N313: Evaluating Shale and Tight Oil and Gas Reservoirs

Instructor(s): Creties Jenkins

Format and Duration

Classroom - 4 Days
Virtual - 8 Sessions

Summary

Please note this course is offered in partnership with Rose and Associates. They will deliver and provide all logistics for the course.

Business Impact: This course will enable participants to critically assess opportunities, compare them to successful analogs, and invest in those projects whose characteristics are consistent with commercial success

This class provides an introduction to the exploration, appraisal, and development of oil and gas resource plays. It identifies the data that need to be collected, how to analyze and interpret them, and how to integrate and apply this knowledge to the decision-making process. Case studies from a large number of active plays are presented.

Learning Outcomes

Participants will learn to:

1. Compare and contrast the rock and fluid characteristics of oil and gas resource play systems, including shales, sandstones, carbonates, and coals.
2. Understand what geoscience and engineering data need to be collected, including cores, logs, well tests, and production data.
3. Analyze and integrate the acquired data to make good decisions about what the next steps should be, including if and where to drill additional wells.
4. Determine the inconsistencies, omissions, and errors associated with analyzing and interpreting acquired data, and take steps to mitigate these problems.
5. Compare and contrast the different drilling and completion techniques used in these reservoirs and learn the key factors that control their selection.
6. Understand the production characteristics and forecasting tools that can be used for determining rates and ultimate recoveries from these wells.
7. Determine the key questions to ask and critical uncertainties to be addressed, and how to resolve these through the integration of various data and disciplines.
8. Apply successful industry practices in formulating exploration, appraisal, piloting, and development project strategies.
9. Understand the non-technical factors affecting this work, including environmental, leasing, marketing, political, and financial considerations.

Training Method

This is a classroom or virtual classroom course comprising a mixture of lectures, discussion, exercises, and case study poster sessions.

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Who Should Attend

This course is intended for geoscientists, petrophysicists, engineers, and managers who are seeking a comprehensive introduction to oil and gas resource plays. It is appropriate for those with no previous experience in these reservoirs, those that have some experience and want to broaden their understanding, and more experienced people who want exposure to some of the most recent technologies and practices. It is not intended as an advanced course for individuals with extensive experience working these reservoirs.

Prerequisites and Linking Courses

There are no prerequisites for this course.

Additional insight into resource plays at a Basic Application level is presented in N184 (Unconventional Resources: The Main Oil Systems), N259 (From Outcrop to Subsurface: Understanding and Evaluating Shale Resource Plays), and N274 (Unconventional Resource Engineering for Geoscientists).

More advanced coverage may be found in a number of courses, including:

Geoscience focus: N250 (Evaluation Methods for Shale Reservoirs) and N284 (Seismic Attributes and Pre-Stack Inversion Tools for Characterizing Unconventional Reservoirs).

Engineering focus: N973 (Reservoir Engineering for Unconventional Gas and Tight Oil Reservoirs), N957 (Forecasting Production and Estimating Reserves in Unconventional Reservoirs), N986 (Reservoir and Production Engineering of Resource Plays), and N944 (Shale Gas and Shale Oil Completions Using Multi-Staged Fracturing and Horizontal Wells).

Please refer to the Unconventional Resources Competency Map on our website for a complete listing of related courses.

Course Content

Section 1

- Introduction: Definitions, technologies, worldwide potential, commercial aspects
- Shales
  - Geology: Origin, composition, deposition, pore types, natural fractures
  - Geochemistry: Rock-Eval, thermal maturity, sorption, liquids to gas transition
  - Geophysics: Geohazards, seismic attributes, microseismic, geomodeling
  - Petrophysics: Core analyses, preferred logging suites, analysis/integration

Section 2

- Shales (continued)
  - Geomechanics: Static & dynamic properties, stress impacts, frac design

  - Drilling/Completions: Drilling practices, completion types, environmental impacts
  - Well Performance: Flow regimes, dynamic data, empirical and analytical methods
- Shale Gas Case Study Posters: Fayetteville, Haynesville, Barnett, Horn River

Section 3

- Liquids-Rich Shale Case Study Posters: Eagle Ford, Marcellus, Wolfcamp, Woodford
- Tight Sandstones and Carbonates
  - Geology: Depositional systems, diagenesis, stratigraphy, correlation
  - Geophysics: Resolving geobodies and fractures, quantifying reservoir properties

Section 4

- Tight Sandstones and Carbonates (continued)
  - Petrophysics: Core and log analyses, rock fabrics. Cotton Valley and Bakken examples
  - Drilling/Completions: Designs, engineered completions, data analytics, Bone Spring example
  - Well Performance: DFITs, material balance, forecasting recovery from Bakken oil well
  - Discrete vs Basin-centered accumulations: Characteristics, impacts, differentiating them
- Tight Sandstones Case Study Posters: Lance, Medina-Clinton, Cardium, Codell

Section 5

- Tight Carbonates Case Study Posters: Bakken, Niobrara, Jean Marie, Austin Chalk
- Evaluating Opportunities: Applying the fundamentals of this course in a staged approach
- Coalseam Gas*
  - Geoscience: Deposition, origin of coalseam gas, fracturing, hydrogeology
  - Core & Log Analyses: Desorption, isotherms, proximate analysis, saturation state
  - Drilling and Completions: Vertical/horizontal wells, cavity completions, fracture stimulation
  - Well Performance: Well tests, material balance, numerical simulation, decline curves
  - Appraisal Strategies: Appraisal and pilot data gathering, success/exit strategies
- Coalseam Gas Case Study Posters: South Shale Ridge, Spanish Peaks, Drunkard's Wash, Castlegate Fields

*Note that coalseam gas will be reduced to 0.5 days or less for North American classes