

RADON / THORON MEASUREMENTS IN ROMANIA AND COMPARISON WITH MACEDONIAN SCHOOLS

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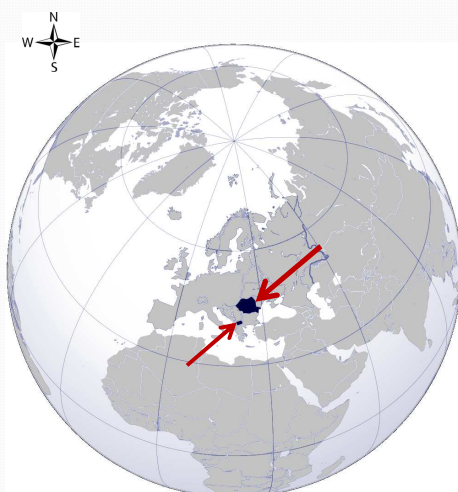
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INTRODUCTION

Radon problem has been widely investigated within the Romanian borders throughout the years while thoron did not attract that much of attention. However, fairly recent studies around the world have pointed out that indoor thoron should not be neglected when estimating the effective dose. Taking this into consideration a new survey is in progress, a survey that is going to provide the effective dose not only due to indoor radon but also the thoron contribution to it. A small comparison exercise with Macedonian schools pointed out that both radon and thoron activity concentrations appears to be slightly higher in Romanian schools. Notwithstanding, the Romanian dwellings presented slightly lower activity concentrations for radon compared to the values obtained in schools.

GEOGRAPHIC LOCATION

The investigated location is represented by the Vaslui county, specifically the surroundings of Barlad Town.



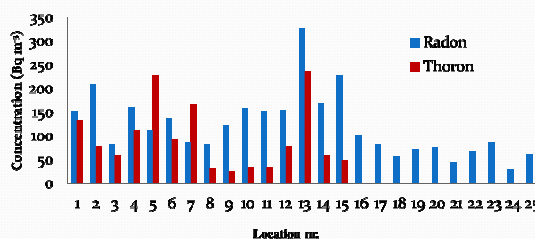
MATERIALS AND METHODS

In order to measure radon activity concentration more thoroughly, in the present survey were used two types of passive detectors represented by nuclear track detectors based on CR39 chips, provided by Radosys Ltd. Budapest, namely RSK, used to measure radon and RADUET, used to measure both radon and thoron activity concentration¹. Detectors were deployed in dwellings, schools and public institutions over a period between 90 and 100 days taking into account the dweller's status (smoker or non-smoker), the building material and geological background.

RESULTS

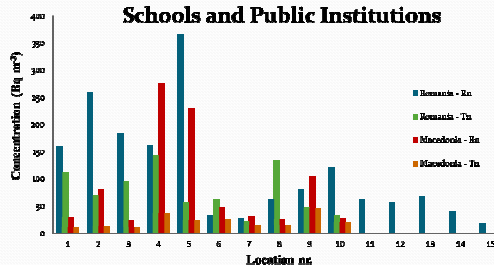
A total number of 40 locations throughout four counties were included in this survey, 25 locations were investigated with RADUET and 30 with RSK. In 15 locations were used both types of detectors. The plot of all data can be seen in the following figures.

Dwellings



The thoron activity concentration was found to be higher than radon in two of the investigated dwellings. Both values were found in adobe houses. The only difference from the other adobe houses investigated was that the walls had a layer of cement onto the adobe. Adobe represents the building material used for 60% of the locations.

Schools and Public Institutions



A comparison exercise with 10 Macedonian schools pointed out that both radon and thoron activity concentrations appears to be rather higher in Romanian schools with an average radon activity concentration of 87 Bq m⁻³ for the first versus 113 Bq m⁻³ for the last and respectively 21 Bq m⁻³ versus 78 Bq m⁻³ for thoron. Notwithstanding, the Romanian dwellings presented slightly higher activity concentrations for both radon, with an average of 120 Bq m⁻³ and thoron, with an average of 93 Bq m⁻³. However, the present paper analyzes only a low number of locations; a more substantial survey is yet in progress.

ACKNOWLEDGEMENT

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CONCLUSIONS

After this survey, only two location, a school and a house built with red bricks presented radon activity concentration higher than 300 Bq m⁻³, the reference level for radon indoor (ICRP115, 2010), namely 366 Bq m⁻³ respectively 326 Bq m⁻³. The rest of the data were below this reference level making this regions, up until now, a rather safe place to live when it comes to radon and thoron. These measurements represent the first survey using passive methods for investigating both radon and thoron within this regions of Romania. However scarce, these data are part of a national survey which would provide radon and thoron prone areas throughout the whole Romania.

REFERENCES

1. THORON AND RADON MEASUREMENTS IN ROMANIAN SCHOOLS . B. D. Burghel; C. Cosma .Radiation Protection Dosimetry 2012; doi: 10.1093/rpd/ncs143
2. ICRP 115 (International Commission on Radiological Protection). Lung Cancer Risk from Radon and Progeny and Statement on Radon. ICRP Publication 115 Ann. ICRP 40. 2010.



		²²² Rn (Bq m ⁻³)	²²⁰ Rn (Bq m ⁻³)
Dwellings	Average	120	93
	Min - Max	28 - 326	24 - 235
Romanian schools and public institutions	Average	113	78
	Min - Max	18 - 366	32 - 143
Macedonian schools	Average	87	21
	Min - Max	23 - 276	10 - 45