Development of Natural Gas Field Producer

Course Price

£3250

Course Description

This course is a theoretical-practical course designed to address the basic three stages in a gas field’s life: Reserves Determination, Development and Operation of the gas field. Before planning development of an optimum producing gas field, it is necessary to determine the total reserves of the gas field as accurate as possible. After this first step, It is necessary to determine the number of wells to develop the field based on the Gas Reserves, Reservoir Pressure, Reservoir fluids and Rock Properties, Gas Reservoir Dominant Mechanisms and Gas Demand.

Course Objectives

- Review Basic Rock-Fluid Properties Related to Gas Reservoirs
- Study Classification of Reservoirs Fluids and Reservoirs
- Determination of Gas Reserves by using different methods
- Study pressure tests and fluid data acquisition in the oil industry
- Study fluid production mechanisms in the reservoir
- Review and Analyze Modern Pressure Maintenance by Nitrogen Injection in Gas Reservoirs
- Prepare production forecast
- To obtain Recovery Factors in the exploitation of Gas Reservoirs
- To learn how Efficiently Develop and Operate a Gas field depending on Gas Demand Reservoir Pressure, Fluid Characteristics, and Dominant Mechanisms
- Study Field Operational Problems and Gas Compression in Gas Field Operations

Who Should Attend

Designed for Gas engineers, engineering trainees, technical managers, technical assistants, technicians, chemists, physicists, technical supervisors, service company personnel, data processing personnel, and support staff working with Gas definition, development and production and others involved in maximizing Gas plant, and/or planning work-over operations. The program will benefit for personnel who wish to broaden their knowledge of the technical environment and “best practices” of the natural gas development especially the fields of gas projects.
Course Content

Day 1

1 Introduction

- Scope of the Course and State of the art of Reservoir Engineering
- Instructor and Participants Introduction

2 Brief Review Basic Rock and Rock-Fluid Properties

- Permeability, Porosity, Saturation and Compressibility
- Wettability
- Capillary Pressure
- Relative Permeability
- Drainage and Imbibition Concepts Apply to Reservoir Engineering
- Mathematical Models to Generate Kro and Krw Vs Sw Empirical Curves
- Discussion, Examples and Problem solutions

3. Classification of Reservoirs Fluids and Reservoir

- Types of Petroleum Reservoir Fluids
- Reservoir Development Decisions That are influenced by Fluid Type
- Phase Diagrams
- Black oil Diagrams
- Volatile Oil Diagram
- Retrograde Gas Condensate Phase Diagram
- Wet Gas Phase Diagram
- Dry Gas Phase Diagram
- Used Production Indicators for Black and Volatile Oils

DAY 2

4. Oil and Gas Economics and Used of Economic Excel functions

- Project Economic Analysis
- Economics Measurements
- Cash Flow Report
- Rate of Return (IRR)
- Depreciation in Economic Analysis
- Key input for Projects
- Use of Microsoft Excel Computer Functions
- Economic Practice and Exercises

5. Analysis of Natural Fluids Displacing Mechanisms in the Reservoir

- Rock and Fluids Expansion
Gas Cap Drive
Water Drive
Gravity Segregation
Combine Mechanisms
Performing Data for Each Reservoir under one or combined Mechanisms

DAY 3

6. Pressure Acquisition in Reservoir Engineering and Determination of Well Production Capacity

- Gas Well Testing
- What is Well Testing?
- Why do we do Well Testing
- What is Pressure Transient Analysis
- Types of Tests
- Build-up test (Example and Application Problem)
- Falloff Test (Example and Application Problem)
- Deliverability Test Plot and Calculations
- Isochronal Testing/ Example calculation
- Jones, Blount and Glaze Method
- Calculation of Average Reservoir Pressure
- Well Average Pressure
- Areal Average Pressure
- Volumetric Average Pressure
- Example and Problems

7. Gas Flow Trough Porous Media

- Linear Flow of Gas Darcy and Poiseuille’s Equation
- Linear Flow throughout Fractures and Channels Flow Throughout
- Radial Laminar Flow of Gas and Turbulent Flow of Gas

DAY 4

8. Volumetric Calculation and MBA Applied to Gas Reservoirs

- The Perfect Gas Law
- Specific Gravity of Gases
- Non- Ideal or Real Gases
- Reservoir Gas Volume Factors, Density and Gradients
- Calculating Gas in Place by the Volumetric Method
- Calculating of the Unit recovery From Volumetric Method
- Material Balance in Gas Reservoirs
- Limitation of Equation and Errors

9. MBA as a Straight Line (Havlena and Oded Techniques)
10. Methods of Production Forecast and Gas Reservoir Model Software

- Productivity Index and IPR
- MBA as a Predictive Tool/ MBA Software application to Gas Reservoir Projects
- Case History, Calculation & Exercises

11. Modern Pressure Maintenance by Nitrogen Injection in Gas Reservoirs (Optional)

- Concept of Pressure maintenance by using Nitrogen Injection
- Theory and Applications
- The Concept of the use of Nitrogen in Substitution Projects
- Case History

12. Development and Optimization of Gas Reservoir

- A Model for Gas Field Development
- Gas Reservoir with or without Aquifer
- The Model and Solution techniques
- Effect of Permeability on Gas Production
- Effect of Water Inflow on Gas Production
- Effect of Production Rate on Gas Recovery
- Effect of Water Viscosity and Compressibility
- Rebuilding of Pressure History
- Determination of Optimum Number of Well to be Drilled
- Depending on Gas Demand

DAY 5

13. Field Operational Problems

- Prediction of Sand Production in Gas Wells with the Production of Water
- USA Gulf Coast Case Study
- P/Z versus G, Plots used as detection tools (Use of MBA_software)
- Rate Versus Time Plots

14. Gas Field Design & Development

- Field Development process
- Exploitation Field Development Phases
- Case Study: Development Boylston Project
- Reservoir Geological Model
- 2D Seismic Survey of Boylston Prospect
- Structural map Carrie Sandstone
- Development Plan
- Characteristic of Well log Carry Sandstone
- Estimation of Hydrocarbon in Place
- Nat. Gas Composition and Saturation
- Well Performance
- Gas Reservoir Performance
15. Gas Measurement Technology (Optional)

- Orifice Metering
- Other types of Gas Meters
- Example of Orifice Meter field Application

16 General Discussion and Conclusions

CPD Unit

Continuing Professional Development

35 HOURS CPD