

ABSTRACT

Experimental Petrophysical and Rock Mechanics Characterisation of some Formations in the Northern Range and Southern Basin, Trinidad

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During the past 200 years, the Chancellor, Galera, Sans Souci and Cruse Formations, have been investigated using scientific procedures such as lithology, stratigraphy, petrology, paleomagnetism, microscopic analysis and mineralogy. A physico-mechanical properties approach was taken in this work to microstructurally characterise building upon the existing literature of the Chancellor, Galera, Sans Souci Formations of the Northern Range and the Cruse Formation in the Southern Basin, Trinidad.

Experimental analytical techniques including x-ray diffraction, scanning electron microscopy and physical properties characterisation methods were employed to establish the physical make up of rock samples taken from type sections. Qualitative and quantitative mineralogical, topographical and elemental distribution characteristics were deduced from the results of the analytical techniques employed. Mechanically, the average compressive strength value and the hardness were obtained for some of the samples.

All Formations in this study were individually characterised microstructurally. Qualitative and quantitative XRD analyses of a total of 24 samples established that varying proportions of different minerals were found within all formations. Furthermore the microstructure of the samples showed a high degree of variability. Physical characteristics such as apparent porosity, bulk density and water absorption were also determined and their values ranged between 0.57-24.49 %, 1.62-2.73 g cm⁻³ and 0.92-18.24 %, respectively. For samples exhibiting layering, compressive strength values perpendicular to the layering were 4.04 Nm⁻² and 12.61 Nm⁻² for the Chancellor and Galera Formations respectively. The Vickers microhardness of the Sans Souci rock sample was 833.9.

Keywords: Experimental Petrophysics; Rock Mechanics; Chancellor Formation; Galera Formation; Sans Souci Formation; Cruse Formation; Northern Range; Southern Basin; Trinidad.