

Challenges Associated with Drilling Hydrostatic/ Subhydrostatic Reservoir: Fluid Engineering Aspect

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Large section of lithological sequences covering sand, clay, shale (troublesome element), coal are required to be drilled to reach the pay sand for assessment of reservoir as anticipated by G&G. At present, there is always an emphasis on drilling large interval of shale and pay sand alternations with lowest possible fluid weight in developed fields. This may be due to reservoir depletion and for enhancement of productivity. In a case of Southern field of ONGC, desired fluid weight is hydrostatic + 5% for drilling shale/ sand alternations. Whether it is feasible with this weight or not forms the basis of the present study. Fluid weight performs two functions. On one hand it controls the influx of fluid (oil or gas) by controlling pore pressure and on the other hand it also controls the effective stress of the formation matrix and preventing it from collapsing due to overburden. Thus minimum fluid weight required should be in excess of pore pressure and collapse pressure requirement. In an effort to maximize productivity by maintaining fluid weight as per the reservoir pore pressure may result in destabilization of overlying/ associated shale which may need higher fluid weight. Study on shale cutting samples of the area showed it to be moderately dispersive in nature and can be easily controlled chemically by using KCl or Amine or Cationics-O. Inhibition achieved through said additives definitely push the fluid weight to lower bound side of fluid weight window but care has to be taken that in no case it bypass collapse pressure requirement. Only satisfying pore pressure requirement is erroneous. Practically it has been observed in the area that fluid weight around 1.10-1.16 SG had to be maintained for successfully drilling the well which per se also meets the requirement of collapse pressure. The study has come out with following conclusions: Pore pressure and Collapse pressure may be considered for selecting lower bound fluid weight and must be displayed in Geotechnical order of the well. Not feasible to drill large interval of shale/sand with low fluid weight. Additional casing may be lowered up to the top of reservoir sand and then reservoir may be drilled with desired fluid weight using light weight filler in fluid. Geomechanics study of the area will be extremely useful for plotting „Fluid weight window“ for Lower bound fluid weight and Upper bound fluid weight. KCl or Amine or Cationics-O based fluid system may be used for stabilizing shale.