**

*Bandung Train The Trainers 16th -28th May 2016*

**Reservoir Geomechanics End of class exercises**

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**Excel exercise - 1**

**Duration: 20 min**

**Open Excel file named 17052016GEOCAP\_TTT1.04TUD-ReservoirGeomechanicsExerciseStressProfiles\_withoutanswers.xls**

1. **Create a vertical stress profile through the Earth for a simplified Earth structure with an average density of 2.3 g/cm3 (sandstone with porosity) and a more dense volcanic crust with an average density of ~3 g/cm3**
2. **Create a fluid pressure profile through the same section.**
3. **If we assume an average Poisson’s ratio for the crust 0f 0.25, what are then the minimum horizontal stresses.**
4. **How much do we need to increase the borehole fluid pressure to open fractures if the tensile strength of the sandstone is 8 MPa and that of the basalt is 22 MPa?**
5. **What do those borehole fluid pressures (Pff) mean if the intention is to avoid fracturing?**

**Excel exercise - 2**

**Duration: 60 min**

**A set of logs is available from a well between 3800 and 4400 m. The logs amongst others include density, vp and vs data and bottomhole pressure.**

**Open Excel file named 17052016GEOCAP\_TTT1.04TUD-ReservoirGeomechanicsExerciseLoggingdata\_withoutanswers.xls**

1. **Create again a vertical stress profile using the log data. For the first 3830m use an average density of 2.3 g/cm3, after that you can use the density of the logs.**
2. **Calculate the poisson’s ratio log using the available data.**
3. **Calculate the minimum horizontal stress profile for the logged section and again calculate the borehole fluid pressure needed to induce fractures if we assume a tensile strength for the logged section (mainly carbonates) of ~ 12 MPa**
4. **Since both Vp, Vs and density are measured you can also create logs for the Young’s modulus, Bulk modulus and Shear modulus. How many layers would you assume to be present based on the geomechanical logs and how many based on the density and velocity logs alone. What causes this possible difference?**