IADC DEC Q4 2022 Tech Forum,
"Designing & Delivering Wells to Maximize Value Throughout Their Lifetime"

Wednesday, November 16th, 8:30am-11:45am

Engineers are increasingly focusing on designing and delivering wells to maximize the return on investment while dealing with a more stringent regulatory environment, from permitting to abandonment. This forum will highlight methodologies and technologies being employed to ensure that wells can be optimally drilled, completed produced and eventually abandoned.

The event was held in person at HESS Corp, 1501 McKinney St, Houston, TX 77010. A virtual option was also available.

Special thanks to our event host HESS Corp!

Agenda:

08.30-08.35 Welcome – Matt Isbell, Chairman, and introduction to event – David Limbert and Robert Darbe, DEC Board members

08.35-09.05 **Managing Risk of Wellbore Instability and Lost Circulation in Depleted Formation of ERD Well**, Michael Yao, HESS *View the video recording*

Drilling ERD wells is challenging due to several factors. 1. It requires higher mud weight to keep wellbore stability; 2. ECD would be significantly higher than that in less deviated wellbore assuming the same drilling parameters; 3. Hole cleaning is much more difficult in deviated wellbore. We recently faced all these challenges in drilling an ERD well in offshore Malaysia. In the predrill planning, we pinpointed the problems on several aspects: 1. Optimize mud weight selection; 2. Optimize drilling parameters for ECD management and hole cleaning; 3. Design StressCage for lost circulation prevention. A decision tree was made and followed during operation to deal with uncertainty in depletion level. The well was drilled successfully without NPT caused by wellbore instability or lost circulation.

09.05-09.35 **09.35-10.05** **Practical Method for Uncertainty Reduction on Wellbore Position by Combining Overlapped surveys**, Javier Melo, Gyrodata *View the presentation* *View the video recording*

In directional drilling, the trajectory and final position of the wellbore are established by collecting survey data. It is a common practice to designate as the definitive survey of the wellbore the error model with the lowest uncertainty associated with the wellbore position at total depth, discarding the information acquired with the other tools. Combining the surveys from different tools by calculating a weighted average improves the estimation of the wellbore position and reduces its uncertainty. The resultant uncertainty values are lower than those obtained considering each tool separately, as it is currently done. We developed a process for creating a combined instrument performance model (IPM) file that directly yields the reduced uncertainty of the averaged survey. The file format allows an easier exchange between

companies and more importantly, it can be used for collision avoidance, and reservoir mapping in addition to the current uses of IPM files in directional software.

09.35-10.05 **Redefining heat in Saudi Arabia – Providing a digital solution to operator's toughest drilling challenge**, Michael Barstrip and Dino Syafitri, Schlumberger *Presentation not available for posting*

Abrasive sandstone laterals represent the operator's biggest drilling challenge due to the low rate of penetration and the total number of bit runs required to drill the production section. The low ROP and the high number of runs required to drill the lateral are a product of the high compressive strength, and high abrasive and impact characteristics of the formation. To overcome this challenge, an advanced data analytic technique, Schlumberger digital software was used to build a stochastic model to map the variation in sandstone formation properties. The model was built for 3 fields with more than 60 wells analyzed. The resulting comprehensive field maps enabled us to accurately identify wells that would be drilling through more challenging sandstone formations. The model was recently tested in a lateral and showed a perfect match between the synthetic prediction and the actual well log data, opening the door for a new optimization approach to meet the operator's performance objectives

10.05-10.35 **Use of Machine Learning and Advanced Modeling to Improve Drilling Performance**, Eric Muller, ConocoPhillips *View the presentation* *View the video recording*

In the Eagle Ford, ConocoPhillips is using large data, machine learning, and advanced modeling techniques to optimize ROP and reduce COS. In 2021 data scientists and engineers were able to develop a model that predicts ROP with a 12% error. This model identified key parameters that the field was able to target. After implementing the parameters ROP in their vertical section increased by 26% while not impacting failure rate. The team is developing real time workflows to have models run in real time that will further optimize parameters while reducing COS

10.35-10.45 **Break**

10.45-11.15 **Advancing Digital Well Planning and Operations**, Amr Metawie, Halliburton *View the presentation* *View the video recording*

An operator, service provider, and contractor are collaborating on improving the well construction system using transformative digital technologies. Well plans are managed in a new way using process and digital connectivity to deliver value across the value stream. Operator well planning involves creating a well program across internal and external stakeholders as requirements and details are considered and confirmed. The well plan also must consider the capabilities and technologies supported by service companies and drilling contractor. The people-based process assures variation even with standardized plans leading to execution risk and performance variation in well delivery safety, quality, delivery, and cost. One variation source is how people move data between one another in well planning documents and field operations plans. The collaborative work underway addresses this with a new way to manage this process across organization and discipline boundaries to reduce variation. This presentation details how a pilot program using a common framework for the exchange and management of a well plan.

11.15-11.45 **Using Data from Stuck Pipe and Fishing Operation for Success Probability Remedial Work Decision Making**, Tim Obakayashi and Andres Nunez, Schlumberger *View the presentation*

Well construction projects often require the merging of operational data and financial data, perhaps from multiple data systems, for making complicated decisions in the well construction process. What follows is a data analysis methodology for well construction that utilizes operational data, restructures the data for a specific use case, merges with additional contextual and cost data for data-driven decision-making support. A data analysis project was conducted to examine historical fishing success probabilities within a particular region. Structured data tables that captured run activity data was the primary source of data for this analysis and used to extract and calculate meaningful statistics that were inputs for further downstream decision making.

11.45-12.15 **Combining Downhole Axial and Surface Oscillation Tools, What Are the Consequences on Tool Face Control Performance?** Stephane Menand, H&P *View the presentation*

When drilling in sliding mode, axial oscillation tools (AOT) and surface oscillation tools (SOT) are two possible solutions that are used in the industry to overcome the friction forces, especially in unconventional well trajectories with a long lateral section. The AOT is assembled in the drillstring and run in hole such that it is generally placed in the middle of the lateral section. It is actuated by the mud flow to produce high-frequency axial vibrations. As for the SOT, it is placed at surface and produces low-frequency torsional oscillations in the drillstring by alternating the rotation direction. For some challenging trajectories, the idea of combining both tools, where the SOT reduces the friction on the top part of the trajectory and the AOT deals with the bottom part, seems appealing. However, when coupling the two types of oscillations, one should be careful to the possible implications on tool face control performance. In this presentation, time-domain dynamics modeling is used to investigate the AOT and SOT behavior, whether they are employed separately or together.

12.15 Adjournment (light lunch to be provided by HESS)