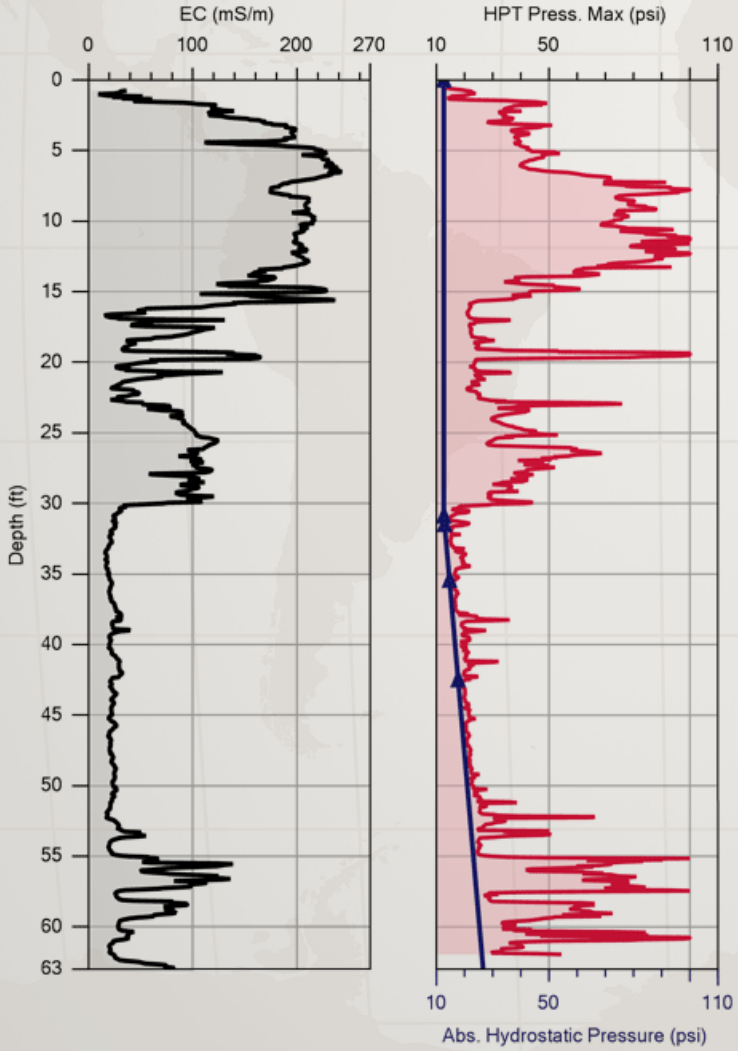
Hydraulic Profiling Tool (HPT)

HPT Introduction:

The Hydraulic Profiling Tool is a logging tool that measures the pressure required to inject a flow of water into the soil as the probe is advanced into the subsurface. This injection pressure log is an excellent indicator of formation permeability (Figure 1). In addition to measurement of injection pressure, the HPT can also be used to measure hydrostatic pressure under the zero flow condition. This allows the development of a hydrostatic pressure graph for the log and prediction of the position of the water table.



- HPT produces a detailed hydrostratigraphic log
- Can be used to estimate hydraulic conductivity in the saturated zone
- Logs both HPT injection pressure and electrical conductivity
- Measures hydrostatic pressure and depth to water table
- HPT logging is easy to learn and operate
- Interpretation of HPT logs is straight forward and intuitive

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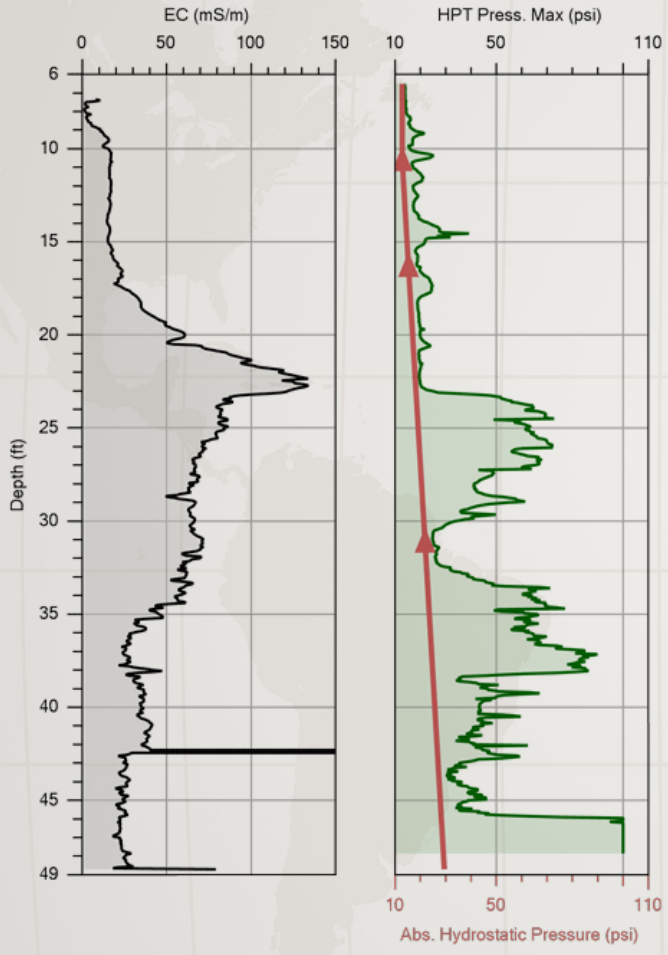
The HPT is also useful for the detection of brines or other high electrical conductivity fluids in soil. These brines may originate from oilfield production or storage activities. Other high ionic fluids amenable to this technique include road salts and remediation fluids. Detection of these fluids is detected as an anomaly between the EC and HPT log. This occurs when the EC increases, in some cases even above that observed in background logs, while the HPT indicates a zone of high permeability.



An example of the detection of salt or brine contaminated groundwater using the HPT and EC logs. In this case (Left), the EC increases from baseline to maximum value in the 15 to 23 feet interval. At the same time the HPT pressure remains low, indicating that this is a zone of high permeability. The rise in EC in this case is caused by in increase in salt content in the groundwater, yielding specific conductance values in groundwater samples that are several times above background. The shape of the EC curve in this interval is also characteristic of salt contamination.

The equipment to perform HPT logging is simple. In addition to the Field Instrument (FI6000) for data acquisition, HPT requires the use of the K6300 Controller. This instrument provides the pump and pressure and flow measurement required to perform HPT logging.

HPT probes are available in both 1.75 in. (44.5mm) diameter for use with 1.5 inch (38mm) probe rods and 2.25 in. (57mm) diameter probes for use with 2.25 in. probe rods. Tools string diagrams for these probes may be found at: geoprobe.com/hpt-tool-string-diagrams. HPT probes are robust, driveable under all Geoprobe® 54 series and 60 series hammers, and can be factory rebuilt when they wear out (provided remaining thread life is deemed sufficient).