**Mitigate salt drilling risks**

Baker Hughes geomechanics experts offer advanced finite element-based simulation and integrated workflows to efficiently model the impact of salt on drilling risks such as circulation losses and casing failures. Advanced 3D geomechanical modeling processes help in understanding the stress field around or under salt structures and the tendency for salt to creep, so you can reduce nonproductive time (NPT) related to wellbore instability problems while drilling through or near the salt.

**Enhance drilling efficiency with 3D stress modeling around salt workflow**

The standard assumption in stress modeling is that the vertical stress is a principle stress. At Baker Hughes, we recognize that proximity to salt structures causes the stress field to be perturbed with strong spatial variation of both stress magnitudes, as well as orientations. As a result, vertical and horizontal stresses are no longer principle stresses. Realizing this fact, our geomechanics experts simulate the stress field around the salt using realistic 3D structural geometries and finite-element simulations on multiprocessor clusters, resulting in robust and accurate models. These models are then used to conduct realistic wellbore stability studies that can help reduce the risks of NPT.

**Optimize salt exit location**

Baker Hughes geomechanics experts use a fully three-dimensional finite-element model of the salt and the surrounding geologic formations to incorporate the effects of the salt body on the stress field. The simulations allow an output of the stress tensor along an arbitrary well path, which can be seamlessly imported into our GMI•Wellcheck™ software to provide answers on salt exit location risks by determining the optimum mud windows, thereby minimizing the risk for circulation losses and wellbore instabilities.

**Applications**

- Drilling in and around complex salt structures
- Well construction and design in and around complex salt structures

**Features and benefits**

- Mitigate drilling risks
  - Reduce circulation losses
  - Maintain wellbore integrity before casing is run
- Improve drilling efficiencies
  - Reduce NPT
  - Keep the hole open
- Ensure casing integrity through the life of the well
  - Prevent casing failure during production
Lower the risk of salt creep-induced casing failure

Wells drilled through salt can be compromised if the salt creeps fast enough to close the hole before the section is cased. Our finite-element simulations are used to model salt-creep closure as a function of time for given mud weights, stresses, and temperatures with the goal to optimize mud weights for the openhole interval in the salt section.

Salt creep also causes a load increase on casing during the life of the well, and a poorly designed casing and cement job can be at risk for collapse during production. Our finite-element numerical models are used to accurately calculate the load on casing as a function of time after well completion. Our models accurately replicate well design and consist of a steel casing, a cement layer, and the salt formation. Furthermore, the finite-element models encompass the entire well history, starting from the drilling process, followed by an openhole period with the drilling mud supporting the borehole wall, the placement of the casing, and finally the buildup of load on the casing. Hence, the finite-element model will provide, in a realistic manner, the maximum load the casing will need to tolerate during its lifetime.

For the most accurate salt-creep behavior modeling and stress mapping to help lower your drilling risks in and around complex salt structures, contact your Baker Hughes geomechanics representative for more information or visit us online at www.bakerhughes.com/geomechanics-consulting