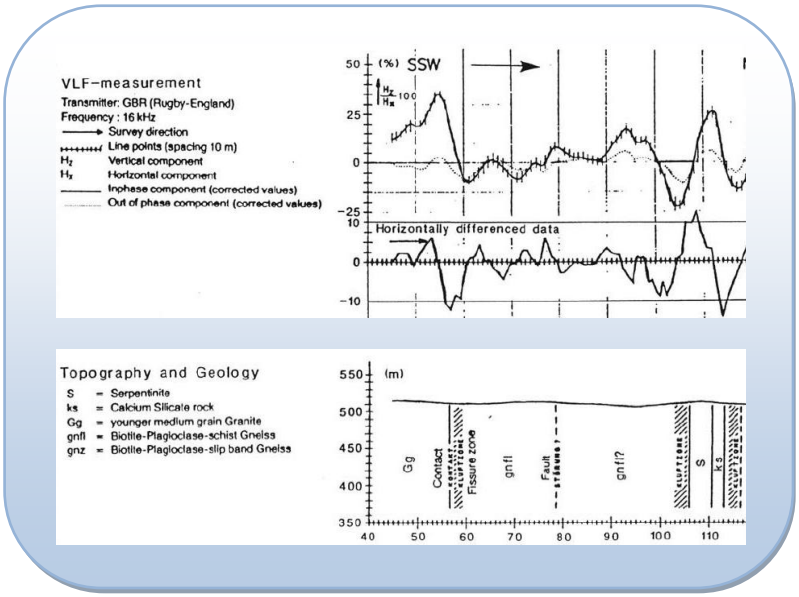
Quality Geophysics

Geophysical Method

Very Low Frequency WADI™

Very low frequency (VLF) geophysical methods are typically based upon military communication carrier frequencies. These methods are used worldwide to communicate long distance, with submarines, and typically range from 15 to 30 kilohertz (KHz). Popularized by Abem from Sweden with the WADI™, there are several international manufactures of VLF Equipment, including Geonics from Canada, (EM-16) and IRIS from France (T-VLF). VLF geophysical survey equipment is inexpensive and seemingly simple to use, however, the underlying basis is highly complex. In the absence of subsurface conductors, the transmitted communication signal is horizontal and linearly polarized. However, when a conductor is crossed, the magnetic field becomes elliptically polarized, and the manor axis of the ellipse tilts with respect to the horizontal axis. Only bodies with low resistivity can generate secondary fields.

Measuring variations within the electromagnetic and magnetic fields provides insight into the location of highly conductive zones within bedrock. VLF is effective for locating linear zones of high conductivity such as mineralized or water-filled fractures or faults within bedrock. However, to be successful, VLF signals propagate well along fractures that are oriented in the direction of the transmitting base station monitored, and the survey lines have to be oriented perpendicular to the conducting fracture. Over the last decade, VLF surveys have declined in value in North America as the United States Military has reduced reliance on VLF communication. Often a portable VLF transmitter is required to perform a successful survey. There is no ASTM standard for the performance of a VLF survey.



VLF surveys are limited in areas with utilities since power line, wire fences, pipes etcetera are all conductive bodies. In addition, horizontal layering, common in young sedimentary rock, will present limited contrast for measurement. Conductive soils will often mask underlying signal strength creating noisy conditions. The direction to the VLF transmitting station should be parallel to the strike of the conductor to be detected. The limited number of transmitter stations with adequate primary field strength to be detected may require a remote transmitter.