A new joint industry project (JIP) on wellbore stability methodologies will be conducted by Knowledge Systems, Inc. Aimed at improving wellbore stability prediction through the identification and development of best practices and methodologies, the project follows on a series of successful Knowledge Systems joint-industry projects on predicting earth pressure and in-situ stress.

Wellbore Stability Problems

Wellbore stability predictions are central to many aspects of wellbore design, including casing and fluid plans, trajectories and drilling practices. However, results of these projects are often less than optimal.

Billions of industry dollars are spent annually dealing with wellbore stability-related issues. Left unplanned and unaccounted for, these geomechanical issues lead to many wellbore instability problems, including:

- Wellbore collapse
- Lost circulation
- Stuck pipe
- Casing collapse
- Reservoir damage
- Inability to acquire logging data
- Complete loss of the wellbore (requiring a re-drill)

Many modern wellbores present an increased risk of wellbore instability when drilling:

- Deviated wellbores, which involve greater risk than vertical wells
- Near salt, where stress-related rubble zones are a stability problem
- In tectonically stressed regions, where variable stratigraphy leads to variable rock strengths, contrasts and stress

It is clear that maintaining wellbore stability is a key factor in improving safety and drilling efficiency while minimizing problem costs associated with construction and production operations. But despite this need to understand the conditions that create instability, there is no industry consensus on stability analysis methodologies.

Several failure models are widely used to predict wellbore stability, and there is a diverse range of experience and
opinion as to which model is more accurate, and which
more applicable under what conditions.

Collaboration is needed to identify and develop best practices
for practical wellbore stability analysis, as well as develop
guidelines to assess the relative priority of data types and the
minimum data needed for effective modeling.

**JIP Objectives**

The purpose of the wellbore stability JIP being conducted by
Knowledge Systems is to identify and develop best practices
for practical wellbore stability prediction.

Analysis will be performed by an experienced multi-discipli-
nary team of geomechanical engineers, drilling engineers,
geologists, geophysicists and petrophysicists, and guided by a
technical advisory committee from participating operating
and service companies. The resulting database and method-
ologies will focus on practicality and ready-implementation
by drilling engineers.

JIP research will:
- Survey existing failure criteria models and the develop-
  ment of improved methods
- Survey existing rock strength correlations/predictions and
development of improved methods
- Survey existing methods and development of improved
  methods for derivation of S2
- Study the use of stochastic modeling to build constrained
  predictive models in the absence of copious data
- Examine analytical versus FEM modeling

The project will examine about 250 wellbores from five
regions around the world. Studies are planned for:
- Western Canada (WCSB)
- U.S. deepwater GOM
- U.S. shelf GOM
- Australian northwest shelf
- North Sea

These geologic areas will be examined in detail using the
most promising approaches. Stability models will be devel-
oped and a database of publicly available digital well data
will be built and maintained.

Improved methodologies may include new or combined mod-
els as well as guidelines for applying existing models. New
tools for defining and constraining rock strength may include
temperature effects, streamlined workflow using stochastic
modeling and rock strength correlations.

Knowledge Systems has a long history of conducting JIPs
grounded toward reducing trouble time while improving drilling
and production performance. Past projects include the
Drilling Engineering Association's DEA 59 project, which pio-
neered the development of software for pore pressure
and fracture gradient prediction, DEA 119 to improve the
methodologies used in deepwater pore pressure and fracture
gradient prediction, and the ongoing subsalt pore pressure
prediction JIP examining salt mini-basins using 3D geologic
Earth modeling.

For more information on Practical Wellbore Stability JIP, or to receive a project proposal,
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