

STATISTICAL ANALYSIS ON CORRECTED WELL-LOG DERIVED TEMPERATURES IN SOUTH-EASTERN NIGER DELTA

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ABSTRACT

Analysis of bottomhole temperature (BHT) data from 10 exploration wells in X-Field of south eastern Niger Delta has been carried out in order to determine appropriate correction method and correction factor which can be used to correct the measured bottom hole temperatures, estimate geothermal gradient, true formation temperatures using the corrected BHT and to ascertain the accuracy of the corrected BHT data using statistical tool. Horner and Waple's methods were used to correct the bottomhole temperatures. The study shows that the geothermal gradient of a formation can be effectively determined by first correcting the measured bottom-hole temperatures. Geothermal gradients computed from the various wells indicated that these gradient varies from well to well. These variations may be attributed to changes in thermal conductivity of the rocks within the formation groundwater flow etc. The geothermal gradients ranges from 0.014°C/m to 0.030°C/m. A regional average vertical geothermal gradient of 0.023°C/m or 23°C/Km was obtained from the study area. The accuracy associated with the corrected bottom-hole temperatures (BHTs) was achieved using the student's t distribution at the desired level. At 95% and 99% confidence interval (CI) and computed corrected BHTs for Well AMK-1 is 113.27 ± 8.02 and 113.27 ± 19.14 Similarly for Well AMK-2 is 110.43 ± 6.20 and 110.43 ± 27.15 . It was observed that the 95% confidence level is more reliable than the 99% since the lower limits of the confidence intervals will be very far from the uncorrected bottom-hole temperatures, in principle the lower confidence interval limit should be equal to or greater than the uncorrected bottom-hole temperatures. The deviations of the uncorrected bottom-hole temperatures (BHTs) from the corrected (BHTs) using both Horner and Waple's methods for wells AMK-1 and AMK-2 are $\sigma_h = 3.30$, $\sigma_w = 3.82$ for AMK-1 and $\sigma_h = 0.26$, $\sigma_w = 0.81$ for AMK-2. Our investigations also show that there is a high degree of closeness between the corrected bottom-hole temperatures (BHTs) values of Horner and Waple's method.

KEYWORDS: Statistical Analysis on Corrected Well-Log Derived Temperatures in South-Eastern Niger Delta