

RESERVOIR MODELING OF HEAVY OIL RESOURCES

RSE039

COURSE OVERVIEW

As conventional oil reserves decline, more emphasis is placed on heavy oil and bitumen. Heavy oil and bitumen are plentiful in many developed oil provinces, as well as in areas with no conventional oil. As with conventional oil, the reservoir engineering aspects of the development of heavy oil and bitumen is aided by modeling of various kinds. For heavy oil and bitumen, the modeling is complicated by the high oil viscosity and the need for enhanced oil recovery techniques, usually involving heating of the reservoir to produce the oil at commercial rates. In this course, modeling is understood as a part of reservoir engineering and includes the use of analogues and analytical modeling, as well as numerical simulation. The emphasis is on numerical simulation, but analytical techniques are also examined in some detail, since they provide considerable insight into the recovery process. The emphasis of the course is on HOW to perform a successful heavy oil simulation study, including factors to be considered, pitfalls to avoid, testing of models, examination of output, and ensuring results are reliable. Note that this course does NOT teach details of data input for a particular program, advice on selection of software, detailed comparison of features of different software, or a cookbook on how build a model.

COURSE OBJECTIVES

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

- Select and apply appropriate modeling techniques for heavy oil reservoir studies.
- Design effective modeling studies for different objectives in heavy oil development.
- Collect, analyze, and incorporate relevant data into reservoir models.
- Run and validate numerical simulation models for heavy oil reservoirs.
- Evaluate and compare development options using simulation results.
- Interpret and assess third-party studies related to heavy oil reservoirs.
- Understand reservoir engineering and characterization for heavy oil.
- Utilize geostatistical models in heavy oil reservoir modeling.
- Consider key rock and fluid data for heavy oil properties.
- Explore non-thermal and thermal recovery methods for heavy oil resources.

WHO SHOULD ATTEND

Petroleum and reservoir engineers who will be actively working on studies, and be involved in assessing the results of studies.

COURSE DURATION

5 Working Days

COURSE OUTLINES

Day 1

- Pre course evaluation
- Selecting the type of modeling required to meet the aims of the study
- Designing different types of modeling studies to achieve the aims of the study
 - Feasibility
 - Operating strategy
 - Development plan
 - Ultimate recovery
- Collecting and select the data for the study
- Incorporating field observations into the study
 - Production data
 - Pressure data
 - 4D seismic
 - Observation well data

Day 2

- Setting up, run, and test the model(s)
- Assessing the adequacy of the history match(es)
- Creating and run different development options and assess the results
- Assess the results of third party studies (in-house or external)
- Introduction
 - Definitions of heavy oil
 - Types of study
 - Types of modeling
 - Design of study
 - Grid effects
 - Binary screening

Day 3

- Basic reservoir engineering and reservoir characterization
- Overview of reservoir engineering techniques
 - Limitations for heavy oil
 - Types of geological models
 - Introduction to geostatistical models
- Rock and fluid data for heavy oil

- Oil viscosity
- Thermal properties of reservoir
- Temperature dependence of relative permeability

Day 4

- Non-thermal recovery of heavy oil
- Cold heavy oil production with sand
- Chemical flooding
- VAPEX
- Immiscible gas flooding

Day 5

- Thermal recovery using steam
 - Cyclic steam stimulation
 - Steamflood
 - Steam-assisted gravity drainage
- Thermal recovery without steam
 - In-situ combustion
 - Electrical heating
 - Hot water flood
 - Steam with additives
- Post course evaluation.

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