

# **RADON AND LEGAL DISPUTES IN CZECH REPUBLIC**

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# The family house sale

The family house was sold in the year 2012



# The family house sale

After some months the new house owner started the reconstruction.

The old plasters and the partition walls were removed. Clinker concrete panels showed to be the principal construction elements.



# Clinker concrete panels

It is well known, that at the end of the last century were with these products some problems in Czech Republic

The precast concrete plant (Rynholec, 1965 – 83) produced products using the clinker left by the local power station that burned the lower quality brown coal

The slag waste piles – 750 thousands m<sup>3</sup>

- <sup>226</sup>Ra content 1 – 5 kBq/kg

The gamma radiation dose rate

- 0,5 -1,7 μGy/h (in contact with the contaminated wall)

- 0,4 – 1,0 μGy/h (0,5 m distance from the wall)

Radon indoor concentrations 400 – 1000 Bq/m<sup>3</sup>

# Cliner concrete panels



The measurement proved that the  $^{226}\text{Ra}$  concentration in panels is 2100 Bq/kg and gamma radiation dose rates are 0,8 – 1,0  $\mu\text{Gy/h}$

# Radon concentrations

The radon concentrations are always questioned by one or another side.

Because they are the function of:

- ventilation,
- number of inhabitants and their customs,
- heating,
- weather, ...

No one of these can be long term standardised.

# Radon concentrations

The radon concentrations substantially differ and were measured under different conditions:

**Originally** (in early nineties), the long term EEC was measured in occupied house - **normal use conditions** -

EEC less than 100 Bq/m<sup>3</sup>

**At present** (2012) one week mean indoor radon concentrations were measured in the house **under reconstruction**

In two different measurements (carried out in different terms) the ranges of results were

520 -1045 Bq/m<sup>3</sup>

765 – 1038 Bq/m<sup>3</sup>

The mean radon concentrations differ more than 5 times (notice the EEC and radon concentrations) !!

Is this possible??

# Measuring conditions

**Original:** Occupied, normally used house

- persons move around the house,
- some doors and windows are sometimes partly or entirely open,
- the house is heated according the demand,
- the windows are not tight, out of date design ...

Estimated value of **ventilation rate** **(0,4 – 0,8) h<sup>-1</sup>**.

**2012 measurement:** the house is **under reconstruction**

- no partition walls,
- no heating,
- the windows were closed
- no one entered the house during one week exposition

The measured **ventilation rate** **0,08 h<sup>-1</sup>**.

# Gamma radiation

The elevated gamma radiation dose rate is the consequence of the presence of the natural radionuclides in building material. In normal situations the indoor gamma radiation dose rate does not exceed the 1,5 times the outdoor background value.

In this case, the gamma dose rates are 9 times higher than the outdoor background value and the measured  $^{226}\text{Ra}$  concentration in building material was 2100 Bq/kg.

Radium in building material is additional source of indoor radon, that must be removed from indoor air by technical means, e.g. ventilation, air conditioning.

# Radon diagnosis

Radon diagnosis was carried out in the house of concern with following conclusions:

- The house has high  $^{226}\text{Ra}$  concentrations in building material
- The gamma radiation dose rates are much higher than local background, due to natural radionuclides in building material
- The building material is the main source of indoor radon. No significant soil radon infiltration was found.

The high content of  $^{226}\text{Ra}$  was designated as **the hidden defect** of the house

# Controversy

The new owner declares, that the building has the hidden defects and sues the original owner against the validity of the purchase contract.

... on the other hand ...

The original owner raises an objection that he has in his hands official document issued in ninetieth of the past century by hygienic service, that declares that the level of the **combined action level** is not exceeded. The declaration was issued by the hygienic service - the former official state institution responsible for regulation of the exposure of the public by ionisation radiation.

# Combined action level

The quantity (not used from 1997) combined exposition by the radon and gamma radiation:

$$AI = \frac{c_{eq}}{200} + \frac{\dot{D}}{0,5}$$

$c_{eq}$  the equilibrium equivalent radon concentration (Bq/m<sup>3</sup>)

$\dot{D}$  the highest gamma dose rate (μGy/h) measured in 0,5 m distance from the walls

# The role of justice

The justice must cope with the protest of the respondent, that the fault does not exist.

The objection is that the only legal regulations of the indoor „radon“ are the reference/action levels from Decree No. 307/2002

## New buildings

- radon concentration  $< 200 \text{ Bq/m}^3$
- gamma radiation effective dose rate  $< 0.5 \text{ } \mu\text{Sv/h}$

## Existing buildings

- radon concentration  $< 400 \text{ Bq/m}^3$
- gamma radiation effective dose rate  $< 1.0 \text{ } \mu\text{Sv/h}$

## The role of justice

The content of natural radionuclides in building material **for existing buildings** is not regulated and from this point of view the hidden defect does not exist

Nevertheless high concentration of radium and other natural radionuclides cause high radon concentrations and gamma radiation dose rates and technical measures must be taken to reduce them.

Moreover the **reference levels are too high** to represent the real situation, taking into the account the real distribution of the indoor radon concentration and good practice.

## Meaning of the sides

The feeling of the **new owner** is that he does not want the house with radioactive building material. He states he had no information, while there were some information at original owner.

Original owner relies on official document declaring that the level of the **combined action level** is not exceeded and the house meets all legal requirements.

The justice must point to the person responsible for selling the house with hidden defects without providing information. The curiosity of this situation is, that the problem is by officials discovered and was dealt in past.

## Similar cases

The described trial is after two years not yet finished alike similar later one.

Another trial with the sale of house with **contaminated** building material finished at out-of court settlement.

Naturally there are many problematic cases of sold houses **subsoil radon** as the most significant source of indoor radon. But in these situations there are always technical measures, more or less expensive, to mitigate this house. Also the proving of holding the information back from buyer, is always very difficult, partly because of lack of the national database of indoor radon measurements. These situations usually finish at out-of court settlement.

Thank you for your  
attention