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INTEGRATED GEOPHYSICAL INVESTIGATION OF SEQUENCE OF DEPOSITION OF SEDIMENTARY STRATA IN ABAKALIKI, NIGERIA

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ABSTRACT

Both seismic refraction and electrical resistivity surveys were run in Abakaliki, Nigeria along the same profile. The objective was to investigate the sequence of deposition of sediments in the area. Abakaliki is a sedimentary area located geographically within latitude 6^0 17^I – 6^0 20^IN and longitude $8^0 05^I$ – 8^0 10^IE.and situated within the lower Benue trough with a total land mass of about 81km^2. ABEM Terrameter (SAS 300C) and its accessories were used for the resistivity survey while a signal enhancement seismograph (MOD.S79) was the major equipment for the seismic refraction survey. Five geoelectrical layers were delineated by the current in the resistivity survey while only three geoseismic layers were delineated by the compressional waves used in the seismic refraction survey. The three geoseismic layers had average compressional wave velocities of 725m/s, 1994m/s and 3168m/s; for the first, second and third layers respectively. The thicknesses of the first and second layers were 1.70m and 2.78m respectively. These layers were interpreted to be probably made up of lateritic overburden, clay and carboniferous siltstone for the first three layers respectively. The resistivity result however showed that the first five layers of the study area from the surface with resistivities 872.94Ωm, 268.34Ωm, 1169.84Ωm, 176.17Ωm and 80.67Ωm consists of lateritic overburden, ferruginised clay concretions, siltstone bed, well compacted but fissile shale bed and well consolidated and mineralized layer from top to bottom for the first five layers from the earth's surface respectively.

Keywords: seismic, geophones, seismograph, refraction.