



Coring Operation: Tracing Drilling Fluid Infiltration

Value for Operator

The tracer study provided the operator with valuable information in terms of the contamination degree of retracted fluids. This allowed the company to calculate the corrected composition of the reservoir fluids. Thus, addition of tracers to drilling mud ensures that contaminated fluid samples become as valuable as uncontaminated, native fluid samples.

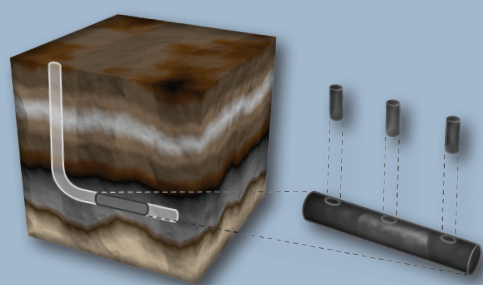


Figure 1. Illustration of coring operation and retrieval of three core plugs. These core plugs are horizontally divided in to sections to analyze for drilling fluid infiltration.

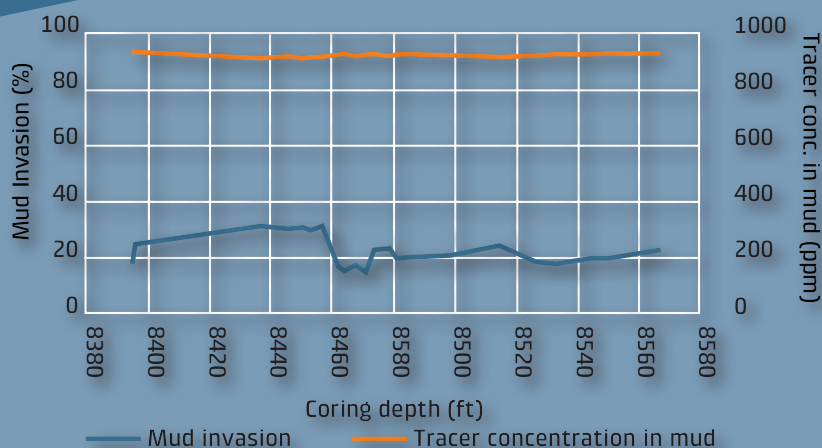


Figure 2. The tracer concentration in the mud was monitored throughout the operation (yellow curve) while subsequent laboratory analysis of the core fluids provided the mud invasion percentages (blue curve).

Background

The prime target in a coring operation is to obtain reliable information about the reservoir. Here, parameters like water and oil composition and saturation levels are in focus.

Information about the reservoir is evaluated by analysis of the collected cores and PVT samples. In case of drilling mud core invasion, the recovered liquid does not represent the native liquid but rather a mixture of drilling fluid and reservoir fluid. This will substantially affect the conclusions drawn from the analysis and hence decisions based on these.

In this case, an oilfield operator wished to quantify the degree of drilling mud invasion into the core and the ratio of drilling fluid vs. reservoir fluid in PVT samples.

DTI has experience with a wide range of tracers suitable for both water and oil based drilling mud. The tracers possess no safety issues and do not alter the performance effect of the drilling mud.

The Tracer Operation

A DTI engineer added the tracer to the drilling fluid over one full circulation. The drilling mud was circulated for several rounds to ensure a homogenous distribution of tracer. Mud samples were regularly taken from the mud pit before, during and after coring. Each mud sample was linked to a specific coring depth, which allowed for comparison of tracer concentrations in the drilling mud and in the cores.

DTI analyzed mud samples at site using

its portable laboratory equipment and gave instant feedback to the drilling engineer. The continuous monitoring ensured that the tracer was present at desired concentrations at all times during the coring operation (figure 2). The cores were collected by third party company and shipped onshore for analysis. DTI received a number of core plugs for tracer and fluid composition analysis. The core plugs were divided in to segments, to facilitate investigation of a possible gradual infiltration of the core. Each sample underwent a fluid extraction procedure followed by a quantification of the tracer present in the fluid. Finally, the tracer concentrations in cores and drilling mud were compared to determine the contamination degree (figure 2).



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CASE STUDY

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“DTI was very professional in planning and executing the tracer study. The tracer operation ran smoothly and I highly recommend them”

Michael Cowling, Drilling Engineer, Maersk Oil



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