



## Fundamentals of PVT Analysis

Course format: lectures, hands on exercises and experiments at PanTerra's PVT laboratory

Trainer: Lucian Pirlea

Lucian is a seasoned PVT & EOR specialist with more than 20 years' experience in the oil and gas industry. Between 1996 and 2000, he was involved in the downstream oil and gas sector as a pipeline construction project manager, successfully undertaking projects worth several US\$ million. He also managed international co-operation and procurement activities as head of department. Since 2001, he has actively carried out PVT analysis, from the position of lab analyst to supervisor. He worked in various locations across the world, helping setting up new labs, implementing company's quality policy at the subsidiaries and reducing the backlogs. Since October 2006, he is the PVT supervisor with PanTerra Geoconsultants BV, in charge of running PanTerra's PVT & EOR laboratory.

### Course content

The fundamentals of PVT Analysis course is divided into sessions: theoretical and practical.

The theoretical aspects of PVT Reservoir Fluid Analysis will cover:

1. Generalities: scope of PVT Analysis
2. Properties of Reservoir Fluids: composition, phase behavior, ideal and real gases properties, liquid properties, compressibility, thermal expansion, formation volume factor, classification of reservoir fluids
3. PVT Sampling: well conditioning, sampling procedures, sampling equipment, pros and cons - subsurface, wellhead and surface sampling
4. Samples Reconditioning and Quality Control: subsurface Samples, Surface Samples, QC Equipment
5. Recombination of Surface Samples: mathematical recombination of separator liquid and gas compositions based on separator or stock tank rates (GOR), physical recombination of separator liquid and gas, bubble or dew point check of recombined fluid, compositional analysis of recombined fluid equipment.
6. Reservoir Conditions PVT Analyses: well test data, type of completion, types of producing reservoir, pressure depletion stage, sampling data, identification of fluid type based on composition, previous PVT data if available (FVF, GOR, shrinkage, API gravity, viscosity etc.)  
Reservoir Conditions Laboratory Experiments: Constant Composition Expansion, Differential Liberation, Constant Volume Depletion, Separator Tests, Live Viscosity, Gas Solubility Tests (Swelling) - analysis description, equipment, software, data evaluation, interpretation, calculation and reporting
7. Time Allocation: 2 days

The Practical Aspects of Reservoir Fluids Analysis session will focus on experiments using PanTerra's laboratory equipment.

1. Equipment Maintenance and Calibration: PVT cells, viscometers, chromatographs, piston cylinders, pressure gauges.
2. Samples Quality Control
  - Liquid Samples: Opening Pressure, Sample Volume, Composition by Flash Separation, Bubble Point Pressure at Tsep
  - Gas Samples: Opening Pressure, Composition
  - Recombination of Surface Samples
3. Reservoir Conditions PVT Analyses
  - Constant Composition Expansion and Differential Liberation for Black Oil: running a CCE and DL Test (1 stage), GC Compositions of Stage Gases, Oil Density Measurement, Oil Mole Weight Measurement
  - Viscosity Measurement: running a single phase viscosity measurement.
4. Time Allocation: 2 days

#### **Learning objectives**

This four days course is intended for petroleum engineers, fluids analysts and chemists that are using reservoir fluids data. The course will cover typical PVT analysis performed on black oil and gas condensate wells. Upon the completion of the course, the participants will have a better understanding of PVT analysis and the usefulness of the fluids data in improving the overall efficiency of the oil and gas production.

#### **Duration & location**

Depending on the participants' learning objectives course duration can range from two to four days.  
Panterra's head office in Leiderdorp

#### **Documentation**

Each participant will receive a print-out of the course.