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Electrical Resistivity Survey to assess the geological conditions in a Proposed Uranium tailings pond

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The Earth's apparent resistivity is related to various parameters such as the mineral and fluid content, porosity and water saturation in the rock and soil. As most of the soil and rock-forming minerals are non-conductive, measuring the electrical apparent resistivity helps to delineate the porosity and the water content of a rock or soil system. Thus the electrical resistivity measurements provide the means to investigate the subsurface lithology and hydrological conditions of a region. The Vertical Electrical Sounding (VES) method is commonly used for the evaluation of subsurface geology and hydrogeology. In this study was carried out with the objective of using VES to assess the geological conditions of a proposed uranium mine tailings pond. Twenty six VES was carried out in the Seripalli area of Nalgonda District, Andhra Pradesh, India, where it is porposed to locate the uranium tailings pond. The interpretation of the results of VES indicate the presence of three layers. The first layer resistivity characteristics are those of sand and sandy clay with a thickness ranging from 0.5m to 3m. The next layer(weathered granite) with a thickness ranging from 1.3m to 12m and the lower most layer (fractured or massive granite) with a thickness ranging from 12.4m to 54m. Interpretation made was validated with a bore hole log of this area. The top soil constitutes the unsaturated zone with a apparent resistivity range from 0.57 to 452 ohm-m. The apparent resistivity ranges from 3.5 to 297.52 ohm-m in the weathered granite zone (upper aquifer zone) and from 300 to 3400 ohm-m for in the fractured or massive granite. Further work requires the characterization of the fracture system in the granite basement, because fractures may represent preferential pathways for the movements of the pollutants from the tailings disposal area.

Keywords: geology, fractures, Seripalli, Nalgonda District, Andhra Pradesh, India