TETRA TECH RPS ENERGY | TRAINING

N996: Gas Reservoir Engineering and Management

Instructor(s): Pete Smith

Format and Duration

Classroom - 4 Days
Virtual - 8 Sessions

Summary

The course is designed to address gas reservoir engineering and gas reservoir management. The course provides participants with the skills and knowledge to evaluate, operate and manage gas reservoirs and gas fields. The technical understanding is underpinned with reference to the business and commercial framework applying to gas monetization.

Learning Outcomes

Participants will learn to:

1. Understand the importance of assessing fluid properties for reservoir behaviour, material balance and flow assurance.
2. Understand methods of estimating gas reserves, gas sales contracts, economics of field developments and negotiation of gas sales price.
3. Develop an understanding of resources and reserves booking philosophy as it appertains to gas reservoir appraisal and development.
4. Understand Gas Deliverability – determining production rate using vertical lift performance, inflow performance relationship, choke models and nodal analysis
5. Gas well completions design – including reservoir, mechanical and methods of completion & Perforation strategy including bullet, jet and hydraulic perforating methods
6. Understand the technical aspects of well testing and its use in both appraisal and development decisions as well as the potential to deepen understanding of the reservoir description.
7. Evaluate how reservoir energy (including aquifers), fluid responses, drive mechanisms and compression are assessed and managed to maximise planned recovery.
8. Evaluate the use of both static and dynamic reservoir models as part of the decision-making process. Understand the pitfalls and best practices in building and using simulation models for appraisal and development decision making and hence assess the implications and limitations of reservoir simulators.
9. Evaluate the essentials of gas reservoir management to plan an efficient exploitation and management program.

Training Method

A four-day classroom-based course with a mixture of lectures, practical exercises and case studies.

Who Should Attend

The course is designed for experienced (5 years minimum) subsurface staff who have been involved in field appraisal and development, team leaders and asset managers involved in the planning and execution of subsurface reservoir modelling projects. It is also aimed at reservoir engineers wishing to gain a greater insight into gas reservoir engineering.

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Course Content

Day 1 - Gas Value Chain, Properties and Volumetric assessment

- Introduction
- Gas reservoirs
- Gas Fluid Properties
- PVT
  - Gas Sampling
  - Gas Properties
  - Gas Condensates
- Volumetric Assessment
  - Gas Initially In-Place (GIIP)
  - Gas Recovery Factor
  - Gas Resource Estimation

Day 2 - Gas Reservoir Performance Prediction

- Gas reservoir engineering
  - Performance Prediction
  - Water Drive
  - Overpressure
  - Low-permeability gas sands
- Gas Material Balance
- Decline Curve Analysis
- Reservoir Simulation
  - Infill drilling evaluation>
  - Application of horizontal wells
  - Predicting reservoir performance
- Total systems analysis
  - Maintaining production – compression
  - Maintaining production – increased wells

Day 3 - Gas Well Performance and Testing

- Gas well performance
- Gas Well Completions and Perforation Strategy
  - Well completions
  - Commingled production
  - Pressure drops in wells
- Gas Well Testing
  - Interpretation
  - Reservoir Inflow Performance

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- Multi-rate testing of gas wells
- Impact of non-Darcy flow effects
- Horizontal Gas Well Performance
- Gas Well Production Uncertainty

Day 4 - Gas Projects, Management & Economics

- The gas value chain
  - Differences between oil and gas field development
  - Stranded Gas? Criticality of market, Global gas market exploration
- Surface development and development economics
- Gas sales agreements and gas sales negotiations
- Subsurface issues in gas field developments (overview)
- Special projects - LNG, Tight gas & Shale gas transmission
- Gas reservoir management, production and processing
- Gas reservoir projects - Case studies
  - Two distinct gas reservoirs? El Qara reservoir development
  - Vertical or horizontal wells in the Marnock reservoir development
  - Managed gas production in the Andrew field development - subsurface perspective
  - Mahogany field and LNG development