

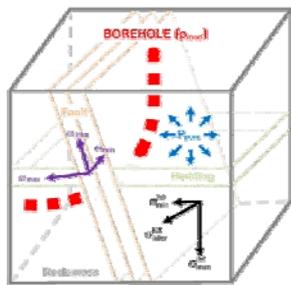
BOREHOLE

Evaluation of borehole stability

Information

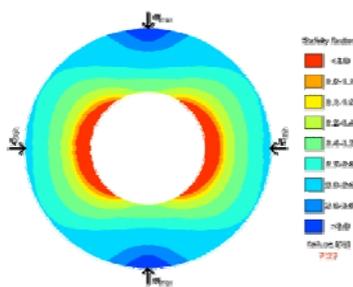
Version: 07. November 2014

The **BOREHOLE** software package was developed to analyze the stability of boreholes, including the risk of sanding. A key application is the optimization of drilling projects (choice of borehole trajectory, mud pressure etc.). It can also be used to back-analyze observed instabilities revealing the likely mechanisms and so increasing the confidence in subsequent projections.



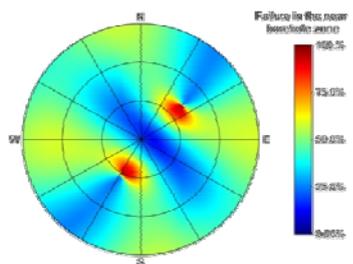
BOREHOLE is based upon well-known rock mechanics approaches, which are combined in a 3D Finite Element Model. The inputs include the in situ stress situation & pore pressure, simple rock deformation & strength parameters, and the selected drilling conditions (mud pressure, borehole wall conditions and borehole trajectory). Pore pressure and/or temperature gradients relative to the borehole can also be considered. The parameters may be single values or (especially for optimization) may have a range of magnitudes.

If required, the analyses can include up to three planes of weakness (bedding planes, faults etc.) with different orientations and strengths.



The main quantitative output in tables and graphics is the extent and location of unstable and/or endangered areas around the borehole. These are characterized by safety factors (relation between load and strength).

For tight formations the results also include the impact of failure-dependent changes in the **Mechanically Operating Pore Pressure (MOPP⁺)** is the result of increased pore pressure effectiveness).



The **BOREHOLE** analyses assess common types of failure - breakouts (shear failures resulting from insufficient mud pressure and/or shear stresses parallel to the borehole axis) and frac (tensile failures). Also evaluated are the influences on stability of different 3D in situ rock stress configurations, of the borehole deviation and of planes of weakness.

Trend analyses of the extent of failure are used for optimization of trajectory and of drilling parameters. The mechanisms leading to the instabilities in each specific situation are evaluated by considering the 3D stress distribution around the borehole wall.

*Stability assessment with **BOREHOLE** (in use since the 1980s) is quick and simple to carry out and therefore well-suited for parameter optimization. The analysis results are designed for use by members of the drilling team who are not necessarily specialists in rock mechanics.*

Complementary to the consulting service, a client may now use the **BOREHOLE software package on-site on a leasing basis.**

Schmerberger Weg 113
14548 Schwielowsee
Germany

office: +49 33209 20583
mobile: +49 172 510 9808
fax: +49 33209 20733

dr.roland.braun@t-online.de
www.dr-roland-braun.com

