WELL WATER CONNECTION, INC.
Water Well Design & Project Management

VLF Geophysical Survey

VLF geophysics is a proven scientific technology used to locate a drill target for bedrock water supply wells at a site by identifying potential specific water bearing fractures before the actual drilling is performed. However, this technology cannot predict specific well yields and specific well yields will only be determined once the borehole is drilled and yield tested. Rather, the value of this technology is in increasing the effectiveness of drilling by identifying targets more likely (but not guaranteed) to yield water producing bedrock wells.

This technology utilizes the electromagnetic components of VLF waves produced by VLF transmitters around the world. VLF transmitters are primarily located near oceans and seas and are used by military personnel all over the world to communicate with submarines. The frequency of the VLF waves emitted from these transmitters ranges from 15 to 30 Kilohertz (KHz). These VLF waves can propagate many thousands of miles and can penetrate below the ocean's and the earth's surface. In order for a proper VLF survey to be performed, a VLF transmitter must be located approximately on strike or trend to the particular fractures or faults that are to be studied. The geophysicist can then determine the proper magnetic orientation to layout the VLF geophysical line.

As the VLF wave emitted by a transmitter sweeps across the earth electromagnetic energy is conducted along water bearing fractures. This flow of electromagnetic energy along a hydraulically conductive zone also creates a secondary electromagnetic field, which is also measured by the instrument. The instrument therefore actually measures both the in-phase (real) and out-of-phase (induced) components of the particular wavelength.

Once the VLF signal is received an instrument records its relative strength. The geophysicist then processes the field information collected from the VLF transmitters with the use of VLF software. The computer program produces the colored and black and white profiles for the lines measured. This data is then interpreted to identify potential water bearing zones in the bedrock. The current density is a relative reading. The higher or stronger the current density, the more electromagnetic energy at that location. Areas of high current density in the in-phase component of the VLF signal are selected as the drill targets, as they generally behave as linear bedrock conduits to fracture flow.

Electromagnetically, a water bearing fracture zone will conduct a greater amount of energy emitted from a VLF transmitter on strike or trend with that fracture. A less conductive, solid bedrock will not conduct as much electromagnetic energy. High current density signature in both the in-phase and out-of-phase components may indicate chemically altered zones of bedrock where clays or minerals have formed in the fractures. Most often, these can be interpreted as such and are not chosen as drill targets.

PO Box 158 * Tewksbury, MA 01876 * Tel: 978-640-6900 * Fax: 978-640-6901 * www.WellWaterConnection.com