Heavy Oil Production

Course Price

£3250

Course Description

This course is intended to imbue the participants with a greater understanding of heavy oil/in-situ oil sands resources. Both beginning level concepts and more technically advanced topics are covered with an introduction to the business aspects of heavy oil/in-situ oil sands in order to appeal to a wide range of both technical and managerial level E&P professionals.

Heavy oil/in-situ oil sands comprise a large portion of the future of the world’s oil reserves. However, what they offer in size, they lack in the difficulty of production and commercialization.

The course offers an insight on evaluation, development, and commercialization aspects of heavy oil/in-situ oil sands resources. It takes an unbiased practical approach to both non-thermal and in-situ thermal production methods citing benefits and limitations. Participants are to be imparted knowledge on subsurface evaluation, laboratory characterization, production, transportation and refinery/upgrading topics of the heavy crudes.

Each attendee should come away with an introspective understanding of evaluating and developing heavy oil resources with exposure to the commercialization aspects. The course contains development case studies and laboratory evaluation examples. It also provides overview of the emerging technologies.

Course Objectives

- Gain insight on evaluation, development and commercialization aspects of heavy oil resources
- Understand the importance/challenges of heavy oil/oil sands resources for future world supply
- Know the characteristics of heavy crudes and methods for subsurface and laboratory evaluation, production, treatment, transportation and refinery/upgrading.
- Compare/Contrast heavy oil/oil sands to conventional resources in terms of resource size, production characteristics, and commercial aspects.
- Demonstrate heavy oil/oil sands recovery project with non-thermal and thermal means using various case studies
- Recognize and evaluate the environmental challenges required to develop and produce heavy oil/oil sands resources
Who Should Attend

This short course is intended for both technical and managerial level oil and gas professionals responsible for the exploitation of Heavy/Extra Heavy Oil Fields.

Course Content

PART A:

1. EMULSION AND TREATMENT SYSTEM AND DESIGN
   - Crude Oil Treatment System
   - Treater Description, Sizing And Selection/
   - Designing Equations For Heavy Oil Thermal Treaters
   - Emulsion Concept In Heavy Oil Treatment
   - Type Of Emulsion
   - Emulsion Formation And Stability
   - Methods To Break Emulsion
   - Emulsion Summary
   - Gravity Separation/Stokes Equation
   - Coalescence
   - Heavy Oil Thermal Treatment/ Heat Input Equations
   - Horizontal Heat Treater
   - Horizontal Electrostatic Treater
   - Oil Treater Settling Equation
   - Crude Oil Treatment System Design
   - Vertical Treater Design and Selection.
   - Horizontal Treater Design and Selection.

2. HEAVY, EXTRA-HEAVY AND BITUMEN CHARACTERISTICS

3. UNCONVENTIONAL TYPES OF OILS
   - Heavy Oil
   - Extra-Heavy Oil
   - Tars
   - Bitumen
   - Oil Sand
   - Shale Sand

4. CLASSIFICATION: CLASS BASED ON VISCOSITY

5. HEAVY OIL CHARACTERISTICS: SARA LABORATORY PROCEDURE DIAGRAM
6. HEAVY OIL CHEMICAL COMPOSITION: SARA FRACTIONS IN A HEAVY OIL

7. SARA FRACTIONS OF A CONVENTIONAL OIL

PART B:

1. Introduction and Concepts Review

Fluid * Density* Viscosity* Specific Gravity of Liquids* API Gravity: Formula and Classification* Solubility of gas in the oil* Bubble Point* Standing correlation* Flows types* Oil Volumetric Factor* Specific Gravity of Gases* Emulsions

DAY 2

PART A :
- Influence of Temperature in Oil Viscosity,
- Absolute Viscosity, Conceptual Equation
- Rheological Classification Of Fluids
- Effect Of Temperature On Oil Viscosity
- Heavy Oil Characteristics
- Viscosity Of Heavy Oil/Naphtha Mixtures
- Heavy Oil Properties-Dynamic Viscosity
- Heavy Oil Properties-Kinematics Viscosity
- Units, Equations And Conversions-Viscosity
- Types Of Viscometers

PART B:

- Energy sources for heat generation
- Practical applications of oil viscosity reduction with temperature:
  Steam Stimulation, Steamflood, SAGD, Steam Injection in Pipelines, Electric Bottom Heating,
- Tubing Heating, Hydrogen Peroxide, Solar Energy: Oman and USA projects
- Solar Energy for Heavy Oil Transportation
- Beggs-Robinson viscosity-temperature correlation

- Cst & Ssu Conversion at 100 °F
- Oil viscosity variation with temperature
- Influence of depth in the temperature and oil viscosity

DAY 3

Part A: HEAVY OIL PRODUCTION METHODS:
1. Water System
1.1. Water Injection and Adjustment by Diluent
1.2 Wetting System (Case Study)
2. Light to Medium Oil Injection
3. Downhole Emulsification
4. Downhole Adjustment by Diluent
5. Diluent Fluid Recovery
6. Heating System and Diluent Adjustment
7. Pack-off System and Adjustment

PART B: HEAVY OIL METHODS OF TRANSPORTATION
1. Heating
2. Dilution
3. Emulsification
4. Partial Field Upgrading
5. Core-Annular Flow
6. Combination

Part C: Using of Diluents for Viscosity Reduction
1. Density of a mixture of two miscible fluids
2. Variation of oil viscosity adding diluents
3. Examples of practical applications
   (Using Diluents for Heavy Oil Transportation* Hot Diluents for Stimulation)

DAY 4

PART A: THERMAL HEAVY OIL CASE STUDIES
– Steam Flood Optimization with field examples
– ISHRE In-Situ HydroVisbreaking Process Modeling

PART B: ASPHALTENE
– Application of Laboratory Technique for Screening of Asphaltene Inhibitors

DAY 5

PART A: HEAVY OIL GATHERING SYSTEM AND TREATMENT
- Gathering System & Treatment Of Produced Fluids
- Schematic Of Heavy Oil Production Facility

Part B: ARTIFICIAL LIFTING METHODS
1. Sucker rod pumping
2. Progressive cavity pumps (PCP)
   Conventional PCP*, Metal-metal PCP, Electrical submersible PCP, *Heavy lift system
3. Electric submersible pumps (ESP).
4. Gas lift
5. Jet pump
6. Artificial lifting methods: summary table

CPD Unit

Continuing Professional Development
35 HOURS CPD