G-SC-9

Pore Pressure, Wellbore Stability and Casing Failure Prediction

Instructor: Dr. Yousef Abbasi Asl

Course Description (3 Days, 24 Hours)

The safe drilling of wells requires a detailed pre-drill prediction of pore pressures, fracture gradients and potential wellbore instability. Accurate pore pressure prediction is vital for several aspects of well planning, such as casing and cementing design, as well as the prevention of potentially disastrous kicks, losses and blowouts. Pore pressure analysis represents a key part in reducing drilling costs and optimizing drilling, both in the planning and operational stages of drilling a well. Another serious concern to well completion design and production management is the casing integrity. Many factors can negatively affect the integrity of a well's casing. The most common culprits are hydrogen sulfide (H2S), which is highly corrosive, and mechanical failures due to geomechanical influences. Mature wells, especially those undergoing secondary recovery, are particularly susceptible to integrity problems. The casing may simply leak in which case formation water can intrude in to the casing. The influx of external water increases the water-oil ratio of the produced fluid. Another casing failure phenomenon is severe casing deformation and the resultant difficulties in working over the well. The workover tools will have difficulty passing through a certain section of the casing that is significantly deformed. In the worst case scenario, a sidetrack may be required.

This 3-day course will start with the fundamentals of pore pressure measurement, overpressure generation, overpressure analysis, and pore pressure prediction in order to provide attendees with an understanding of the core components of pore pressure prediction. This course will then introduce to the participants current state-of-the-art geomechanical analytical and numerical modelling workflow applied to predict and model wellbore stability and casing integrity failure due to depletion, reservoir compaction and subsidence, sand production, bedding plane /fault slip. The focus is not on practices that mitigate wellbore and casing failures that have already taken place. Rather, it is a proactive, pre-completion, pre-drill phase effort to evaluate wellbore and casing design criteria to guard against possible failures. Field case studies will be presented that highlight the applicability of the proposed workflows.

Course Outline

This 3-day course is an introduction to Geomechanics principles and their application to pore pressure, wellbore stability and casing integrity. The following topics will be covered:

- Pore Pressure Introduction
- Sediment Compaction and Unloading
- Causes of Overpressure
- Geology Effects on Overpressure
- Pore Pressure Calculation Methods
- Data for Pore Pressure Prediction
- Stress Modeling : 1D
- Wellbore stability
- Potential Causes of Casing Deformation
- Fault/Fracture Slip Analysis
- Sand Production Prediction
- Weak Bedding Plane Analysis
- Induced strain Analysis
- Detailed Analyses :3D + 4D Finite Element Modelling + Sub Modeling

Cost: 12,600,000 IRR

Date: 21st -23rd May 2017 (1st -3rd Khordad 1396)

Biography

Dr. Yousef Abbasi AsL is a Geomechanics Specialist/Reservoir Engineer with Baker Hughes, Canada. He has previously worked for Dana Energy and KinderMorgan. He has more than 6 years of work experience in characterization and development of conventional and unconventional oil & gas reservoirs by integrating geological, geophysical, geomechanical and engineering data and using analytical and numerical tools. He has gathered extensive experience throughout a diverse range of geomechanical projects as a consultant for the oil and gas industry. His portfolio covers light & heavy oil, fractured reservoirs, shale oil & gas and tight reservoirs in WCSB, the United States, Mexico and the Middle East. In addition, Yousef is also involved in research at the University of Alberta, developing some advanced numerical tools to investigate the importance of reservoir geomechanics on EOR mechanisms in stress sensitive reservoirs. He received his Ph.D. in Reservoir Geomechanics from University of Alberta, his Master's degree in Reservoir Engineering from University of Texas Austin, and was a dual degree graduate (Reservoir Engineering and Electrical Engineering) from Sharif University of Technology. He received a gold medal at the international physics Olympiad held in Bali, Indonesia, 2002.