

Performance Evaluation of Horizontal Wells

Course Objective:

This course provides in-depth background and state-of-the-art tools necessary to maximize the performance of Hz wells. Practical examples will illustrate how candidate horizontal wells are selected and designed using multi-disciplined team efforts to ensure both technical and economic benefits are maximized. Methods used to predict well performance; such as, expected producing rate, drainage area, and fluid coning will be explained through class problems. Optimization of Multi-stage Fracing of Horizontal Wells (MFHW), including the number frac stages, spacing between the frac stages, size of the fracs, and how to take advantage of the “sweet spots”, will be illustrated using advanced software. Mini frac benefits to improve the frac design, including test interpretations; pre-closure and post closure data. The art of well test interpretations and the challenges of evaluating the performance of MFHW’s will be discussed for various formations including tight oil (Cardium, Pekisko, Bakken, Spearfish), shale gas (Horn River, Duvernay, Barrent), and tight gas (Montney, Doig, Baldonnel)

Who Should Attend:

This course is aimed at reservoir, petroleum and exploitation engineers/technologists, geophysicists and geologists who are involved in the applications and optimization of Hz and specifically Multi-stage Fracing of Hz Wells (MFHW).

Course Instructors:



Mr. Saad Ibrahim, P. Eng. President of Petro Management Group Ltd., has over 30 years of diversified experience in the oil and gas industry as a worldwide highly recognized engineering consultant and distinguished instructor. He completed a Post-graduate program with the University of Calgary, in Chemical and Petroleum Engineering. The focus of Mr. Ibrahim’s experience lies in the area of reservoir management and well test planning/analysis. Mr. Ibrahim is a member of APEGGA and SPE.

Course Agenda:

➤ **Introduction**

- History and level /types of activities

➤ **Benefits/applications of horizontal wells**

- Uncertainties and risks; geological, engineering and economical
- Well constrains; reservoir - drilling - completion

➤ **Well productivity**

- Factors influencing well productivity
- Horizontal well drainage area (analytical/numerical methods)
- Productivity estimates of Multi-stage Fracing of Hz Wells (MFHW)
- Productivity of slanted wells

➤ **Design optimization of Multi-stage Fracing of Hz Wells (MFHW)**

- The number of fracs or frac spacing
- Size of fracs and frac half-length
- Open hole vs. cased hole completion/fracing of MFHW's
- How to take advantage of the "sweet spots"?

➤ **Mini Frac Applications – use of the G-Function**

- Reasons/benefits of Mini Fracing
- Diagnoses of different types of leak-off
- Analysis techniques including:
 - ✓ Pre-Frac Closure
 - ✓ After Closure Analysis (ACA)
- Case studies

➤ **Well test analysis (PTA) and production analysis (PA)**

- Flow geometry/regimes for Hz and slanted wells
- Well test analysis techniques
- Flow geometry/regimes for Hz and slanted wells
- Well test and production analysis techniques, including MFHW's
- Case studies

➤ **Fluid coning prediction**

- | Determination of the "Critical" rate and time to breakthrough
- | Completion optimizing in the presence of fluid contact(s)

➤ **Reserve estimates**

- Estimate of recoverable reserves (Plahn method)
- Decline analysis, statistical, and empirical methods
- Use of new numerical techniques to estimate Stimulated Reservoir Volume (SRV) and Contacted Reservoir Volume (CRV)

➤ **Screening criteria and design considerations for Hz well candidates**

- How to select successful Hz candidates
- Impact of Hz well orientation on well productivity
- Well flow-back considerations (case study)
- Use of new evaluation tools