Reservoir Engineering and Management

COURSE OVERVIEW

A reservoir’s life begins with exploration that leads to discovery, which is followed by delineation of the reservoir, development of the field, production by primary, secondary, and tertiary means, and finally to abandonment. Integrated, sound reservoir management is the key to a successful operation throughout a reservoir’s life. Further, the need to enhance recovery from the vast amount of remaining oil and gas-in-place, plus the global competition, requires better reservoir management practices. Reservoir management is the application of scientific principles to solve issues arising during the development and production of oil and gas reservoirs.

This course is designed to provide many tools and techniques to help address the challenges of providing a more reliable and sound reservoir engineering & management. Participants can learn a wealth of classic information on the concepts and processes involved in reservoir engineering and management. The course presents insights about data acquisition, reservoir performance analysis & forecast, field development planning, reservoir management economics and improved recovery processes.

LEARNING OBJECTIVES

Upon the successful completion of the course, participants will know the following:

- Use appropriate approaches in reservoir engineering and management
- Be familiar with the appropriate data collection, analysis, validation and integration process
- Illustrate the points of integration between the different disciplines (geoscience, engineering etc.) during the applications of the reservoir management concepts
- Ensure the appropriate execution of the reservoir management process
- Use the Interdisciplinary Synergistic approach to efficient reservoir management
- Include each reservoir management component and the importance of timing and cost/benefit analysis
- Apply the different methods of reservoir performance analysis and forecast & give emphasis on the integration of production/injection data, pressure data and any subsurface data
- Acquire an up to date knowledge on the improved recovery processes related to water flooding, thermal methods, chemical methods and EOR screening guidelines

TARGET AUDIENCE

Reservoir, Petroleum Operation and Production Engineers, Geologists, Geophysicists, field operation staffs, managers, government officials, and others involved with reservoir operations and management.

TRAINING METHODOLOGY

Our highly practical experiential learning method is results-oriented; based on an adult learning concept. The Reservoir Engineering and Management is designed as a blended environment of presentation; workshops; group work; practical exercises; field application/ case studies, analysis and several industry videos showing all processes; and general discussions. The course will include real case studies in the oil and gas industry. Most of the cases studies have been presented in international journals by the instructor.
Pre & Post course assessments will be used to measure the effectiveness of this training and measure the skill and ability of participants.

COURSE CONTENTS

DAY 1 - Reservoir management process, components and plan

- **KeyTopics:**
  - Reservoir Management Concepts
  - Definition of reservoir management: an integrated, interdisciplinary team effort
  - Reservoir life cycle
  - Scope and objective for integrated reservoir management
  - Fundamentals and resources of reservoir management
  - Reservoir management concepts and processes
  - Reservoir management plans
  - Synergy and team
  - Responsibilities for team members
  - Integration of geoscience and engineering
  - Setting goals: goal setting, planning, implementing, monitoring, and evaluating reservoir performance
  - Developing plan and economics (scenarios): field development and field operating plans to optimise profitability
  - Why integrated reservoir studies
  - Revision of plan & strategies
  - Reasons for failure of reservoir management programs
  - Economics for Reservoir Management

DAY 2 - Reservoir engineering data

- **KeyTopics:**
  - Data needed for integrated study
  - Data types: reservoir rock & fluids properties
  - Data acquisition, validation, analysis and management
  - Integration of production/injection data, log data, pressure data and any subsurface data for analysis
  - Efficient monitoring of reservoir performance
  - Identifying and acquiring critical data, data acquisition, and analysis
  - Reservoir performance analysis and forecast
  - Static geological model and reservoir simulation
When simulation models are required
History matching and identification of by-passed oil
Total integration of surface and sub-surface

DAY 3 - Reserves estimation and classification/ reservoir drive mechanisms and producing characteristics

- **KeyTopics:**
  - Induction of new technologies to maximizing economic recovery and minimizing capital investment, risk and operating expenses.
  - The timing of field implementation of reservoir management plan: during the primary recovery, pressure maintenance, and secondary and tertiary recovery
  - Reservoir management plans and scenarios
  - The economic model, uncertainties and risks
  - Maximizing economic recovery and minimizing capital investment, risk and operating expenses
  - Oil reserves types and classification & reservoir engineering and evaluation
  - Natural producing mechanisms
  - Reservoir performance analysis and forecast
  - Estimation of reserves and prediction of reservoir performance
  - Determination of hydrocarbon in place (volumetric method, decline curve method, material balance method, and mathematical simulation)

DAY 4 - Water flood monitoring and management

- **KeyTopics:**
  - Secondary recovery and pressure maintenance process
  - Water flood management in mature fields: surface as well as subsurface issues.
  - Describing water flooding definition and objectives, candidates, patterns, factors affecting pattern selection, well spacing, fractional flow, performance measures, practices and problems
  - Design aspects of the water injection system
  - Water injection systems: water sources (produced water, aquifers and seawater), water compatibilities and scale, and basic water treatment
  - Water quality: quality issues and associated risks, the effect of injection water quality on infectivity
  - Water flood monitoring and management
  - Reservoir performance with water flooding projects
  - Effects of water injection on the recovery factor and reserves
Key Topics:

- Introduction to enhanced oil recovery techniques
- Conventional and none conventional EOR processes
- Chemical, thermal, and miscible EOR methods
- EOR processes concepts and mechanisms
- Screening criteria guidelines of the EOR processes
- Performance of the EOR processes and expected recovery factors
- Development plans of the EOR processes
- Stages of the EOR projects
- Role of the reservoir management for the application of the EOR processes
- Reservoir management case studies of mature fields: several development plans for water floods and EOR projects.