


Seasonal Measurements of Indoor Radon Level in the Period of Summer at Technical College of Applied Sciences in Zrenjanin

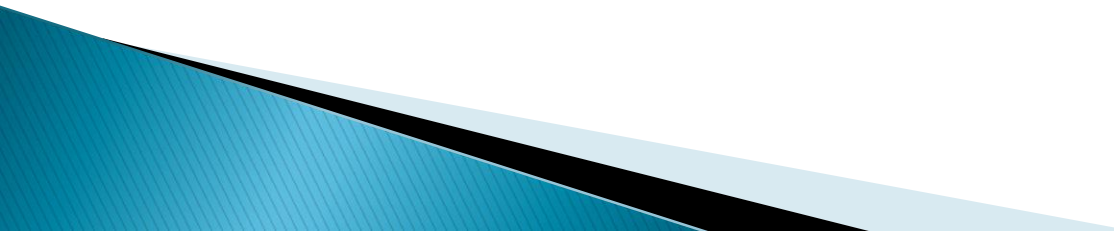
dr Iris Borjanović, dr Aleksandar Rajiić, dr Željko Eremić
Visoka tehnička škola strukovnih studija u Zrenjaninu
iris@ipb.ac.rs

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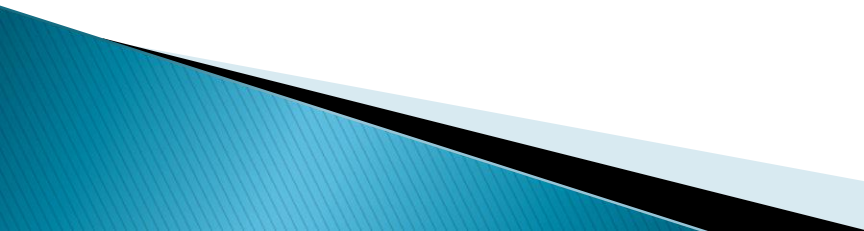
Summary

- ▶ Radon
 - ▶ Pathways of exposure
 - ▶ Health risks
 - ▶ Project
 - ▶ Detector
 - ▶ Measurements
 - ▶ Results
 - ▶ Conclusion
 - ▶ Future plans
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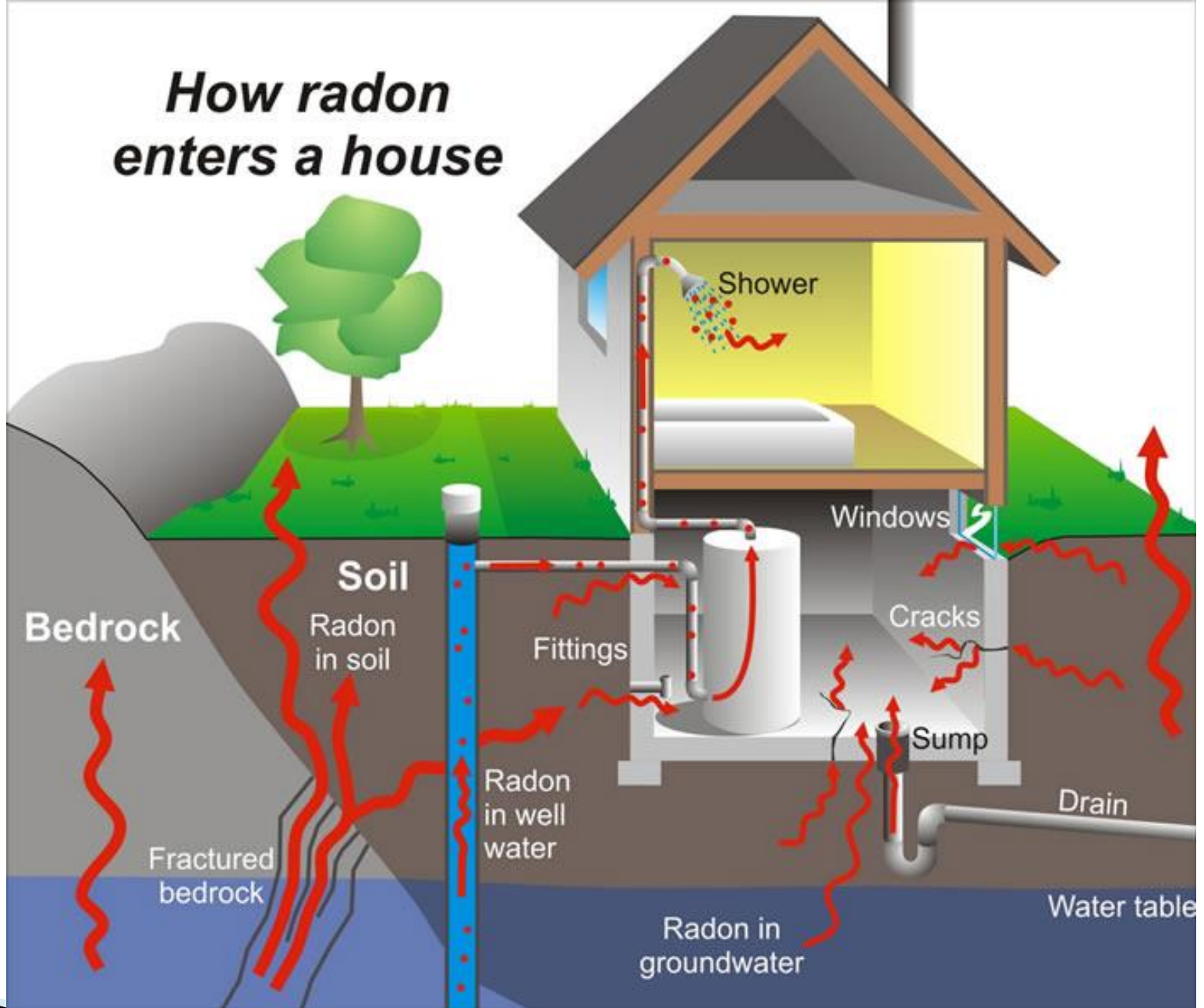
Radon

- ▶ Colorless, odorless, tasteless, radioactive, noble gas.
 - ▶ Naturally occurring Radon -222 formed in the ^{238}U decay chain.
 - ▶ Half-life 3.8 days.
 - ▶ Emits alpha radiation, much like other alpha generating radiation sources, as plutonium.
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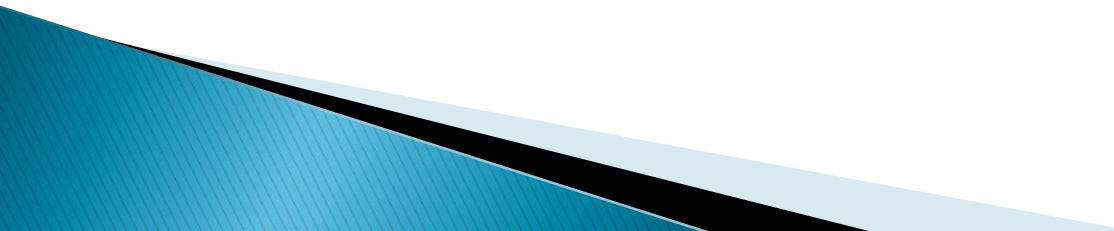
Pathways of exposure

- ▶ Pores in the soil,
 - ▶ Cracks in geological structures,
 - ▶ Formation (rocks,...),
 - ▶ Water drainage systems.
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- ▶ Flows from the soil into the air and homes.
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- ▶ Ingestion, inhalation of the electrically charged atoms attached to dust particles.
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How radon enters a house



Health hazards

- ▶ Cell damages in the lungs and the disruption of DNA in lung cells thus causing lung cancer as the main hazard.
 - ▶ Smokers are at higher risk.
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The project

- ▶ Title of the project “*Radon Level Measurement*”.
- ▶ Cofinanced by the **Provincial Secretariat for Higher Education and Scientific Research.**
- ▶ Created at **Technical College of Applied Sciences in Zrenjanin (TCAS)** in **2022** and is still in the process of realization.

Radon detector

- ▶ Airthings Correntium Home Radon Detector is used <https://www.airthings.com/home> .
- ▶ Continuous monitoring.
- ▶ Capable of performing long-term measurements (up to 1 year) and also short-term measurements (1–7 days).
- ▶ Based on alpha spectrometry with passive diffusion chamber.
- ▶ Precision: 10% for short-term measurements and 5% for long-term measurements.



<https://www.airthings.com/home>

Measurements

- ▶ A quick test is performed during **summer 2022** at **TCAS** in the basement and the groundfloor (the surface of 4000m²) with labs, offices, storage spaces, classrooms, a printing press office and a heating system room.
- ▶ **Short-term two-day-long (48h)** measurements in rooms with no ventilation and with closed doors and windows all the time –**worst case scenario**. Rooms were also sealed for at least 12h (some rooms even much longer) before the start of the measurement and the heating system was not used.

Results

- ▶ Radon concentration level at TCAS during summer ranged from

10 ± 1 to 30 ± 3 Bq m⁻³ .

These results are similar to values obtained during spring measurements.

Conclusion

- ▶ Even a small percentage of radon is harmful.
- ▶ WHO recommendation: $<100 \text{ Bq m}^{-3}$.
- ▶ Many countries define their own National Reference Limits.
- ▶ The levels of indoor radon concentrations measured during summer 2022 at TCAS are within acceptable values, below our National Reference Limit (i.e. 200 Bq m^{-3} for new buildings and 400 Bq m^{-3} for old buildings).

Future plans

- ▶ To repeat all the measurements at TCAS during **autumn and winter 2022** (as radon fluctuates seasonally) and **over longer period of time** (as it fluctuates daily).
- ▶ Also perform a long-term measurement in the room with the highest radon level.
- ▶ There is a plan to repeat the measurements at TCAS in collaboration with the Institute for Nuclear Sciences VINČA by using **chaorcoal canisters** for the comparison of results.