



## DEPTH ADJUSTMENT OF CUTTINGS USING A PORTABLE GAMMA-RAY DEVICE: A CASE STUDY IN A WELL OF THE PARNAÍBA BASIN, NE-BRAZIL

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### Abstract

The Gamma-Ray (GR) curve is an important tool for lithological identification in boreholes, used in almost all oil and gas wells. Therefore, the GR log is widely used to provide depth adjustments in terms of comparison between the shape of the curves derived from open well logs and the ones from cores, throughout the core gamma curve. Depth corrections of cuttings, on the other hand, do not have an appropriate curve to provide the adjustments. Thus, the correction is commonly performed by lag time calculations, which are not always recurrent and effective for most wells. This difference between the bit depth (drilling depth) and the logging depth usually diverge up to several meters, depending on the sampling depth, the open hole geometry, the caliper of the well, the density of the drilling mud, and parameters such as mud pumping pressure and penetration rate. In this study, an attempt to adjust the drilling/logging depths using a portable GR device, RS-230 (Radiation Solutions), is proposed. The device is able to measure the total GR (nGy/h), corrected to gAPI using the general equation  $\{10,64 \times K(\%) + 6,69 \times U(\text{ppm}) + 2,54 \times Th(\text{ppm})\}$ . Moreover, this workflow was applied on cuttings of the well PGN-5, located at the Hawk Park (*Parque dos Gaviões*) gas cluster, in the Parnaíba Basin, collected at a 3-meter interval. Comparing these data to the borehole GR curve, it was possible to estimate a variable depth displacement from 2m to 9m in the drilled interval in Poti Formation. This method revealed itself to be low operational and cost-effective in correcting cuttings depth, increasing robustness in geological and petrophysical interpretations of well logs for the plot of a reliably interpreted lithology of composite logs, and in providing a better depth correlation between logs and analytical parameters obtained from cuttings. Finally, this depth correction is also fundamental for sedimentological and stratigraphic studies, rock-log correlation, and electrofacies recognition, increasing the accuracy of E&P activities.

**Keywords:** Gamma-Ray; Cuttings; Depth Adjustment.