Mud Gas Logging – Principles, Problems and Applications

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Mud gas logging has been part of mud logging for over 70 years and experienced various advances and improvements with the ongoing technical evolution of gas extraction and measuring devices. Nevertheless, the data is considered to be unreliable, as an extensive array of drilling operations has the ability to influence the gas signal.

Aims of the study were to evaluate the influence of various drilling parameters and the application of normalization for penetration rate, flow rate and bit diameter on the measured gas data. In addition the mud gas composition, $C_1/C_2/C_3/C_{(4+5)}$ in relation to $\sum C$, was calculated for various wells of the Molasse Basin to establish a supporting indication for oil-bearing and water-bearing reservoirs.

The penetration rate is the most interactive factor to the normalized mud gas logs and is significant enough to eliminate gas shows visible in raw data. Minor variations of the gas signal related to bit type, bit make up and diameter changes are partly compensated by lithological influences.

In contrast to the normalized mud gas logs, the gas composition logs are more sensitive to fluid content as to lithology. Gas composition logs of C_2 versus C_3 and $C_{(4+5)}$ of 9 wells in an investigated oil field suggest a possible correlation of oil-bearing and water-bearing reservoirs. Uncertainties remain, mainly for C_{3+} components, related to fluctuation of the extraction coefficients of the utilized gas trap and comparable sampling precision.