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1D RESISTIVITY RESPONSE IN THE AREA AROUND NELUMWEWA THERMAL SPRING, SRI LANKA

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As a part of ground reconnaissance survey, geoelectric resistivity studies have wide applications in hydrogeological and geothermal field investigations. Surface electrical methods have been successfully employed in a number of places for exploration of geothermal energy resources. A Vertical Electrical Sounding (VES) study was carried-out around Nelumwewa thermal spring area with the aim of ascertaining the vertical distribution of water bearing zones, delineating major subsurface discontinuities, and reconciling them with the hydraulic mechanism of Nelumwewa thermal spring. The formation resistivity at different depths and the corresponding thickness of the layers were reproduced by a number of iterations until the model parameters of all VES curves were totally resolved with minimum standard deviation and residual error. Apparent resistivity distributions in the sub-surface at four depth levels of sounding locations were contoured using 'inverse distance weighted method' and then compiled on depth specific maps.

The apparent resistivity distribution clearly demonstrates a narrow NE-SW running low resistivity zone across the area. This feature coincides with a regional lineament that can be seen on aerial photographs. Comparatively higher resistivity values observed on either side of the low resistive zone indicate the presence of solid bed rock. It was also noted that the width of the low resistive zone (or degree of weathering within it) decreases with depth. Resistivity sounding interpretations indicate presence of three distinct subsurface layers; a) Top most residual soil with formation resistivity less than 150 Ω m, b) Weathered country rock with formation resistivity between 150 – 500 Ω m and, c) Fresh country rock with formation resistivity greater than 500 Ω m. The resistivity sounding on the trace of the regional lineament indicates weathering conditions to a great depth with formation resistivities less than 150 Ω m. Contrary, presence of solid bedrock at shallow depths is indicated by sounding when moving away from this zone. Results thus indicate presence of a major subsurface fault associated with the Nelumwewa thermal spring. The thermal spring appears to be fed by deep percolated groundwater though this fault zone.

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