

The induced polarisation (IP) method is an effective means of exploration for disseminated mineralisation. The method utilises significant electrical current introduced by electrodes at the ground surface to provide two distinct measurements of the electrical properties of earth materials at the survey site. The first of these is the measurement of the electrical resistivity. This large signal is the capacity with which earth materials can support the flow of electrical current. Amongst the many uses of this parameter in mineral exploration for instance, is defining silicified zones which may be a favourable rock alteration indication.

The second measurement taken in IP surveys is the chargeability. This measurement indicates the degree to which particular mineralisation is present in the rock. Grains of metallic sulphide, graphite, and sometimes clay disseminated throughout a rock mass result in a change in the dispersion of electrical properties as a function of frequency. The effects of polarisation are measured by noting the potential difference developed between two measuring electrodes. This may be used to provide a measure of the relative presence of metallic sulphides in mineral exploration. Chargeability and resistivity measurements are taken simultaneously during the survey.

Chargeability measurements involve dynamic signals that are much smaller than signals required to obtain corresponding resistivity data. The results therefore are susceptible to noise of all types.

A new means of acquiring higher resolution induced polarisation data employs the full waveform method. In this approach to IP surveying, the entire waveform is continuously recorded, usually from several receiver dipoles simultaneously. As the full received waveform is available for processing, self potential drift, telluric effects and several other noise sources can be efficiently identified and removed from the chargeability signal. This results in usable chargeability data at lower signal levels as compared to conventional IP receivers. The result with full waveform data acquisition is more accurate and higher resolution IP data in areas of conductive overburden or in areas of weak signal or deep penetration where signal strength is more readily attenuated.

Frontier Geosciences have developed IP receiver technology that facilitates the recording of full waveform data in an IP investigation. This generally results in greater resolution and penetration over conventional IP data acquisition. The data is presented in raw pseudo-section format or inverted by software such as the Loke inversion program.

IP surveys have been used extensively in mineral exploration. Recently, IP has been applied to hazardous waste landfill and groundwater investigations to identify clay zones.

