

BREAK-OUT SESSION: 27TH OCTOBER '11: OIL VISCOSITY ESTIMATION

Moderator: Khalid Ahmed

What is the best way to estimate oil viscosity? To what extent Lab data is representative of Reservoir properties?

The following are the common view of the members of the break-out session:

- There are 2 ways to estimate viscosity of the oil in in-situ condition: a) by taking a PVT sample b) Viscosity estimation using logs
 - **PVT Sample Collection:** The viscous oil at sample depth can be ascertained thru the various down hole sensors like MRIL Lab, LFA, In-situ analyser. Once it is detected, the pump rate of the wireline sampler has to be reduced, keeping formation pressure such as not to go below P_b (Bubble point pressure) and not to generate condition of emulsion due to water drawdown at probe face. How low the pump rate and how optimum the drawdown pressure may be, appreciable contamination (10 to 20%) shall still be there.
 - **Requisites for good sample:**The mud rheological properties need to be optimized to produce a stable hole for proper pad sealing. Proper sand filter need to be placed at probe/ sample chamber end to eliminate sand particle in the oil sample. Pump out rate need to be maintained to avoid emulsion creation at probe end. Post sample, in order to avoid precipitation as well as to retain light-end, the sample chamber is to be pressurized over 1000 to 3000 psi above reservoir pressure.
 - **PVT Sample Analysis:** the Lab which shall perform the analysis of the oil has to first of all, knock out filtrate (water for WBM/ diesel for OBM). The WBM filtrate is to be removed without addition of any chemical demulsifier (else oil's chemical composition shall be altered) and possibly by gravity drainage and slow and steady heating without reaching to bubble point condition. Contamination can be reduced but cannot be eliminated 100%- hence the estimation of viscosity in the Lab shall be accurate within this contamination tolerance
 - **Logging Methods:** So far only NMR can indicate viscous oil presence thru deficit porosity and the 2D plots of D-T1 or D-T2 maps. Stoneley wave can give permeability estimation but not viscosity. NMR in order to provide a continuous viscosity profile for the reservoir shall require a Lab study on core and fluid with NMR techniques to establish Viscosity-T2 correlation, which again shall require to be calibrated to Lab measured Viscosity as benchmark

- In view of the intrinsic dependency and inherent limitation, the members could not comment on the Best estimation methodology. Both the above methods are the only available ones, to the best of knowledge of the members and are to be pursued till something more accurate is not developed.