The use of geoelectrical imaging to study groundwater pollution at Gemenceh waste disposal site, Negeri Sembilan

ABDUL RAHIM SAMSUDIN[1], TAN CHU AI[1], BASHILLAH BAHARUDDIN[1]
& MOHD TADZA ABDUL RAHMAN[2]

[1]Jabatan Geologi
Universiti Kebangsaan Malaysia
43600 Bangi, Selangor

[2]Institut Teknologi Nuklear Malaysia (MINT)
Bangi, Selangor

Geoelectrical imaging method is now frequently used for environmental pollution studies. The method basically maps the distribution of the resistivity of subsurface materials. Ground water that has been contaminated by leachate frequently has a significantly lower resistivity value. The geoelectrical imaging technique was used in this study to help delineating contaminated ground water at a domestic waste disposal site of Gemenceh, Negeri Sembilan. The quality and contaminated zone of the underground water was determined based on the measured geoelectrical resistivity value of subsurface materials. Two dimensional resistivity profiles and subsurface geological information from both bore hole as well as seismic refraction data were used to interpret the extension and direction of the contaminant flow within the underground water system in the area being studied.

The contaminated zone of the ground water aquifer gives relatively low resistivity value of less than 10.0 ohm-m compared to that of the uncontaminated groundwater which resistivity value ranges from 10 to 100 ohm-m. The geoelectrical resistivity and chemical analysis of the water samples indicate that the underground water aquifer in all bore hole except SP8 and SP12 have been contaminated by the leachate. In comparison, the ground water sample from bore hole SP4 is highly contaminated. However the ground water contamination in this area appears to be confined within the vicinity of the dumping ground. The resistivity profiles suggest a flow of contaminant towards north east which follows the regional trend of ground water flow of the area.

The seismic refraction result gives three subsurface layered material. The first or top layer has low velocity (< 500 m/s) which corresponds to unconsolidated soil of silty sand to sandy silt. Whereas the second or intermediate layer has an average seismic velocity of greater than 1,600 m/s which is interpreted to be the water saturated aquifer layer. The third layer shows relatively high velocity (> 2,500 m/s) which represents the weathered material of the granite bedrock.

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