

The d-exponent will increase as the depth, compaction and differential pressure across bottom increase in normally pressured homogeneous shale. Upon entering a geopressured zone, the compaction and differential pressure will decrease, which is reflected by a decrease in the d-exponent.

Differential pressure is dependent upon mud weight as well as formation pressure. Rehm and McClendon (1971) proposed the correction to allow for mud weight.

$$D_{xc} = d \times \frac{W_{eq}}{ECD}$$

Where D_{xc} = corrected d-exponent

d = d exponent

W_{eq} = normal pore pressure gradient
(Equivalent Mud Weight, ppg)

ECD = Effective Circulating Density, ppg

Any negative deviation of the D_{xc} from a normal trend (based on clean shale points) may be indicative of an increase in pore pressure.

Exlog introduced N_x and N_b to account for ROP variations due to tooth wear/efficiency (based on Bourgoyne and Young's (1973) model), mud hydraulics, and lithology. A plot of N_b with depth then serves as an indication of formation pressure changes at the bit.

2. Gas

The drilling mud continuously passes through the gas trap situated at the flowline, and the gas extracted is pumped to the logging unit to be analysed by the catalytic or flame ionisation gas detector. The amount of gas is expressed as "gas unit". Exlog's gas detectors are calibrated with a mixture of 1% methane in air to read 50 units, i.e. 1 unit is 200 ppm, according to API standards for mud logging.