Advanced Steam Injection Processes

Course Price

£3050

Course Description

Steam Injection is a thermal drive process that adds heat to the reservoir to expand the oil-in-place, reduce its viscosity, provide drive and thereby improve the displacement efficiency of injected fluid. This course explores the concepts behind steam injection processes in the field. The emphasis is on the practical aspects of steam injection. Equations and calculation methods are included in the course. There is an emphasis on the surface facilities, field practices, and operational problems. The material presented in this course is directed toward engineers, technicians, independent operators.

Course Objectives

- Review and practice of Steam Injection processes.
- Use and practice of Steam Thermal tables to calculate the injected energy in a steam injection well.
- Steamflood Temperature and Saturation Profiles
- Steam Injection Mechanisms
- Cycle Steam Injection Processes
- Criteria for evaluating Steam Injection Prospects
- Estimated Heat Loss as function of depth
- Steam Injection Project Planning
- Economic of steam injection
- Water Treatment for Steam Generation/Water Chemistry
- Oilfield Steam Generator Water Quality Requirements
- Steam Generation
- Surface Steam Quality Measurement Concept and Methods
- Thermal well Completion Practices
- Thermal Cementing Practices

Who Should Attend

This course is designed for Petroleum Production and Reservoir Engineers and their supervisors; Chemical Engineers Associated with crude oil production in areas of high viscosity. Technical field personnel and services companies representatives to obtain or increase the understanding of the overall concepts and principles of Steam Injection Processes.
Course Content

PART 1

Fundamental of Steam Injection Processes

- Basic of Steam Injection
- Steam Quality
- Steam Injection Process
- Steam Injection Process Mechanisms
- Steam Distillation
- Gas Stripping
- In situ Solvent Drive
- Viscosity reduction
- Thermal Expansion
- Solution Gas Drive
- Gravity Segregation
- Emulsion Drive
- Cycle Steam Injection
- Process Description
- Mechanisms of Cycle Steam Process
- References

PART 2

Criteria for Evaluating Steam Injection Prospects

- Introduction
- Rock and Fluid Properties
- Pay Zone Thickness
- Depth and Reservoir Pressure
- Permeability and Transmissibility
- Stratification
- Anisotropy
- Gas Cap or Aquifer
- Dip Angle
- Porosity
- Oil Saturation
- Clay Content
- Crude Oil Characteristics
- Gravity
- Viscosity
- Field History and Status
- References
Project Planning

- Introduction
- Reservoir Selection
- Depth
- Oil in Place
- Reservoir Segregation and in-homogeneities
- Preliminary Evaluation
- Laboratory Analysis
- Comprehensive Investigation
- Comprehensive Performance Investigation
- Comparison with Conventional Practices
- Pilot Test
- Summary
- References

PART 4

Economic Of Steam Injection

- Introduction
- Economic Factors in steam Injection Operation
- Estimation of Economically recoverable Oil
- Stream Injection Project cost
- Cost Estimate
- Development Cost
- Well Cost
- Water Treatment
- Summary
- References

PART 5

Water Treatment for Steam Generation

- Water for Steam Generation
- Water Treatment Consideration
- Total Hardness
- Alkalinity
- Oxygen
- Sulfides
- Total Dissolved solids
- Total Suspended Solids
- Iron
- Oil
- Silica
- pH
- Ion Exchange Unit Operation Problems
- Resins stability
Varying Water Quality
Poor Operational Practices
Mechanical Problems
Ion Exchange Calculations
Hardness monitoring
Source Water Properties and Problems of a Water system
Summary
General References

PART 6

Steam Generation

- General features of Oil Field Steam Generators
- Generator Selection
- Design Requirements for Oilfield Steam Generators
- Steam Generator Components
  - Feed Water System
  - Feed Water Pre-heater
  - Fuel System
  - Combustion Air System
  - Convection Section
  - Radiant section
- Steam Generator Control
- Process Description
- Fuel System
- Combustion Air System
- Steam Generator Specifications
- Fuel for Oil Field Generators
- Natural Gas
- Steam Generator operation and Problems
- Tube failure
- Other operation problems
- Steam Generator Maintenance
- Steam Generator Efficiency Calculations
- Down Hole Steam Generator
- Summary
- References

PART 7

Steam Distribution

- Introduction
- Components of a steam distribution network
- Main Steam Headers
- Steam Flow rates and Pressure Drops
- Expansion of Steam lines
- Expansion of steam headers
PART 8
Steam Quality

- Introduction
- Surface Steam Quality Measurement
- Separator Method
- Orifice Metering Method
- Total Dissolved Method
- Electric Conductivity Method
- Enthalpy Determination Method
- Neutron Densitometer Steam Quality Measurement System
- Summary
- References

PART 9
Thermal Well Completion Practices

- Introduction
- Temperature effects on Casings and Tubings
- Thermal Well Casing design
- Tubing Strings Consideration
- Thermal Well Completion
- Cementing
- Perforating
- Openhole Gravel Packs
- Consolidated packs
- Suggested Steam Injection and Production well drilling and completion Procedures
- DownHole Equipment
- Packer Installation
- Seal Systems
- Summary
- References
35 HOURS CPD