



N645: Introduction to Shale and Tight Oil & Gas

Instructor(s): Steve Hennings

2 Days

Competence Level:
Awareness



Classroom Course

Summary

The emergence of Shale Oil and Shale Gas has driven a rapid increase in natural gas and oil production in North America during recent years. This has had a positive impact on consumers, as prices and dependency on foreign sources has fallen, but it has had a mixed impact on the oil & gas industry. The positive impacts on the industry have been the infusion of capital and the exciting rapid developments in technology. On the downside, shale development involves different techniques, terms, and concepts than what most people in the industry have been familiar with most of their careers so this has created a training challenge for companies. In addition, the success in dramatically increasing the supply of natural gas has caused prices to fall and so there is less margin for error in properly managing existing and new Shale Oil & Gas development activities. Though some key concepts of Shale development are somewhat unique, fortunately they are not complex and can be effectively transferred to those working in the technical, support and financial segments of the industry.

This two-day introductory course provides an overview of shale development for people in the oil and gas industry who have little to no technical training in evaluating, drilling, completing or producing wells in shale reservoirs, but require additional information so they can better support, guide, value, forecast, or service those activities. The primary topics include unique terminology, horizontal drilling, hydraulic fracturing, resource analysis, common misconceptions, production forecasting, financial analysis, critical rock properties for commercial development, and environmental challenges.

Learning Outcomes

Participants will learn to

1. List two critical differences between shale, tight, source rock, and conventional reservoirs.
2. Assess the critical design issues and selection considerations for modern horizontal well completions.
3. Determine why and how hydraulic fracture treatment additives and designs vary by reservoir type.
4. Review factors dictating hydraulic fracturing mechanics, geometry, additives, objectives and effectiveness.
5. Understand the three different primary techniques used to forecast production, and their limitations.
6. Review the methods to characterize hydrocarbons in a shale, and the importance of this task.
7. Assess the different methods for monitoring hydraulic fracture treatments and their limitations.
8. Outline major milestones that spurred shale development and the currently emerging technologies.
9. Define how changes in horizontal well and hydraulic fracturing designs correlate to production rates.
10. Review critical steps in reducing the risk of environmental impacts from hydraulic fracture treatments.
11. Explain the meaning of unique terms and abbreviations that apply only to shale and tight reservoirs.

Duration and Training Method

Two classroom days providing 1.6 CEU (Continuing Education Credits) or 16 PDH (Professional Development Hours)

Who Should Attend

This introductory course is intended for those working in non-technical roles in the industry who want a



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better understanding of the challenges and work process the engineers and geoscientists are focusing on to develop Shale Gas and Shale Oil plays. The intended audience includes those working in support, service, financial, safety, management, research or regulatory roles. The course is also appropriate for technical people with limited work experience in the industry.

Course Content

Day One

1. Energy Overview
 - a. Traps, Seeps and Migration
 - b. Consumption Trends
 - c. LNG
 - d. Types of Oil & Gas Targets
 - e. Measurement Units and Abbreviations
 - f. Ten Milestones in Shale Development
2. 2015 Development and Forecasts
3. Technical Terms and Concepts
 - a. Shale Oil, Oil Shale and Oil Sands
 - b. Oil & Gas Reservoir Types
 - c. Organic Sources and Transformation
 - d. Porosity and Permeability
4. Permeability Sweet Spots
 - a. Lineaments, Flexure and Reverse Faults
 - b. Brittleness
5. Unconventional vs. Conventional
 - a. Seismic and Attributes
 - b. TOC and Mineralogy
 - c. Phi-k Relationships
6. Oil & Gas Processing Terms and Basics
7. Development Process
8. Well Construction
 - a. Pipe Strings
 - b. Locating the Completion Interval
 - c. Terminology Review
9. Well Completion
10. Hydraulic Fracture Geometry Factors
11. Five Hydraulic Fracturing Objectives
12. Treatment Stages

Day Two

1. Seven Segments of Shale Evaluation
 - a. Critical Basic Electric Logs
2. Organic Maturity
 - a. Gas Sources
 - b. Oil Window
 - c. Isotopic Analysis



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3. Core Tests for SI and GC
4. Production Forecasting
 - a. Decline Curves
 - b. Type Curves
 - c. Production Tiers
5. Frac Equipment
6. Hydraulic Fracturing Overview
7. Environmental Issues and Perspectives
8. Unconventional Terminology Review
9. Frac Fluid Additives and Options
10. Horizontal Wells
11. Fracture Orientation
12. Multi-Frac Technology
 - a. Stages and Clusters
 - b. Perforation Strategy
 - c. Completion Types and Results
13. Fracture Design
 - a. Calibration Tests
 - b. Textbook Approach
 - c. Field Trials
14. Cost-Benefit Analysis
15. Fracture Monitoring
 - a. Nolte Net Pressure Plot
 - b. Micro-seismic
 - c. DAS and DTS
16. Growing and Emerging Technologies