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Deep Schlumberger Soundings for Geothermal Exploration at INEL, Snake River Plain, Idaho **GT-3**

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In June and July of 1978, the U.S. Geological Survey made a deep resistivity survey to study the geothermal potential at the Idaho National Engineering Laboratory (INEL) area on the Snake River Plain, Idaho. The survey consisted of Schlumberger soundings over an area of approximately 600 km². Twenty-nine of these soundings were expanded to electrode spacings (AB/2) of 7.3 km, which allowed the detection of a high-resistivity electric basement at depths that range from 2 to 5 km. The sounding data were automatically interpreted and 5 geoelectric cross-sections were prepared. The generalized geoelectric section for this area is composed of 6 primary geoelectric units, only some of which may exist beneath a given sounding. These six units are: (a) wind-blown soil of 10-30 Ω -m and a thickness of 0-10 m; (b) dry basalt of ≥ 1000 Ω -m and a thickness of 70-300m; (c) fresh water basalt of 200-600 Ω -m and a thickness of 200-2000 m; (d) low resistivity material interpreted to be sedimentary rocks and/or highly altered volcanic rocks of 7-45 Ω -m and a thickness of 500-2000 m; (e) silicic volcanic rocks with resistivities of 45-200 Ω -m and a thickness of 500-2000 m; and (f) highly resistive ≥ 500 Ω -m electric basement interpreted to be pre-Tertiary basement rocks of very large thickness (several kilometers). The low resistivity layer of 7-45 Ω -m is present almost everywhere except in some portions in the southwestern part of the studied area. The probable presence of a northeast-southwest major fault was pointed out by interpretation of the electrical soundings, which in general support earlier gravity interpretations. In May 1979, a 3.15 km test well was drilled in the vicinity of this inferred fault. Lithologic and electric log information were in very good agreement with the geoelectric predictions as a highly resistive (> 1000 Ω -m) rhyodacite basement was penetrated at a depth of about 2.8 km and a temperature of 150°C was recorded.