Coal Bed Methane and Shale Gas Evaluation & Development

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Introduction:

This 5-day course is designed for technical professionals involved in evaluating or developing unconventional gas reservoirs. Unconventional reservoirs represent the largest gas resource in the world and in the past few years they became the major source of natural gas production in North America.

As a result, unconventional reservoirs are now receiving a tremendous amount of attention from various countries, oil & gas companies, and investors. Almost all of the university and industry training is directed at conventional reservoirs and so many professionals in the industry are eager to gain a better understanding of the unique terms and concepts involved in evaluating and developing unconventional reservoirs.

The first three days of the course will focus primarily on gas development from Coal (CBM, CSG, and CSM) and the final two days will focus on developing Shale Gas. In addition, the evaluation methods for Shale Gas combine methods from Coal, Oil and Tight reservoir development and so attendees will also gain a good understanding of a variety of different ongoing plays and the methods applied to each type of unconventional reservoir.

Class examples are planned for each day and so attendees will need to bring either a laptop or calculator to solve simple equations. The case studies and class examples will present the steps to determining; resource volumes, maximum allowable investments, recovery factors, specific well locations, appropriate hydraulic frack size, and reserve volumes for unconventional reservoirs.

The data for the example problems will come from actual development projects, primarily those where the instructor has been involved, to help illustrate the quality and types of data usually available for evaluation.

Objectives:

- Review the key differences in evaluating and developing CBM, Shale and Conventional Reservoirs
- Understand what determines the commercial potential of a particular CBM play
- Review the common features of the most successful plays and why each play has required a unique development approach
- Become familiar with the terminology, technology and emerging trends
- Review the process of calculating resource volumes, identifying the best development areas, forecasting recoveries, estimating cash flow and determining reserves

Who should attend?

- Reservoir Engineer
- Petroleum Engineer
- Geologist
- Geophysicist
- Managers

Attendees are assumed to have a reasonably good understanding of terms and methods applied in the development of conventional oil and gas fields as the course will focus on those items that are fairly unique to unconventional reservoirs.

Course Outline:

DAY 1

- Emergence and Status of Coal Gas
- Determining Net Coal
- Adsorption Isotherms
- Level of Maturity
- Gas Composition Variability
- Coal Stress and Continuity
- Log Responses in Coal
- Core Analysis
- Coal Permeability

- Production Characteristics
- Class Exercise - Calculating Permeability in Coal
- Water Issues

DAY 2

- Relative Permeability
- Permeability Anisotropy
- Horizontal Well Design
- Development Considerations

- Gas Resource Analysis
- Case Study - Due Diligence on Published Gas-in-Place
- Class Exercise - Calculating Gas Resource Volumes in Coal
- Gas Content Analysis
- Gas Saturation
- Case Study - Gas Saturation Variability
- Class Exercise - Determining Maximum Recovery Factors
- Vertical Well Design
- Economic Analysis for Resource Plays
- Completion Options

DAY 3

- Impact of Pressure Drawdown
- Pilot Well Objectives
- Class Exercise - Pilot Well Drawdown Schedule
- Production Variations
- Class Exercise - Forecasting Peak Gas Rate
- Case Study - Production Correlations

- Workovers
- Production Forecasting Methods
- Reserve Estimation
- Class Exercise - Calculating Gas Reserves in Coal
- Global Activities
- Group Exercise on Coal Nomenclature

Day 4

- Emergence of Shale
- Key Shale Properties
- Geologic Factors
- Evaluation Concepts
- Adsorption plus Absorption
- Class Exercise - Absorbed Gas-in-Place
- Development Windows
- Pyrolysis Analysis

- Class Exercise - Shale Oil Resource Volume
- Log Responses in Shale
- Exploration Objectives
- Class Exercise - Calculating Recovery Factors
- Development Overview

DAY 5

- Hydraulic Fracturing Technology
- Fracturing Fluid Additives
- Well Design Overview
- Treatment Monitoring
- Environmental Issues
- Exploration Differences from Conventional Reservoirs
- Group Discussion - Key Development Issues
- Completion Options
- Case Studies - Production Correlations
- Class Exercise - Basic Frack Design
- Rate Forecasting Methods
- Group Exercise on Shale Nomenclature
- Current Trends and Future Opportunities