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RESISTIVITY METHODS FOR GROUNDWATER EXPLORATION IN THE CRETACEOUS-TERTIARY SEDIMENTARY SEQUENCE, EAST OF JEDDAH, SAUDI ARABIA

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ABSTRACT

Vertical electrical sounding (VES) and horizontal electrical profiling (HEP) were used to locate potential groundwater resources in the Cretaceous-Tertiary sedimentary sequence east of Jeddah, Saudi Arabia. The geo-electrical field measurements consisted of 41 vertical electrical sounding points and 104 horizontal electrical profile points using Schlumberger and Wenner arrangements respectively. Three areas were studied in details: Haddat Ash-Sham, Ash-Shamiya, and As-Suqah. Results showed that the sedimentary sequence in the study area contains three major zones for groundwater development and exploitation. The first is a shallow unconfined aquifer at a depth ranging between 10-60 m associated with alluvial gravelly sand deposits. The second is a deep confined aquifer at a depth ranging between 120-180 m associated with gravelly sandstone. The third is a middle fractured zone associated with faults and various types of rocks at a depth ranging between 35-60 m as also indicated by the exploratory drilling. The sandstone layers and the intrusive basaltic flow layers can be differentiated from the shale layers as high resistivity, low conductivity measurements. Conductive features are believed to be related to the saturated zones in the fractures. Drilling of three test boreholes confirmed the results of the geo-electrical investigation and indicated the availability of sustainable well yields. This information will add to the knowledge of the hydrogeology of the area and provide for improved groundwater exploration and management.

Reference: Al-Bassam, A.M. 2005. Resistivity methods for groundwater exploration in the Cretaceous-Tertiary sedimentary sequence, East of Jeddah, Saudi Arabia, *Journal of Environmental Hydrology*, Vol. 13, Paper 19.

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