



GEOPHYSICAL LOGGING – SPECIALIST SERVICE

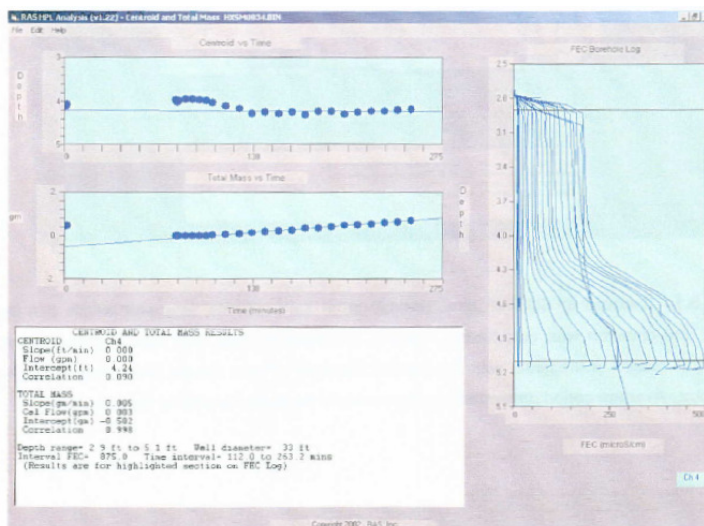
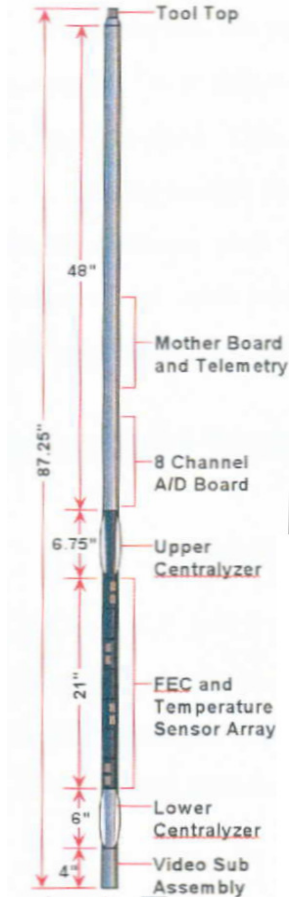
Hydrophysical Logging (in association with RAS inc)

Overview

Hydrophysical logging aims to measure and quantify the distribution of vertical and horizontal flow in the borehole and aquifer. Testing under pump conditions or static conditions in cased boreholes or open boreholes, hydrophysical logging can replace traditional packer testing.

Benefits

- Hydrophysical logging is applicable in a wide variety of hydrogeological settings: low to high yield bedrock, alluvial/porous settings, karst and volcanic aquifers.
- Both open boreholes and completed wells can be characterized (50mm minimum diameter).
- Water bearing intervals are identified to one borehole diameter resolution.
- A wide range of interval specific flow rates can be quantified (0.01 to 100+ lps).
- Flow rates can be assessed independent of borehole diameter.
- Wellbore flow is evaluated under ambient or stressed aquifer conditions.
- A larger volume of aquifer is investigated than by traditional packer testing.
- Interval specific water quality can be evaluated.
- Single and cross-hole aquifer characterization (i.e. larger scale hydraulic connections between two or more wells) can be conducted.
- Data output equivalent to packer testing (Dp and Dq) for transmissivity and hydraulic conductivity calculations.



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THE SERVICE

Hydrophysical logging is a proprietary borehole geophysical logging method developed by RAS inc of Colorado and offered as a service by Borehole Wireline. Hydrophysical logging aims to hydraulically characterize sub surface aquifers through multiple logging of a borehole over time. The logging environment can be under pumping conditions or static conditions but involves the replacement of the native borehole fluid with either deionized water or a water which contrasts significantly with the native groundwater.

Data acquisition involves logging with RAS’s proprietary multi-sensor focused electrical conductivity (FEC) and temperature probe which measures temperature and fluid electrical conductivity of the borehole fluid. Logging is conducted after the replacement of the native wellbore fluids with environmentally safe deionized water or a water of significantly contrasting salinity to that of the native groundwater. The groundwater will contrast electrically with the replacement water in the borehole and provides a means of establishing the location of aquifers, groundwater inflows and quantifying flow rates in-situ.

The RAS hydrophysical tool is the only multi-FEC/T sensor tool available for the purpose of testing with this technique. The instrumentation package has been developed as a result of extensive field experience as well as numerous laboratory/numerical simulations conducted in conjunction with several national DOE and USGS laboratories.

When the hydrophysical method is applied in multiple well investigations, critical data regarding intermediate to large scale permeability and aquifer parameters may be acquired. This information is critical for analyzing the extent of contamination, developing effective remediation plans, understanding groundwater system hydraulics, and calculating aquifer volumetrics/movement.

