

Abstract

Between 1853 and 1939, colourful and highly sought-after uranium paints were produced on an industrial scale in Jáchymov. Until the discovery of radium by Marie Curie Skłodowska in 1898, the waste from production was considered essentially worthless.

In the 1970s, the use of materials with increased radioactivity was detected in buildings in Jáchymov. Some of the most affected buildings were demolished. In the 1990s, remediation interventions took place during which these building materials (plaster and mortar) were removed from most of the buildings. During this period, gamma radiation doses as well as radioactivity and uranium were measured in the laboratory. The mineralogical and phase character of the material was not investigated, which was the main objective for this bachelor thesis.

The presumption of preservation of at least some of the surviving houses was minimal. Nevertheless, a few unique cases have been found. A total of 11 buildings were found along a 12 km tour whose plaster showed elevated radioactivity ranging from 3.2 to 28.4 $\mu\text{Gy/h}$. Sampling was carried out at 6 of them. Determination of ^{226}Ra mass activities was performed by laboratory gamma spectrometry, uranium contents were determined by instrumental neutron activation analysis. In the study set, the radium activities reached values of 0.12 to 5.25 % eU. The radioactive equilibrium coefficients are significantly shifted in favour of ^{226}Ra and range from 205 to 941 %, except for house number 5, where the plaster was close to the Ra/U equilibrium state. The emanation coefficients are low, ranging from < 0.5 - 7.47 %.

The main carrier of radium in plasters is slag, used as a sharpening agent. In X-ray diffraction and electron microscope images they appear as amorphous phases (glass) with admixtures of cristobalite (SiO_2), troilite (FeS) and cubic UO_2 (uraninite s.s.). It is silicate slag from silver smelting, where this material was sometimes added at the time and according to contemporary records.