

Environmental Geological Baseline Study of a Tar Sand Rich Area in Parts of Southwestern Nigeria

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Environmental geology of the tar sand-rich area at Idiobilayo and Idiopopo near Igbotako, Southwestern Nigeria was carried out to generate geological baseline information necessary for the planning of exploitation of the deposit.

Vertical electrical soundings, with the use of campus tigre terrameter were employed to determine the subsurface lithological layers and bitumen bearing horizons. Radiogenic compositions were determined by gamma ray spectrometry. The concentration of heavy metals including Cd, Cr, Cu, Ni, Zn, As, and Pb in the digested tar sands and water were determined by inductively coupled plasma and inductively coupled plasma optical emission spectrometry, respectively. Gas chromatography and gas chromatography-mass spectrometry were respectively used to determine hydrocarbon types and Polycyclic Aromatic Hydrocarbons (PAHs) components. Some geotechnical properties of the lateritic soil were also determined.

Geoelectric sections, correlated with borehole litho-log, revealed four lithological layers: sandy silty clay, shale, sand/bituminous sand and crystalline basement rock. Depth to tar horizons ranged between 2.0 and 50.0 m. Heavy metal concentration in bitumen samples such as Cr, Cu, Ni, Zn, As, and Pb are 2.6, 21.8, 21.7, 1.3, 1.2 and 8.1 respectively, which are considered low when compared with international guidelines. Average total PAHs of 0.08 mg/kg in the tar was found to be lower than the United States department of health and human services' cancer risk evaluation guide of 0.1 mg/kg. Identified compounds were saturated and aromatic hydrocarbons, resins and asphaltenes. Geotechnical and hydrogeological properties of the soils indicate no likelihood of ground water pollution during exploration of the deposit.