

Resistivity Cone Penetrometer Testing (RCPTu)

Gregg Drilling & Testing, Inc. conducts Resistivity Cone Penetration Tests (RCPTu) using a resistivity module that is located behind the standard piezocone, *Figure RCPTu*. The module consists of two electrodes separated with insulating material (Delrin plastic). A constant 1000Hz sinusoidal current is generated and runs across the two electrodes while changes in voltage are recorded during cone penetration. Resistance is then calculated based on these changes in the measured voltage. To maintain a linear response, the current is regulated by a downhole microprocessor that adjusts the current with appreciable changes in resistance. This allows resistivity measurements from 1 to 15,000 ohm-m to be made with an accuracy of $\pm 0.2\%$ of full scale. The high frequency current is used to avoid an increased resistance due to a build up of ions on the electrodes known as polarization. The 1000Hz frequency also falls into the range (25-3000Hz) suggested by ASTM (D1125-82) standard for water conductivity measurements.

As mentioned above, the probe measures resistivity which is not a material property but a function of electrode size and spacing. To convert from resistance to soil resistivity, calibration of the probe in a water tank is conducted. It is assumed that the calibration factor will not vary greatly when the cone is advanced through the soil since the resistivity of the soil is influenced, for the most part, by the resistivity of the pore fluid.

Various contaminants can change the electrical properties of the soil. Soil that contains many non-aqueous-phase-liquid (NAPL) compounds exhibits high resistivity due to large amounts of non-conductive hydrocarbons. This is in contrast to soil with dissolved inorganic compounds that displays a much lower resistivity. Using comparative information about background uncontaminated soil, critical zones can be identified for further sampling.

For a detailed reference on cone resistivity testing, refer to Campanella et. al., 1990.

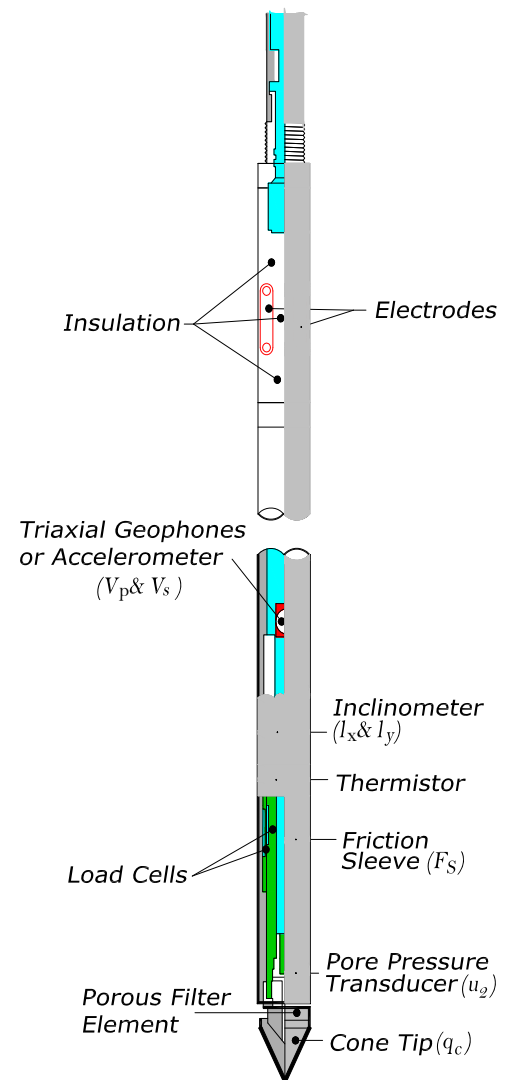


Figure RCPTu

