

# OPTIMIZE CHEMICAL INJECTION

## PRD032

### COURSE DESCRIPTION

Oil and gas production challenges have increased significantly with deeper waters and newer technologies. Generally, one-third to one-half of the original oil-in-place may remain in a reservoir as it reaches abandonment due to its economic limit. The primary reasons are heterogeneity of the reservoir, unfavorable fluid properties, inefficient nature of the displacement process, oil price and production cost considerations. The secondary reasons, however, are: inappropriate development, inefficient reservoir management practices, and escalating costs of remedial interventions/corrective measures and producing operations.

Flow assurance challenges and fluid separation issues have cast a significant demand on production chemicals to a point that the latter has become an integral part of production operations.

A multitude of various facets have to come together for a successful chemical injection program. These various elements bring a variety of issues by themselves, but the industry itself lacks a "systems approach" to chemical injection system design and operation.

This course details the various elemental aspects of the chemical injection system from design of the system including tankage, pumping, monitoring, delivery and optimization to chemical portfolio management from manufacture to delivery including product quality, contamination avoidance, rate control monitoring, inter-chemical impacts etc. Also, it covers the chemical recovery improvement possibilities that present themselves at all stages in the reservoir life cycle. It thereby enables one to timely select the most beneficial method and set realistic expectations on production behavior changes and recovery improvement. The impacts of the selected method on personnel training, technology transfer, and facility modification are also covered.

### COURSE GOAL

To enhance the participants' knowledge, skills and abilities necessary to understand the total chemical injection package and all of the steps that should be followed to ensure that effectively selected specialty chemicals are used in clean operating environments and are delivered using a robust and established injection system based on good design to the right injection locations at the right dosage rates.

### COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Understand production chemical testing and the various considerations including functional requirements, compatibility, effectiveness and shelf life.

- Identify the requirements for good design of the various aspects of the chemical injection system including storage tanks, pumps, dampeners, piping, metallurgy, injection system, valving, flow control valves etc.
- Be familiar with various aspects typically overlooked in chemical injection system design.
- Understand how to Monitor and optimize the chemical injection system.

## WHO SHOULD ATTEND

- Reservoir engineers.
- Production technologists.
- Surface facilities specialists.
- Team leaders.
- Project managers.
- Costing specialist.
- Asset managers who want to have an overview of chemical injection for EOR.

## COURSE DURATION

5 Working Days

## COURSE OUTLINES

### 1. Introduction to Improved Oil Recovery (IOR) Enhanced Oil Recovery (EOR) Methods

- Need for IOR/EOR.
- EOR methods (description, classification and status).
- EOR reserves.
- Screening criteria.
- Environmental aspects of EOR methods.
- Basic equations for fluid flow in Porous Media.
- Monitoring and optimization of chemical injection system.

### 2. Microscopic Fluid Displacement in Reservoir

- Displacement forces in the reservoir.
- Capillary, viscous and gravitational forces.
- Factors affecting phase trapping.
- Mobilization and displacement of trapped phases.

### 3. Macroscopic Fluid Displacement in Reservoir

- Reservoir fluid Pressure-volume-temperature (PVT) properties; rock properties.
- Material balance.
- Mobility ratio.
- Displacement efficiency.
- Areal and vertical sweep efficiencies; oil recovery efficiency.

### 4. Factor Affecting Oil Recovery

- Comparative performance of different EOR methods (miscible, thermal, chemical)
- Screening criteria and selection of most appropriate EOR method(s).

### 5. Chemical Flooding

- Definition of chemical flooding.
- Describe displacement fundamentals—vertical and areal sweep efficiency.
- Applicability of the process.
- Other chemical test for sweep improvement and profile modifications (gels and foam).
- Micellar/ polymer flood, Surfactant flood.
- Using other chemical methods Rock Fluid interaction.
- Factors affecting phase behavior.
- Displacement mechanisms under chemical flood.
- Analytical model of chemical flood.
- Selection criteria and design procedures.
- Laboratory tests for chemical floods.

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