BitLife

Reducing the Uncertainty of Bit Trip Timing

GEOLOG's **BitLife** real-time bit wear monitoring service applies a patent pending method to detect, compare and assess cuttings character, the artificially produced unsaturated alkene hydrocarbons produced by drill-bit metamorphosis and drilling parameter responses such as torque and rate of penetration, to determine the efficiency of the bit and then interpret that in terms of its usefulness.

Benefits

- Timely decisions for when to perform a bit trip
- Validates bit selection for the geology drilled
- Avoid invisible Non-Productive Time (NPT) through junk and under-gauge hole
- Real-time bit life estimation and efficiency

Challenges and Solutions

Understanding when the current bit is nearing its end of life due to wear vs. when it is performing poorly as a result of changing lithology can be a major challenge, especially when the cost to trip out of the hole can have a large impact on drilling and completion costs.

GEOLOG BitLife service provides drillers with timely decision making information about alkene generation from an overheating bit that is experiencing a low Rate of Penetration (ROP) and altering the cuttings. This unique methodology provides clear information to help inform drilling operations of the end of effective bit life due to Drill-Bit-Metamorphism. It's a low cost real-time surface solution that provides an extra piece of insurance to ensure drilling operations are as efficient as possible.

Applications

BitLife is designed to work with Oil Based Muds (OBM) and Synthetic Based Muds (SBM) where thermal cracking of the drilling fluid hydrocarbon components can occur. Water based muds that have hydrocarbon based additives can also benefit from this service. This service is available for both offshore and onshore operations.

Case History

$15M USD saved using BitLife service

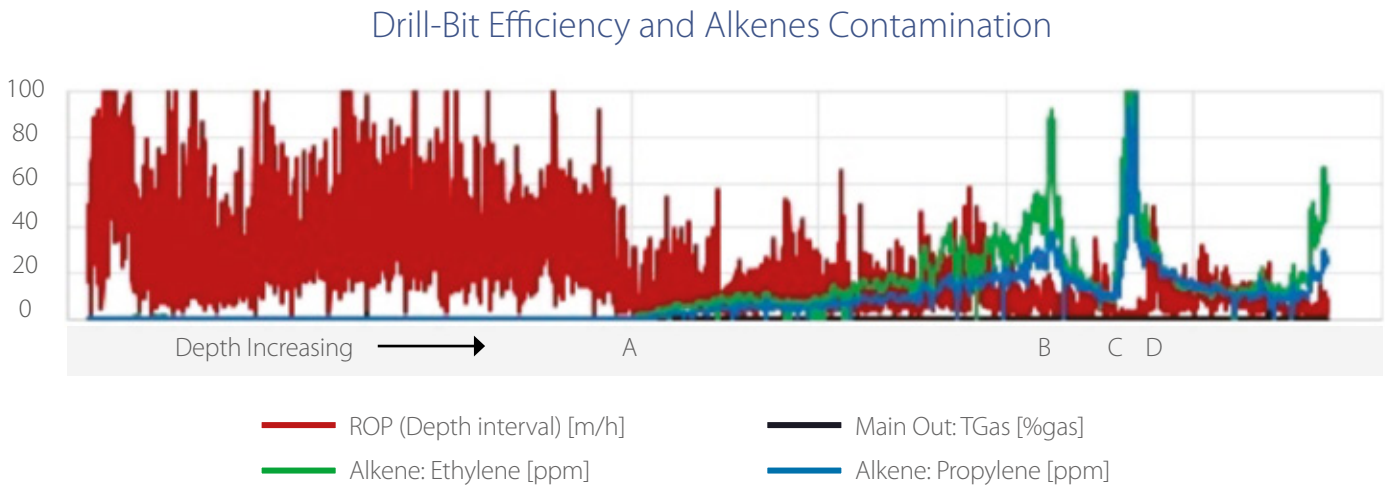

Figure 1. Drill Bit Efficiency plot highlighting ROP and detectable Alkenes. "Drill-Bit-Metamorphism" effect was observed starting at point A. Alkenes continue to increase until point B, indicating the ideal time to perform a bit trip. An additional increase in Alkenes occurs at point C, correlating to extremely low ROP before performing the bit trip. Point D marks the start of the new bit, which demonstrated extreme wear very quickly due to junk left in the hole.

BEFORE

AFTER

Figure 2. PDC bit shown before and after drill bit metamorphism. Bit on the right, note the center has completely broken off and the bit is under gauge. Metal left down hole can result in additional NPT for fishing operations, circulation to clear debris and damage to subsequent bits.

In this deep-water exploration well the operator faced problems with very slow ROP. Uncertainty about the exact causes could not be determined without performing a bit trip, a costly affair taking approximately five days round trip on a deep water drillship.

When the BitLife service was deployed a direct correlation between Alkene contaminates and lower ROP can be seen starting at point A (Figure 1). A further drop in ROP occurred when Alkene production increased substantially at point B (Figure 1). This would be the ideal moment to perform a bit trip since it corresponded to lower ROP. Drilling operations elected to continue on despite the information pointing to a worn bit. As a result further drilling occurred until the ROP dropped to 0.6m/hr at point C for several hours before a final decision to pull out of the hole at point D. The worn bit was shown to have significant damage confirming the interpretation and warnings from the BitLife service.

Subsequently on the same well, drilling operations placed greater emphasis on the feedback from the BitLife service and was able to save $15M USD in drilling costs by avoiding extremely slow drilling, preventing junk retrieval runs and prevented invisible NPT from reaming out under-gauge hole sections.