

RESEARCH REGARDING A NATIONAL RADON INDOOR MAPPING FIRST RESULTES

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Abstract – EURATOM recommends through “EC Recommendation 90 / 143”, protecting the public against Rn indoor exposure by raising new buildings or solutions for renovating the old ones, so that the volume activity of Rn does not exceed a certain effective equivalent dose.

In Romania there does not exist an official map of Rn and neither a database for charting. For the recovery of Romania left behind in this field we have proposed to study and to evaluate Rn risks over Romania’s territory and started using the database from pilot areas (Caras Severin and Hunedoara); elaborating a new software in order to evaluate Rn risks transfer factor to uncovered areas by measured data and in the and to elaborate a set of documents which can be the basis of a legislative decision regarding the action level.

Keywords : radon mapping, track detectors

1. INTRODUCTION

It is known that radioactivity earth crust, especially on rocks is the family of radioactive elements Uranium-238 and Thorium-232. Radioactive gaseous products, Rn-222, Rn-220, resulted from the decay of uranium and thorium, continuously penetrate the soil to air.

We developed a sampling plan and direct measurements in Stage I of a large project was subsequently completed in consultation with experts in Belgium, Italy, Austria, Hungary and consulting related to mapping sites with Rn in other parts of Europe or America.

From a documentary material developed by the specialists from JRC(Ispra,It) in 2006, regarding the hazard map of Rn, presented in Fig.1, results a white area in South-East Europe. The blank maps represent the fact that there do not exist published maps of hazard evaluation of Rn for those areas.



Fig.1. The European map of Rn (2006)

We have chosen two pilot areas Caras Severin(area A) and Hunedoara(area B), Fig.2.

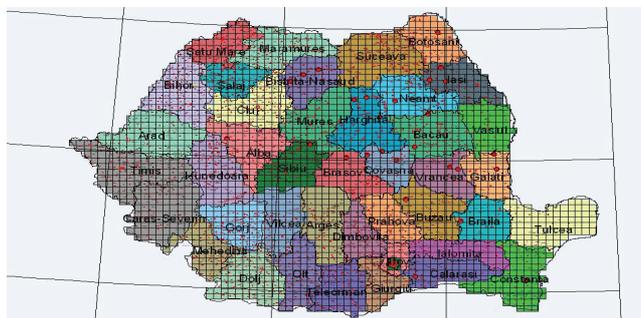


Fig.2. Romania’s map with interest Rn Areas

2. MATERIALS AND METHODS

Indoor radon measurement method was made using track detectors eached [1,2] The determination of radon concentration indoors was carried out using alpha air monitoring device.

The solid tracks detectors, mounted in devices for monitoring Rn indoor, were plastic detectors, CR-39 from the company Page Mouldings Ltd., UK [3]

After the detector devices were in houses of two pilot areas a number of hours, the detectors were "read", and, depending on the number of tracks alpfa was calculate the track density ρ [tracks/mm2] and the specific activity of radon from the volume of the device, C [Bq / m³], for an exposure time $t_{exp}(h)$:

$$C[Bq / m^3] = \frac{\rho[track / mm^2] \cdot F [(kBq \cdot h / m^3) / (track / mm^2)]}{t[h]} \quad (1)$$

The following results were obtained:

Table 1: Results in pilot areas Caras Severin-area A

Detector Area A	ρ [tracks/mm ²]	t_{exp} (h)	[C]=Bq/m ³
A027	1,09E+06	1536	2344,558
A035	9,47E+06	1536	20365,46
A139	3,93E+06	1752	7415,929
A157	2,69E+06	1752	5078,299
A220	6,65E+06	1488	14758,4
A257	2,44E+06	1536	5240,773
A272	5,30E+06	1536	11400,98
A518	3,78E+06	1752	7133,800
A419	3,33E+06	1752	6287,417
A487	2,09E+06	1512	4576,738
A531	1,99E+06	1536	4275,367
A575	4,21E+06	1752	7939,880
A361	2,39E+06	1488	5314,921
A370	2,05E+06	1752	3869,18
A423	1,28E+06	1536	2758,302
A454	6,03E+06	1488	13382,21
A458	1,94E+06	1560	4119,064
A460	5,19E+06	1536	11171,12
A502	8,63E+06	1536	18572,57
A526	8,61E+06	1488	19124,23
A530	1,32E+06	1512	2895,487
A535	5,60E+06	1488	12433,12

Table 2: Results in pilot areas Hunedoara-area B

Detector AreaB	ρ [tracks/mm ²]	t_{exp} (h)	[C]=Bq/m ³
A005	1,92E+06	1536	4137,453
A125	9,17E+06	1536	19721,86
A138	2,69E+06	1536	5792,435
A151	3,46E+06	1536	7447,415
A167	2,52E+06	1536	5424,662
A174	2,99E+06	1536	6436,038
A175	1,58E+06	1536	3401,907
A246	3,46E+06	1536	7447,415
A547	3,46E+06	1536	7447,415
A233	3,21E+06	1536	6895,755
A356	3,08E+06	1536	6619,925
A385	2,29E+06	1536	4918,973
A390	6,60E+06	1536	14205,26
A432	2,54E+06	1536	5470,633
A466	9,72E+06	1536	20917,12
A500	2,05E+06	1536	4413,283
A508	2,80E+06	1536	6022,292
A562	1,47E+06	1536	3172,048
A564	2,91E+06	1536	6252,152

Note that for the same exposure time were significantly different obtained values for specific activity of radon.

We believe that higher values are due to mainly concerned that those homes were not provided with cellars, so diffusion of radon from the soil under the building and its adjacent area in residential areas is made more quickly and directly.

We interpret such results as it is known that ~ 56% of indoor Radon comes through normal diffusion and advection from the ground underneath the building and surrounding one and only ~ 21% comes from building materials.

3. CONCLUSION

The research results and the others in the field of Radon hazard will be capitalized on a national scale through the development of a documentation which will stand at the basis of several legislative measures in order to establish an action level.

The protection of the population in the areas with a higher hazard will be achieved by disseminating information and offering solutions to diminish the hazard. The city halls of those areas will be contacted and measures will be taken

to inform and support the population in the purpose of diminishing the risk of lung cancer.

Among the main beneficiaries of the results of these researches are the Ministry of Health and the Ministry of the Environment who have expressed their agreement to use the results of the research proposed by the project. The final beneficiaries are the citizens of our country and especially the ones in the areas with high exposure hazard to Radon indoor.

On international level, Romania will be among the countries with a Radon hazard map and will no longer be a blank spot on the European Radon map.

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