Summary of the Thesis

Travertine of the Karlovy Vary Thermal System and it´s Relation to the Protection of the Thermal Springs.

The data from 975 boreholes, shafts and excavations as well as old maps, enabled the delineation of the individual travertine bodls in the discharge area of Karlovy Vary thermal water system. In addition to determining the size of these deposits, the location was established of tectonic faults in the granite pluton underlying the spring sedimentation using the methods of the atmogeochemistry. Reviewing and interpreting the details of the present day and historical thermal water and gaseous CO_2 outlets were the principal means of the new definition of the discharge area.

Travertine occurs primarily in the bottom of the Teplá River valley about 300 m upstream from the Hot Spring (the Vřídlo) and about 360 m downstream from it. The travertine deposits form heterogeneous and irregular bodies, containing weathered granite blocks and intercalations of river gravels as well as dominant aragonite-calcite structures. The Karlovy Vary travertine deposits consist of five comparatively large travertine bodies and one small isolated solid one. The largest central deposit was formed directly around the Vřídlo.

Fluid overpressures at the base of the travertine deposits are common. Evaluation of all the data enabled validation of the balance function of the travertine, which is able to overcome fluid pressures up to 0.225 MPa, despite their heterogeneous and anisotropic texture, as well as human impacts on their configuration.

The U-series age data cover a wide time span ranging between 230 ka BP and the present. The oldest travertine deposit found is a small relict located 22 m above the present-day valley. It is assumed that the bottom of the valley was close to this level at that time, which corresponds with the river

terrace dating in the area. The palaeohydrogeological hypothesis concerning the Teplá valley and the discharge zone evolution in the Quaternary was created.

Human activities during the past 650 years have had an even larger influence on the destruction of the travertine than the natural processes. Major travertine quarrying for lime- stone production occurred from the14th to16th centuries, especially close to the church, about 30 m west of the Hot Spring.

During the gradual expansion of the downtown spa area, especially at the end of 19th and early 20th centuries, nearly all the travertine deposits were covered by buildings, artificial surfaces, and the reinforced bed of the Teplá River.

The delineation of such a number of separate sedimentary bodies with partial overlaps has helped to enhance the understanding of the hydraulic functioning of the travertine deposits as a whole. The single travertine bodies determine the location of the outlets of the thermal water and CO_2, e.g. in the area of the left bank of the Teplá River. The eroded travertine in the river-bed between the northern and central deposits causes the present large-scale dissipation of the rising thermal water and carbon dioxide, so that no concentrated outlets are found here despite being located in the fault zone.

The close linkage between individual travertine bodies and the thermal water and CO_2 circulation is evident.

Besides mechanical human impacts, the presence of a network of pathways provides a ready means for the spread of dangerous chemical contaminants. Rehabilitation of damage to this environment is almost impossible, as the travertine forms an ideal medium for the contamination of the thermal mineral water. This is a particular problem in a densely urbanized area, where the repeated discharge of persistent chemical contaminants is very possible.