**HGS Short Course: Applied Understanding for Geoscientists of How Engineers Calculate Reservoir Oil and Gas Volumes using PVT**

Thursday, October 20, 2023 Virtual Event via Zoom

8:00am – 1:00pm

Attendees will receive a Certificate of Continuing Education for 4 PDH

**This short course is being offered to HGS for a special discount from its $100 standard rate.**

**HGS Members** $200

**HGS Student Members & Emeritus** $100

**Non-members** $400

**Registration will close Wednesday October 19, 2023 at 4 pm. Meeting links will be sent at this time to the “Primary” email listed on your HGS account.**

**\*\*Non-Members can submit an application and pay their dues before registering to get the member price. Please call the HGS office at 713-463-9476 to be registered only AFTER your application and dues are submitted.\*\***

**Course Description**

**Learn to apply the fundamental principles of PVT beginning at the well site and progressing through the lab to the PVT report and its application in estimating oil and gas volumes.**

**Summary**

This practical course will provide students with a working knowledge of Pressure Volume Temperature (PVT) and an understanding of Equation of State (EOS) and its application, following a path from field sampling to the lab and on to the examination of common practices and analyses used in classical and simulated reservoir engineering.

**Learning Objectives**

* Understand the field separation processes and sampling procedures
* Learn how to select the method of sampling at the well site
* Learn how the PVT lab validates samples and conducts experiments
* Determine which PVT experiments to perform on your samples
* Identify the six reservoir fluid types and their phase behavior
* Learn to read PVT lab reports for DLE, CCE, CVD, and Separator Tests
* Construct black oil PVT tables for volumetrics and simulation models

**Introduction**

As a Geoscientist it is useful to understand how your team Reservoir Engineer calculates reserves. You might ask what is Applied Understanding of PVT? It means that you don't need to be an expert in PVT to immediately and effectively apply its fundamental principals in estimating oil and gas volumes at various temperatures and pressures. By the end of this course, you will understand phase behavior in the context of reservoir fluid types and the effect of PVT (pressure-volume-temperature) changes for a characterized fluid (a defined multi-component oil and gas system). You will be equipped to apply your knowledge in the field during sampling and in discussions with the lab, and confidently use the reported results to construct PVT tables. You will also learn how to construct PVT tables using correlations built into Excel. The applied understanding of the fundamental principals is a must for petroleum engineers, especially for reservoir engineers who need to effectively estimate reservoir oil and gas volumes at reservoir temperature and pressure during depletion and enhanced oil recovery (EOR). It is valuable for Reservoir Geoscientists to have an understanding of these principals.

**Course Outline**

**Volumetrics and Correlations**

* Oil and Gas Volumetric Equations
* Oil Correlations for Rs Pb Bo
* Gas Correlations for Z and Bg
* Oil and Gas Behavior Animations
* Oil and Gas Correlation Spreadsheets

**Field Separation and Sampling**

* Surface Separation of Oil and Gas
* Sampling Separator Oil and Gas

**Material Balance of Fluids**

* A Day in the Life of a Mole

**PVT Lab and Surface Samples**

* PVT Lab Surface Sample Workflow
* PVT Lab Sample Validation
* PVT Lab Compositions
* PVT Lab Gas Plant Liquids

**PVT Lab Experiments**

* Six Reservoir Fluid Types
* Methods and Analyses
* Physical Recombination
* CCE Experiment
* CVD Experiment
* DLE Experiment with Correction to Surface Conditions
* Example PVT Tables

**Closing Comments**

**About the instructor**



Ronald (Ron) L. Lang, P.E. has over 40 years of experience in reservoir engineering, including classical and simulation applications. He is actively involved as a consultant in domestic and international studies requiring application of PVT equation of state (EOS) principles. He participates in association with geoscience teams in field development strategies including primary, secondary, and enhanced oil recovery (EOR) projects. Mr. Lang is a regular guest speaker for the SPE International Continued Education Accelerated Learning Tutorials relating to PVT and EOS.

Mr. Lang received a B.Sc. degree in Petroleum Engineering in 1974 from Texas Tech University. His career began with Amoco Production Company in Houston and transitioned to consulting firms engaged in exploration and development; acquisition and divestment transaction advisory; and petroleum engineering technical evaluations. He is a licensed professional engineer in the state of Texas.

As an experienced simulation engineer, Mr. Lang learned the importance of correctly applying PVT (EOS) to properly characterize reservoir fluids and accurately predict fluid behavior and its impact on reservoir oil and gas volumes and performance. He has studied under the guidance of leading experts in this field in the oil and gas industry. Mr. Lang had a supporting technical role during the litigation of the Deepwater Horizon Macondo oil spill. In the development of conventional and unconventional oil and gas resources, it is crucial for engineers to understand the differences among the various classes of reservoir fluids. In particular, reserves and their value can be lost rapidly if engineers do not properly identify near-critical fluids, and their behavior, such as in the volatile oils and retrograde gases.

**Instructor Contact Information:**

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