

## THERMAL ENHANCED OIL RECOVERY (EOR) WORKSHOP WITH SPECIAL EMPHASIS ON CYCLIC STEAM STIMULATION (CSS) AND COLD HEAVY OIL PRODUCTION WITH SAND (CHOPS)

### Workshop Description

It is well known that primary and secondary production schemes in heavy oil fields (< 20 °API) generally result in recoverable reserves of 15% or less. Addition of new discoveries has been declining steadily in the past decades, and the increase of recovery factors from mature oilfields in known basins will be critical to meeting growing market demand. Heavy oil fields, since they have low recovery by conventional means, provide significant scope for increasing ultimate recovery using thermal means. This workshop has been custom-designed to provide the attendees an opportunity to review and learn the most up-to-date information available about Thermal Enhanced Oil Recovery (EOR) technologies, and strategies practiced today, with emphasis on simulation of Cyclic Steam Stimulation (CSS) and Cold Heavy Oil Production with Sand (CHOPS), to meet the specific needs of the client.

### Duration and Scope

This high-level workshop is of five (5) days duration and involves a discussion of the state-of-the-art of revitalizing heavy oilfields using Thermal Enhanced Oil Recovery (EOR) technologies and strategies. Several hours are devoted to discussion of simulation of Cyclic Steam Stimulation (CSS) and CHOPS, and there are several class problems for the attendees to work on. A combination of technical discussions plus class room exercises will prepare the attendees to identify opportunities based on previous field experiences, lessons learned, and best practices that have been gathered purposely for this workshop.

This workshop would introduce the attendees to the basics of producing heavy oil fields and help understand the impact of heat on oil recovery. Attending this workshop will allow the attendees to identify options of increasing production from specific reservoirs, pre-screen appropriate enhanced recovery options, determine the applicability of CHOPS and/or CSS, and obtain a first-hand appreciation of challenges and options for simulating CHOPS and CSS. The workshop also incorporates various related case histories from literature and

### WORKSHOP CONTENT

- Background, History and Present Status of Thermal Recovery
- Introduction to Heavy Oil
- Heavy Oil Modeling
  - Reservoir and Geological modeling and characteristics
  - Initial data, Pressure, GOC, WOC
  - PVT, Relative Permeability
- Enhancing Primary Production - Horizontal Wells/Fracturing
- Foamy Oil Behavior and Sand/ Fines Production
- Cold Heavy Oil Production with Sand (CHOPS)
  - Issues in Post CHOPS Exploitation
  - Simulation of Foamy Oil, Sand/ Fines movement, CHOPS
- Steam Stimulation
  - Huff 'n' Puff, Cyclic Steam Stimulation (involving Fracturing)
  - Challenges, Modeling Cyclic Steam Injection and flooding
- Horizontal Wells/ Solvent Additives in Steam Projects
- Heat Management in Steam Operations
- In-Situ Combustion
- Non-Thermal IOR: Water and Polymer Flooding, CO2 Huff 'n' puff
- Modeling Non-thermal heavy oil EOR Processes
- Sensitivity Analysis and Optimization
- Case Studies
- Future opportunities

class problems to help the attendees to better understand the discussed issues.

## Who Should Attend

This five (5) days workshop is custom-designed for managers and senior engineers, and other professionals, familiar with reservoir and production engineering, and interested in mastering Thermal Enhanced Oil Recovery (EOR) technologies and strategies, and basic numerical simulation of Cyclic Steam Stimulation and CHOPS.

## Workshop Requirements

Each workshop attendee should bring their own notebook computer to work on the class problems. Class room should be equipped with power strips, for students to plug in their notebook computers, and a projector for instructors to project their PowerPoint slides.

## Workshop Manual

Each workshop attendee will be provided a workbook, in English, containing copies of the instructors' PowerPoint presentations, and solutions to the class problems.

## Workshop Instructors

This custom designed workshop will be conducted by our high-level and seasoned consultants, with extensive knowledge and experience in the subject matter as well as in conducting training programs around the world.

## Language of Instructions

This workshop will be conducted in the English language. However, if desired by the client, one of our bi-lingual consultants can be present throughout the workshop for the benefit of those attendees who are not fluent in the English language. This workshop can be customized further to meet the needs of the client's professionals and managers.