Rock UCS & MSE Distribution around the Wellbore

Since the amount of weight or torque applied to each tool influence the performance and durability of the complete BHA, a proper combination of bit and reamer size is important. In order to optimize ratio of reamer size to bit size it is important to have knowledge of rock compressibility strength distribution around the wellbore.

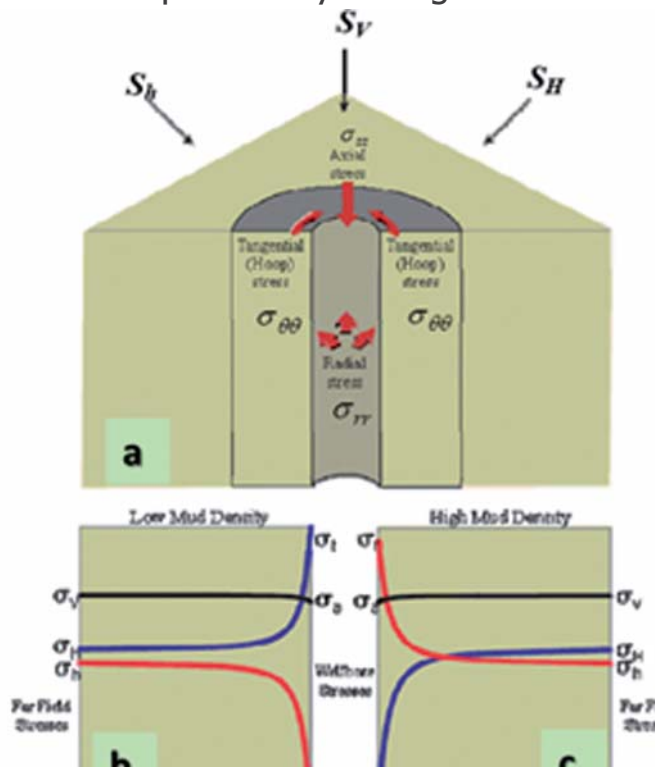

Figure 1: Redistributed stress

In-situ stress around the wellbore has been investigated in detail and is characterized by the magnitude and direction of three principle stresses (Fig. 1). Rock UCS and MSE distribution around borehole have not been investigated in detail.

It is suggested rock compressibility strength around the wellbore will reduce by 1/3 and therefore less energy is needed to destroy rock around wellbore. In order to evaluate compressive rock strength around the wellbore an adjustable size under-reamer (Fig. 2) is proposed to make an existing 2-in pilot hole bigger. The under-reamer must be adjustable by means of a screw type hand wheel at different ratio of under-reamer/bit up to 50 % of total area of new borehole. 2-in pilot hole must drill with a 2-in PDC bit.

Further Work:

- Drive theoretical model for qualitatively explaining experimental observations on rock cutting.
- Numerical studies in order to determine UCS distribution around borehole
- Investigate confining pressure effect on UCS distribution around borehole

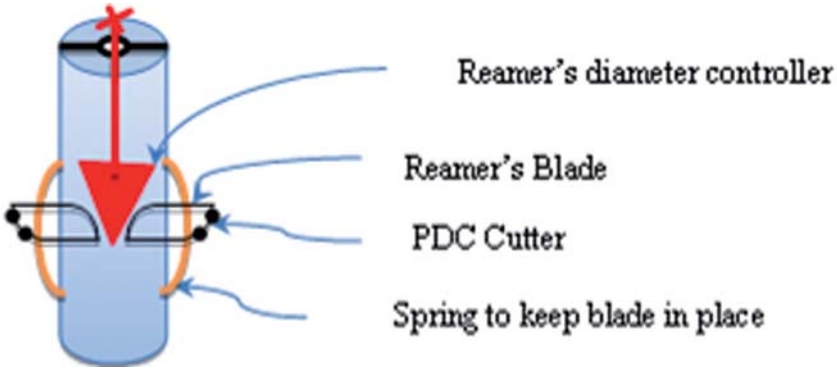

Figure 2: Preliminary design of Under-reamer

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