

Pole-pole Electrical Resistivity Survey and Groundwater Exploration

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1. Introduction

This is to report an experimental pole-pole electrical resistivity survey for groundwater exploration which was conducted in the Taeshin-myon, Yeosu-kun, Kyunggi-do, Korea, for a period of two days from January 7 ~ January 8, 2000. Geologically, Jurassic granites are exclusively and extensively distributed throughout the survey area and its vicinities. Topographic ridges generally run along the structural trend (NNE ~SSW) i.e. joint and fault lines. The survey line itself lies within biotite granite area near two-mica granite area.

The present study is part of the research efforts rendered since 1997 to investigate the applicability of pole-pole electrical resistivity survey in conductive and shallow subsurface environment. As for groundwater exploration, this is the first field work so far carried out.

2. Resistivity depth section and VES

In Fig. 1 is shown the depth section obtained by the inversion of pole-pole survey data along a 400 m length survey line together with Schlumberger sounding columns. The unit electrode, and the maximum spacings are 20 m and 200 m respectively. Res2dinv ver 3.40, a commercial software marketed by ABEM, was used for the inversion of pole-pole survey and VES data.

An anomalous zone of 175 ohm · m ~ several hundred ohm · m is confined horizontally within 200 m ~ 330 m distances, and the thickness and horizontal extension of a possible aquifer are about 20 m and 80 m respectively. The depth to the central part of the aquifer is 55 m or so.

The subsequent drilling at the 250 m point confirmed the existence of the aquifer at 60 m depth. And drilling further down hit upon one more but minor aquifer at 90 m depth. Pumping out test yielded 154 metric tons of water per day, mostly from the upper aquifer.

An important point that should not be missed is that the deeper aquifer does not show up in the depth section. But a hint of its existence is qualitatively shown in the deeper sections of the Schlumberger sounding curve (not shown in this paper) and using a sorted data set enabled to make the deeper aquifer appear at the 93 m ~ 101.1 m depth interval.

Key words : pole-pole resistivity survey, VES, groundwater exploration

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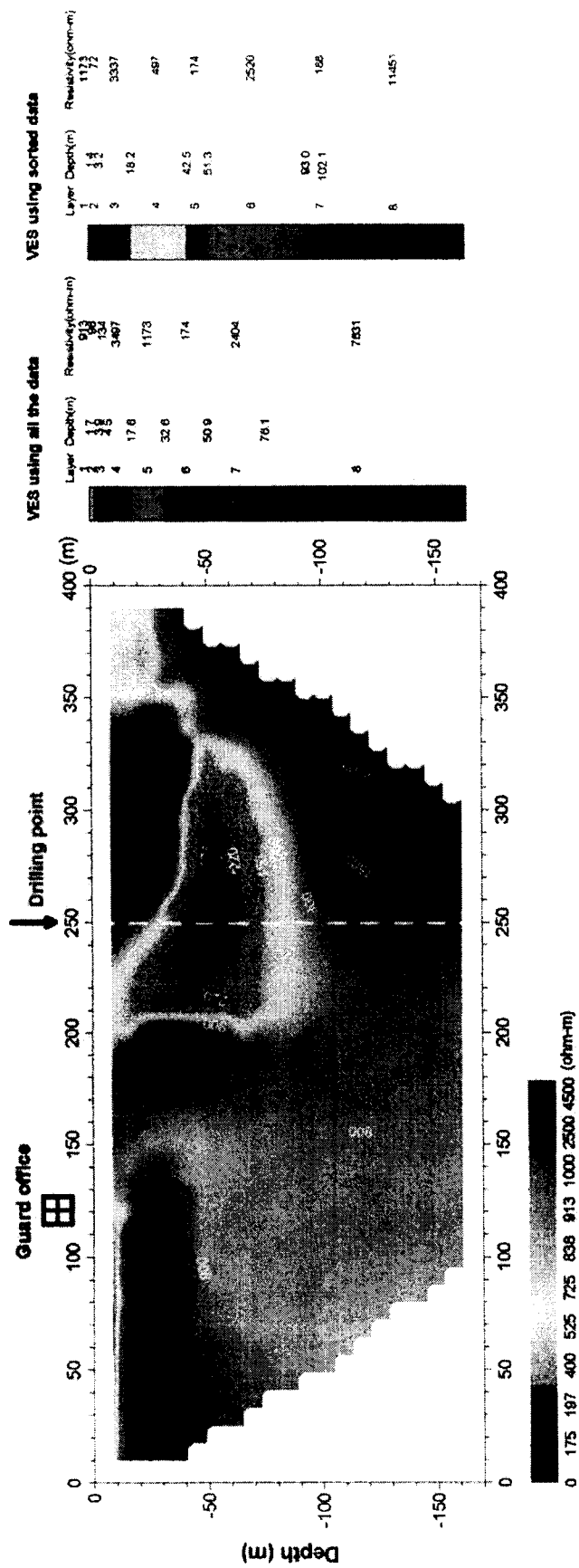


Fig. 1 Pole - pole resistivity depth section and Schlumberger sounding results at the drilling point