

Compensated Neutron Logging (CNL)

Log Name	CNL
Math notation	$N_{\log}$
Units	NAPI

Neutron tool is measuring the intensity of neutron radiation at a fixed distance from neutron source which is proportional to primarily the hydrogen concentration in the media.

The tool has two sensors: near and far .

The tool delivers the neutron count ration between the two sensors:

$$(1) \quad N_{\log} = \frac{N_{\text{far}}}{N_{\text{near}}}$$

The CNL readings are measured in frac (unitless).

The tool readings can be simulated by following equation:

$$\begin{aligned} (2) \quad N_{\log} &= \phi_e N_f + V_{sh} N_{sh} + V_m N_m \\ (3) \quad N_{\log} &= \phi_e N_f + V_{sh} N_{sh} + (1 - \phi_e - V_{sh}) N_m \\ (4) \quad N_{\log} &= N_m + (N_f - N_m) \phi_e + (N_{sh} - N_m) V_{sh} \end{aligned}$$

Unlike litho-density tool the above equations are not always accurate but in the most practical applications can be considered as a fair approximation.

$$\begin{aligned} (5) \quad N_f &= s_{xo} N_{mf} + (1 - s_{xo})(s_w N_w + s_o N_o + s_g N_g) \\ (6) \quad N_m &= \sum_i V_{mi} N_{mi} \end{aligned}$$

See Also

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