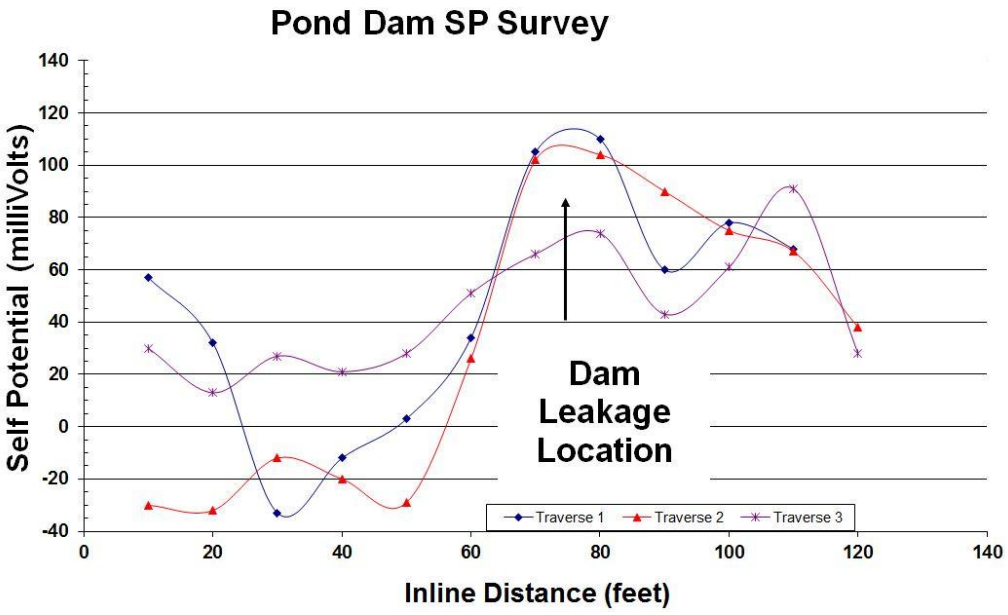
Quality Geophysics

Geophysical Method

Spontaneous Potential (SP)

Spontaneous-potential or self-potential (SP) surveying is a reconnaissance method of measuring naturally occurring electric potential difference in the shallow subsurface due to dissimilar materials, variable concentrations of electrolytic solutions, fluid flow and thermal differences. For shallow groundwater flow investigations, the SP measurement is dependent upon the natural voltage differences, called streaming potential caused by flowing water. Moving water strips electrons from subsurface materials and creates a potential (voltage) difference. Typically, these potentials are measured in millivolts. Special non-polarizing electrodes are used to perform measurements along with, good quality wiring, and a high-input impedance voltmeter.

No standard has been developed for SP by ASTM International. However, SP is discussed in ASTM Standard D-62429 Standard Guide for Selecting Surface Geophysical Methods. Within this standard guide, SP is the primary consensus standard method for investigating dam and lagoon leakage due to the streaming potential of the moving water. While not specifically identified by ASTM, SP has traditionally been used to investigate karst features particularly those with groundwater concentration.



SP surveying is ideally conducted on non-frozen soil, moist soils. Dry soil must be moistened before conducting the survey. Hard surfaces, such as asphalt or exposed bedrock, cannot be surveyed unless preparations are made to provide a contact surface for the non-polarizing electrodes. Preparation may require the measurement stations to be pre-drilled with small diameter (~2 inch) holes to a depth of one to two feet and filled with soil or fine material to provide electrical contacts to the earth.