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RADON LEVELS IN ALEKSANDËR MOISIU UNIVERSITY CAMPUS, DURRËS (ALBANIA)

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STUDY AREA

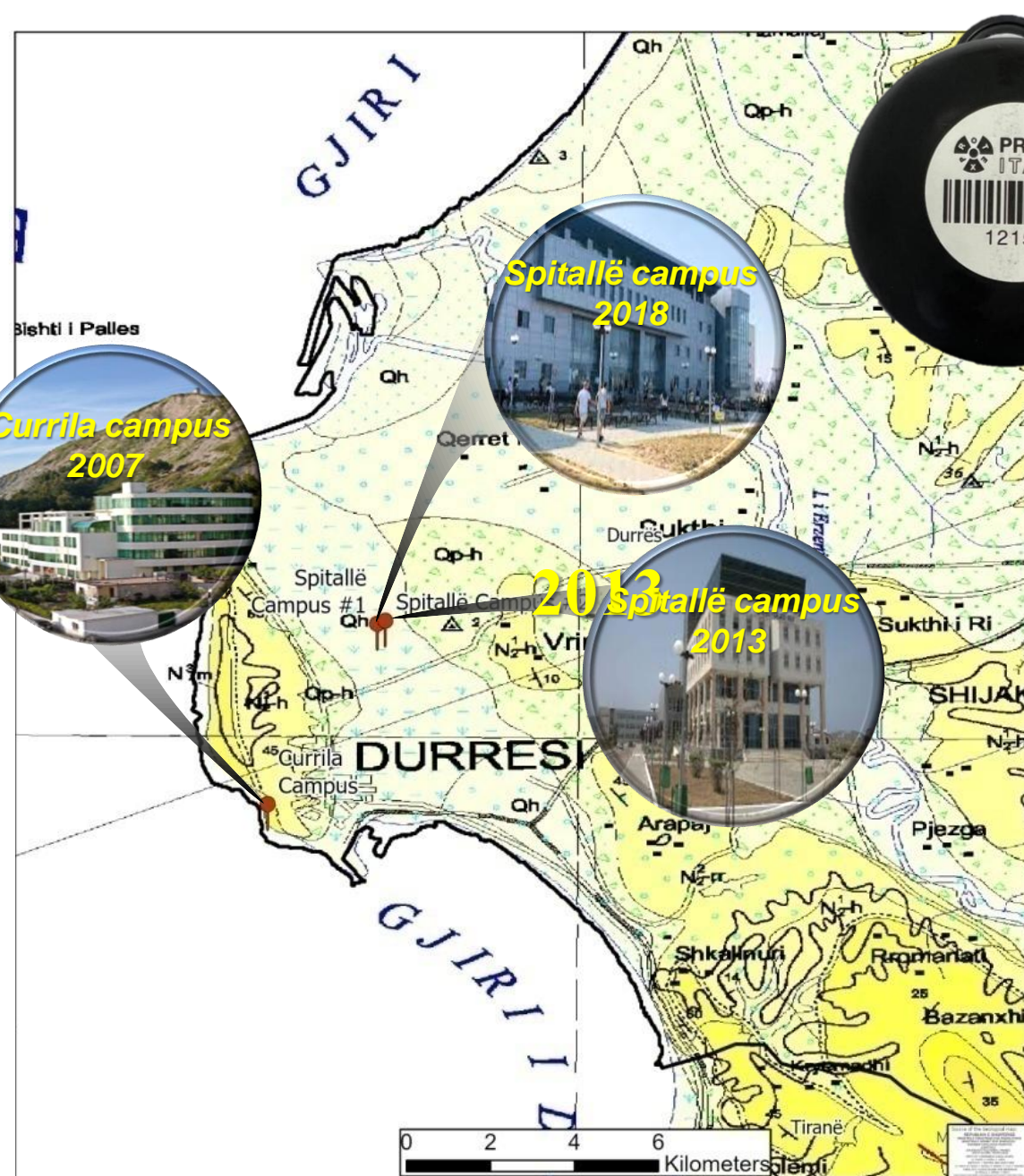
Aleksandër Moisiu University (5 faculties and 23 departments) is a public institution established in 2006 located in the Durrës city.

- Two sampling campaigns in autumn-winter (67) and spring-summer (73) seasons where Cr-39 detectors are exposed for about three-months period each.
- At least one detector is placed every 50 m² (53 locations in three buildings)



The campus of Currila is located near the coast in the base of Durrës hills characterized by sand and clay presence.

The campus of Spitalë is located in Durrës swamp, an alluvial deposit area with sand and gravels



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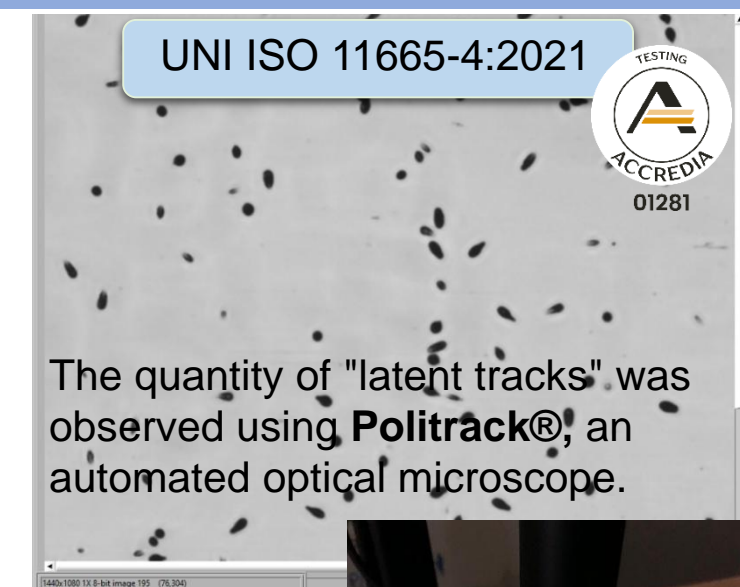
INDOOR RADON MEASUREMENTS



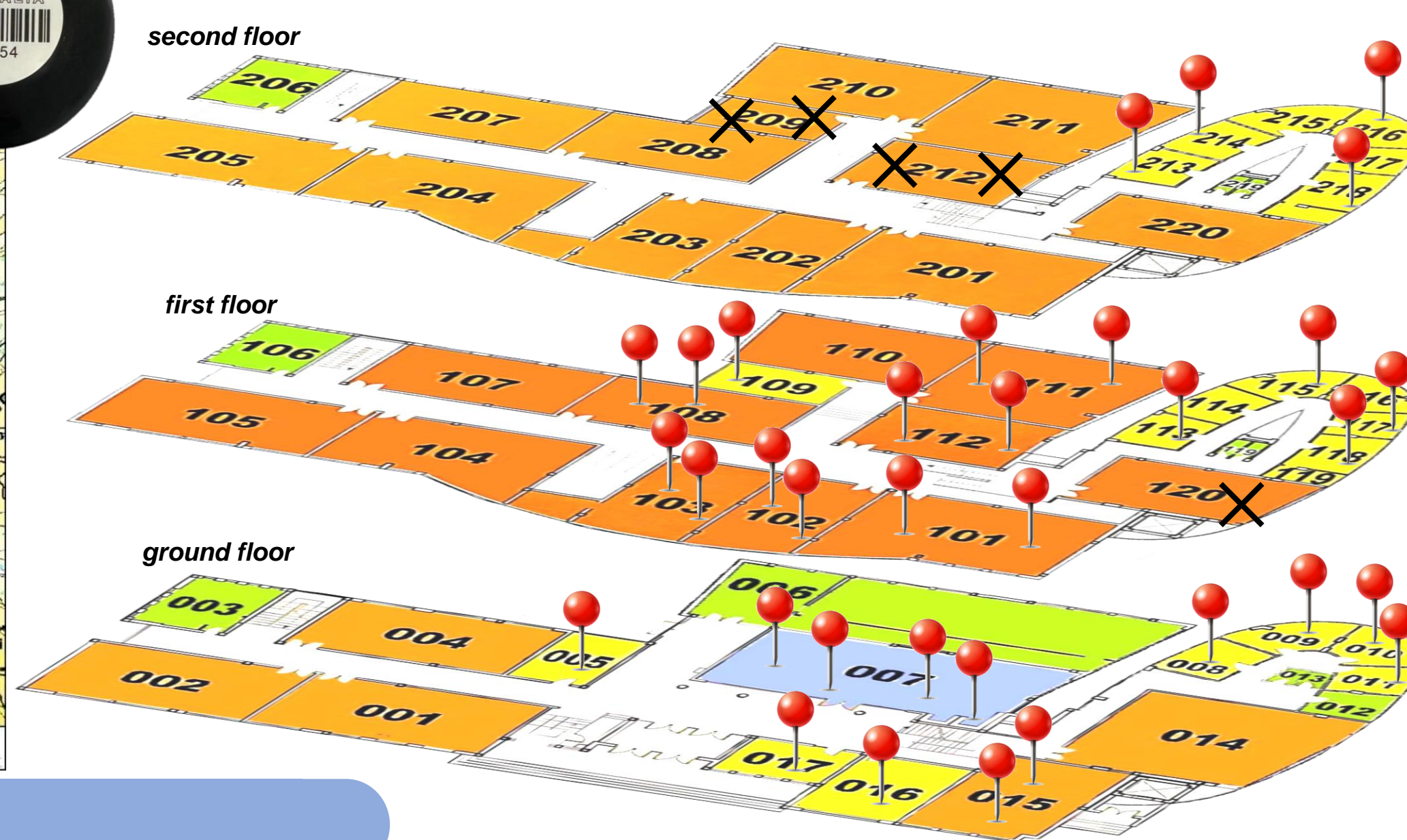
Following the exposure duration, CR-39 detectors were etched in 6.25 N NaOH at 98°C for one hour, then treated with 20% acetic acid and rinsed with distilled water.

The density of nuclear tracks is directly related to radon exposure (kBq h m⁻³).

$$C(\text{Bq m}^{-3}) = \frac{(\text{radon exposure (kBq h m}^{-3}) * 1000)}{\text{duration of exposure (h)}}$$



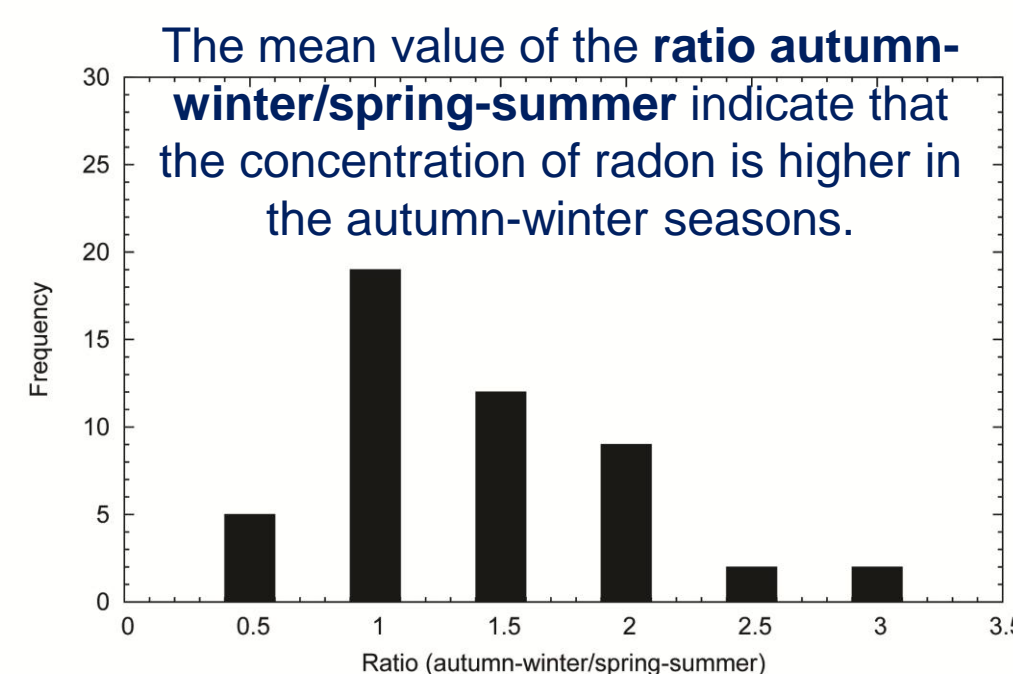
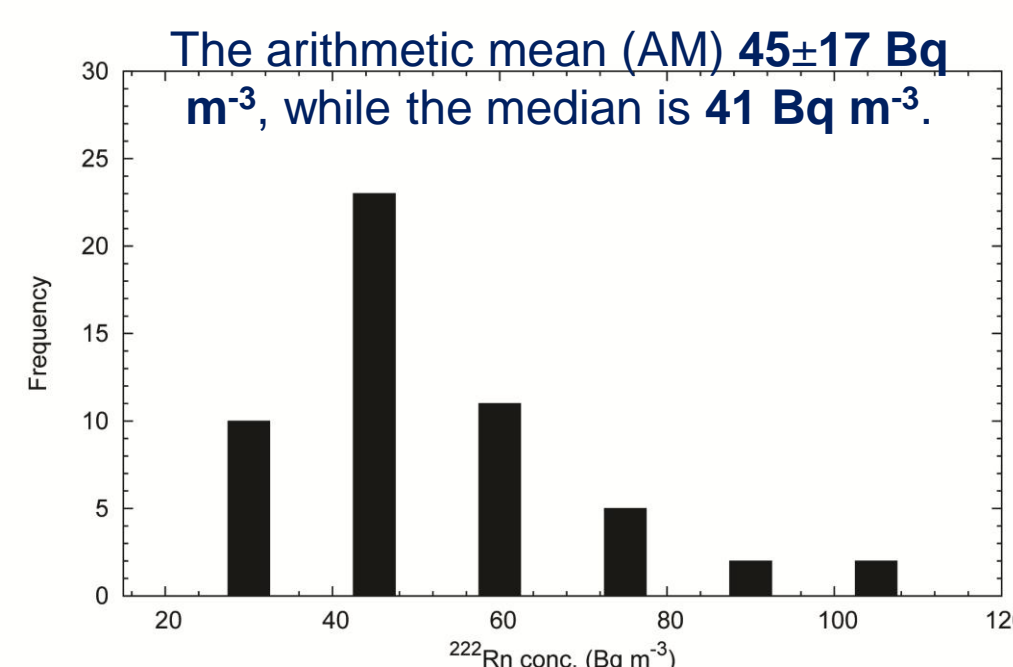
The quantity of "latent tracks" was observed using Politrack®, an automated optical microscope.



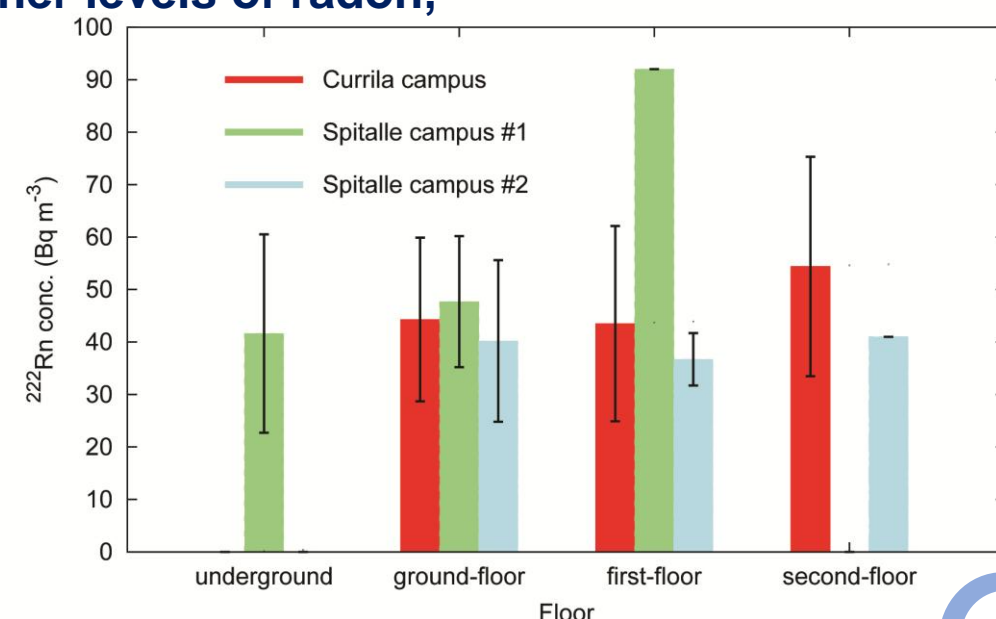
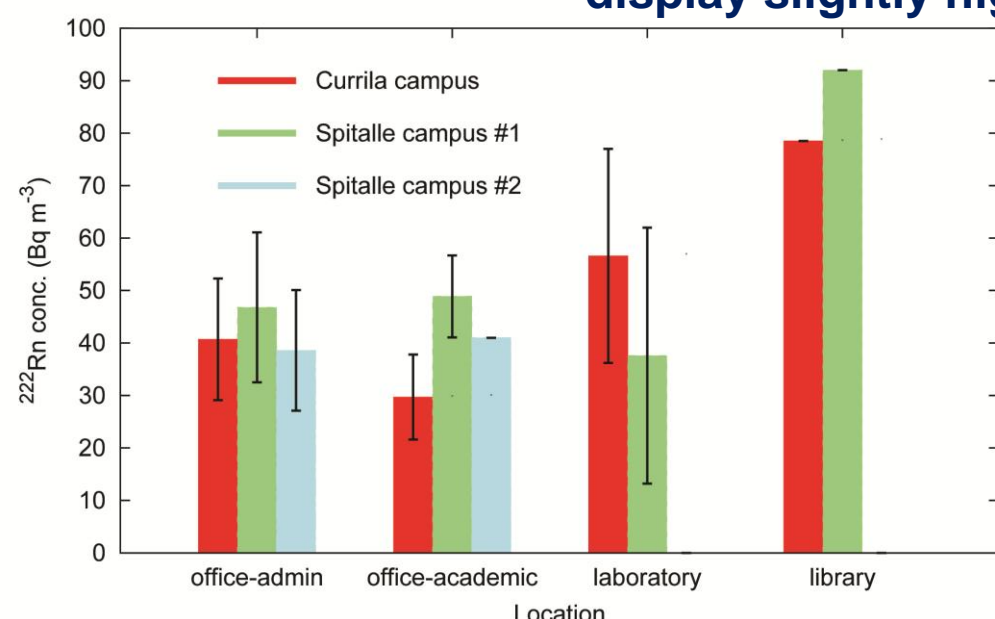
PROTEX ITALIA

ACTIVITY CONCENTRATIONS

The results show that in no location, the radon activity concentrations are higher than 300 Bq m⁻³, which is the reference level of Albanian legislation for workplaces.



The arithmetic mean concentration found among buildings does not differ significantly. The libraries located in different buildings on the Currila campus and Spitalë campus display slightly higher levels of radon,



DOSE RATE ASSESSMENT

The university has a residency population among staff and students of about 20 000 people without including visitors.

The "annual" effective dose rate due to exposure to radon gas in the workplace has been estimated based on the recommendations of the European Commission 2024/440 of 2 February 2024.

$$E\left(\frac{\text{mSv}}{\text{y}}\right) = C_{Rn} \times T \times DCF$$

where:
 C_{Rn} is radon concentration,
 T is occupancy time 2000 hr (workplaces) and 7000 hours (indoor),
 DCF is dose conversion factor 6.7 nSv per Bq h m³ using an equilibrium factor of 0.4 (ICRP Publication 137).

The radon exposure for the national guideline level of 300 Bq m⁻³ corresponds to an annual effective dose of :

- 4 mSv in workplaces and
- 14 mSv in homes.



United Nations Scientific Committee on the Effects of Atomic Radiation

2-10 mSv/y

Statistical analysis	workplace/public building (Bq/m ³)	"annual" eff. dose rate (mSv/y)
Minimum	14	0.2
Maximum	98	1.3
Arithmetic mean (AM)	45	0.6
Geometric mean (GM)	42	0.6

CONCLUSIONS

- No site exhibited radon activity levels exceeding 300 Bq m⁻³. The yearly average concentrations were observed to vary between 20 - 92 Bq m⁻³.
- The results during the autumn-winter and spring-summer periods indicate that the concentrations were typically greater in the autumn-winter seasons.
- The average concentration observed across various buildings and floors shows no significant difference.
- The yearly average dose from indoor radon exposure is estimated to be 0.6 mSv/year. However, during work hours might be considerably reduced resulting from the entrance and exit of people and the operation of the building's ventilation system.

The radon behavior concentration shows a decrease during working hours. This could be attributed to the fact that doors and windows remain open, leading to an increase afterward.

Indoor radon is measured by active method over two weeks in Currila campus during spring-summer sessions.

