

Drilling Deeper: Geomechanics and Geohazards

Report on SUT Perth Branch Evening Technical Meeting
Wednesday, 27 August 2014



By Meysam Bnaimahd, OSIGp Committee Member

The evening was opened by SUT Chairman, Ray Farrier and chaired by Dr Meysam Banimahd who is a Senior Geotechnical Engineer at Woodside Energy.

Presenters were greeted by another large number of audience at the Parmelia Hilton Hotel. The continued excellent turnout at the SUT Perth Branch evening technical meetings is testament to the thriving underwater technology community in Perth and the interest generated by the technical subjects being offered by the SUT, notwithstanding the networking opportunities the evenings provide.

Three very interesting presentations were given on geomechanics and geohazards relevant to oil and gas offshore drilling. The evening concluded with the usual drinks and nibbles, thanks to the evening's sponsor, E-precision Laboratory.

The presentations are discussed below:

Petroleum Geomechanics for Drilling, Completion and Production Cycles Sadegh Asadi, Senior Geomechanics Consultant, Baker Hughes

This presentation focused on Petroleum geomechanics. Petroleum "Geomechanics" or "Rock Mechanics" involves the engineering study of the behaviour of the rock which deals with issues in geosciences related to rock mass mechanics, such as applied to hard rock drilling in high depths. Geomechanics helps to understand the mechanics of interactions of drilling fluid (mud), principal insitu stresses, pore-fluid pressure and formation rock mechanical properties in the entire Petroleum Engineering process. In drilling phase, it helps to define the safe mud weight to avoid influx of formation pore-fluid into the well while maintaining wellbore stability without fracturing the wellbore wall. During well completions, an improperly defined geomechanical model can lead to unexpected costly problems such as sand production. Due to reservoir depletion during production phase, a dynamic reservoir Geomechanical model is essential for operational planning such as fluid injection to enhance production and reservoir stimulation by hydraulic fracturing.

Geomechanics for reservoir and beyond – examples of faults impact on fluid migration
Laurent Langhi, Senior Geologist, Research Team Leader, CSIRO

Numerical approaches to geomechanics allow the integration of geology, petrophysics and rock mechanics to predict and manage reservoirs deformation and failure that will impact well placement and production strategy. When coupled with geophysics, reservoir modelling and structural geology, these approaches can also successfully increase the ability to predict faults behaviour and their impact on fluid flow between reservoir compartments or away from the reservoir and can notably decrease exploration risk and address the issue of production-induced stress variation. Case study examples will illustrate how geomechanical approaches were used to predict flow pattern and trap integrity in oil and gas fields and CCS reservoirs.

Faults, Fluid Migration and Geohazards; Much Ado About Nothing?
Kevin Day, Principal Geohazard Specialist, LR Senergy

Faults and fluid migration have long been high on the list of suspects in relation to geohazards affecting well planning and drilling operations. Whilst Geomechanics plays a vital role in planning and execution, pre-drill assessment of both seismic and seabed data can identify features which may provide clues to the likelihood and presence of past and present fluid migration. The presentation will demonstrate the full scope of such assessments and cover examples from a wide range of basins and geological settings, with comments on interpretational pitfalls and risks associated with these features.