Geophysical exploration of hydrogeological conditions in the valley *Brunntal, Hochschwab* region, *Styria*

Werner Chwatal[(1)], Gerhard Kuschnig[(2)], Karl-Heinz Roch[(1)]

[(1)] Vienna University of Technology, Research Group Geophysics, Gusshausstrasse 27-29, A-1040 Vienna, Austria

[(2)] Vienna waterworks (Municipality of Vienna, Department 31), Grabnergasse 4-6, A-1060 Vienna, Austria

The tributary valley *Brunnta*l is situated near *Wildalpen* in the *Hochschwab* region, which is the catchment area for the springs of the 2nd Viennese water supply pipeline. The glacially shaped north to south oriented valley, which is enclosed by mountains composed of limestones and dolomites, meets in the north the main valley of the river *Salza*.

Typically such valleys are filled with permeable glacial and postglacial sediments, which build up an excellent aquifer. So it´s extraordinary, that in this valley a lake surrounded by a swamp has been formed, which is probably caused by subsurface drainage and a depression in the underground. To the north of this lake, near the river *Salza*, a group of springs, the *Kräuterbrunnquellen,* are located. It is assumed, that the groundwater of the *Brunntal* valley contributes to some of these springs. This requires an aquifer, which is tensioned and sealed up to surface by clayey sediments.

At 5 profiles seismic and multielectrode geoelectric measurements for 2D-imaging were performed, to get detailed information about the hydrogeological situation and for site selection of expensive drill-holes or wells.

The geoelectric results show a zone of low resistivity (10-50 Ohmmeters) nearby the surface. This zone, which has a thickness of over 10m in the northern part of the valley, thins out to the south and seems to vanish south of the lake. Therefore the areal extension of this zone could be determined precisely. It indicates a clay layer (*"Seeton"*), which has been proven north of the river by drilling. Below the clay layer the resistivity is higher and points to sand or gravel sediments.

Different seismic methods, Turning Ray Tomography for exploring the valley fill and reflexion seismics for the rock basement, were applied. The seismic results show an average p-wave velocity of 1600m/s for the clayey layer and over 2000m/s for the underlying sediments, increasing with depth. From these seismic velocities an estimation of the pore volume and the permeability of the valley fill can be made. Clear reflexions show an average depth of 55m for the rock basement, which has an average velocity of 4800m/s. Furthermore a dell in the middle of the valley and a ramp at the northern end is noticeable. Both geophysical methods, which show a good correlation of velocity and resistivity for the upper 10 to 20 meters, confirm the existence of clayey sediments near surface.