
 - e. Fluid Additives
- 20. Completion Factors
 - a. Fracturing Details
 - b. Eagle Ford Factors
- 21. Environmental Issues
- 22. Production Forecasting
 - a. Decline Curve Analysis
 - b. Maximum Recovery
 - c. Type Curves
 - d. Diagnostic Plots
 - e. Forecasting Terms
 - f. Computer Simulation



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23. Advanced Case Studies
 - a. Montney (BC, Canada)
 - b. Bakken
 - c. Barnett Evaluation
 24. Production Correlations
 - a. Bakken
 - b. Eagle Ford Correlations
 25. Final Class Review
 26. Technical References