Case Study: GeoPressure

GEOLOG SURFACE LOGGING

GeoPressure service saves potential NPT by utilizing real-time monitoring and advanced surface logging to avoid an unnecessary mud-weight increase.

GEOPressure

Client

A major E&P operator drilling a deep-water clastic reservoir on an exploration well in Africa.

Challenge

One of the challenges for this operator was that their pre-drill pore pressure model was based primarily on seismic velocity information which was unable to identify subtle changes in lithologies.

Solution

A Combined real-time pore pressure monitoring and surface logging service were provided with GeoPressure Engineers monitoring a variety of real-time drilling parameters to ensure that an expected pressure ramp was correctly identified.

Results

During drilling, some large cuttings were identified and initially interpreted as cavings. A mud-weight increase was then suggested to counter the perceived bore hole instability. The cuttings were evaluated by both the pore pressure engineers and surface logging crew and determined, based on their morphology, to be large cuttings and not an indication of any borehole stability issues. Drilling proceeded without an increase in mud-weight. A subsequent leak-off test was conducted, which identified that an increase in mud-weight would likely have resulted in significant NPT. Using surface logging gas data (gas ratios and background gas information) as an early indicator, the pore pressure ramp was also identified 100m earlier than expected, and casing was set higher. Had the program been followed without making the necessary changes it is likely that remedial action would have been required to complete the well.

Value

The operator was able to drill this deep-water exploration well successfully and safely with no unexpected NPT, despite the lithologies encountered giving false indications of increased borehole instability, and the depth control of the seismic proving to be inaccurate in predicting he top of the pore pressure ramp.

Services used

GEOPressure

The operator was planning to drill a deep-water exploration well, targeting clastic reservoirs in an area with limited well control information. Formation pressure profiles and expected lithologies were modelled based on exploration seismic velocity information. This lead to a high degree of uncertainty into what lithologies would be encountered and at what depth an increase in formation pressures was likely to occur.

A combined GeoPressure and Surface Logging Service was provided by Geolog International and Quad Operations Ltd.

Geolog International provided data acquisition and analysis of all drilling parameters and gas analysis, while Quad Operations ltd. provided the real-time pore pressure engineers to monitor, in real-time, all data streams in relation to the client defined pre-drill model. During the drilling of the intermediate hole, some large cuttings were correctly identified as not being unstable under-balanced cavings but in-situ stress relief cuttings. No other parameters suggested any indications of over-pressure, hence the decision was made not to increase the mud-weight. A subsequent leak-off test indicated a relatively low fracture pressure that may have been broken by any significantly increase in mud-weight. During drilling, a variety of drilling and gas parameters were used to identify an increase in pore pressure, approximately 100m higher than had been forecast.

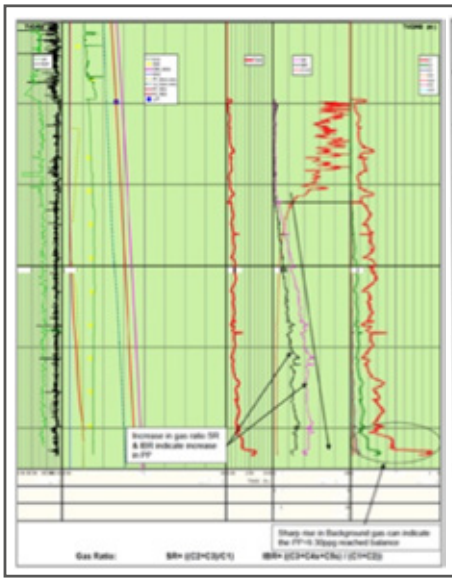

Figure 1. Chart showing background gas and gas ratios being used to identify pore pressure ramp.

Figure 2. Shows the large blocky stress relief cuttings that were correctly identified during drilling

Contact Sales & Marketing for more information at marketing@geolog.com