Importance of Geophysical Logs and Their Interpretation in Groundwater Assessments

Although geophysical logs are commonly run in open-hole groundwater test wells and in some cased holes, the interpretation of the measurements is sometimes ambiguous or problematic. Understanding the various capabilities of logging tools, borehole conditions, and assumptions is important in maximizing the usefulness of geophysical logs. Important parameters such as formation temperature, lithology, bed thickness, fractures, drilling mud characteristics, borehole size, and petrophysics can be significant variables that should be considered in hydrogeological and water quality evaluations from geophysical logs. However, too commonly these or other pertinent factors are not taken into account and/or not measured, resulting in the reduced ability to derive accurate or even reasonable estimates from logs. For example, the estimation of aquifer water quality from resistivity logs is dependent on a sound understanding of the borehole environment and factors that can influence the measurements recorded.

Examples of the usefulness of geophysical logs are common in groundwater applications in Alabama, but their use is not as widespread as it should be for achieving greater efficiency in expenditures of funds available for groundwater exploration and development. Extra costs, practical considerations, and/or additional "trouble" are commonly cited as reasons for not running logs, and in many instances these factors do warrant overriding the need for "science". But a lack of critical data can also be problematic and even costly, either in the short term or long term, in planning and decision making for water supplies. Groundwater resource assessments, whether conducted on a local scale or statewide, depend on the collection and availability of data about the hydrogeology of the area, a key component of which is commonly data derived from geophysical logs.

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