

## HOW DOES IT WORK

The Petro-Sonde utilizes the naturally occurring telluric current (1 Hz or less) which flows in the upper part of the earth's crust to study the subsurface. Basic laws of physics are applied to analyze the telluric current electromagnetic field at the surface to obtain the needed subsurface information.

The electrical properties of a medium through which a current flows, directly affects the current's behavior and the associated magnetic field produced. Since different lithologic units have different electrical properties, the flow of the telluric current through those units will be affected accordingly. The electromagnetic field produced due to the current flow in each lithologic unit will interact with other electromagnetic fields produced at other lithologic units. Therefore, the electromagnetic field at the surface, or at anyone point, is stacked, i.e. contains information regarding all depths at once. To obtain depth specific information, the stacked electromagnetic field at the surface has to be deconvoluted, i.e. unstacked.

The equation  $h = (r/f)^{1/2}/2$  is used to unstack the electromagnetic field at the surface. The equation specifies that the frequency of the telluric current is a function of depth and total resistivity of the stratigraphic column above. Since resistivity can be assumed to be constant (and is actually accounted for by calibration), frequency and depth are directly related. Therefore, in processing, band-pass filters are utilized to admit the signal at a specific frequency range, i.e. depth. That frequency specific signal is then converted into an audible sound. A distinctive sound pattern, i.e. signature, is usually associated with each lithologic unit, regardless of location or depth. Once the lithology is determined *for* a specific depth, the next depth, i.e. frequency range, is admitted for processing, and so on. The data at each location is finally presented in a format similar to that of a downhole log with corresponding lithologic interpretations.