Wellbore Damage Identification Combining High-Resolution Ultrasonic Images and Time-Based Drilling Parameters

Speaker: **Priscila Caldas, Halliburton**

Abstract:

Historically, the Ringhorne field has presented challenges with wellbore instability, non-productive time, and lost sections when drilling the overburden from the drill center. To unlock new reserves and to continue to construct new extended-reach drilling (ERD) wells from the platform over the next ten years, several improvement initiatives have been introduced. To better understand the drilling challenges related to unstable formations, validate the geomechanical model, and to reduce the risks in drilling ERD wells, additional data acquisition and analysis were performed.

Drilling the transportation section in ERD wells has been a known challenge in the Ringhorne field. With sailing angles reaching as high as 80 to 83 degrees inclination, and the presence of weak laminated bedding planes intercalated with calcite stringers exacerbated wellbore instability and damage. The application of additional data acquisition analysis has been implemented and generated a recent published paper which compares four wells results. This presentation shows a follow up with new evidences on a fifth well drilled recently. The ultrasonic caliper, the high-resolution ultrasonic images, and the analysis of time-based drilling parameters were employed in a deterministic way to understand the root cause of different types of wellbore damage, focusing on identifying shear failure from the image logs. Several recommendations have come out of the project, which have been implemented in different phases of the well-delivery process. This includes recommendations on improving drilling practices, mud weight determination, casing design, bit design, and reducing uncertainties in the geomechanical model with targeted data acquisition. The absence of shear failure in the images of the first four wells suggests a margin to reduce the mud weight and to better calibrate the lower bound of the operational drilling window. The implementation of lowering the mud weight and reducing the managed pressure drilling (MPD) setpoint in different phases is analyzed in this fifth well. The analysis also compares the drilling optimization performed to reduce connection washout and improve ROP while drilling through stringers, by the implementation of a new bit design. The design target to reduce jetting on formation wall and changing cutter type structure. An improvement in the borehole quality is evident as well as the drilling performance. These results are being capture and implemented in a well to well base.

Bio:

Priscila Caldas is a Geoscience Solution Advisor at Halliburton in Norway, with over 14 years of experience in the oil and gas industry. She holds a master's degree in Chemical Engineering from Universidade Federal Fluminense in Brazil and began her career at SLB in 2011. Priscila specializes in advanced gas analysis and LWD technologies, particularly image interpretation for exploration and development projects. She actively contributes to the geoscience community through technical publications and serves as an Associate Editor for the SPWLA Journal.