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March/19/2023

Doctoral (Ph.D.) Dissertation Evaluation Report

written by

Mohammademad Adelikhah

Doctoral School of Chemistry and Environmental Sciences

Title: “Numerical and Experimental Investigation of Radon and Progeny in Residential Areas”

1. The actuality of the thesis and suitability for scientific interest.

The thesis work deals with an important topic in radioecology and environmental radioactivity. The applicant studied indoor radon and thoron exposure as well as naturally occurring radionuclide content in building materials in Iran which are of particular interest because of possible human exposure to natural background radiation and constitute the largest source of radiation exposure to the public. Due to the limited information or lack of such data in Iran, the applicant carried out a new comprehensive radiological survey in some parts of Iran to identify potential radiation exposure where there is no such data available.

2. Thesis work structure, ratio, construction.

The dissertation is designed, well distributed into 4 chapters and 116 pages. The structure of the dissertation confirms the principles and requests of the structure of the scientific work. Also, the candidate has studied and used a suitable number of bibliography sources and quoted in this dissertation. Generally, the described literature survey, methodology, and how results are presented are logically acceptable and relevant to the international standards and rules of good

scientific practice. The aims and methods are clearly described; the author represents the ideas and knowledge with the sufficient theoretical background. As a result, the aims were fulfilled; methods of research work are appropriate to the aims and hypothesis formulated in the thesis.

3. The scientific value of the thesis work, description of the scientific novelties

The applicant found some level of NORM concentration in building materials in the HNBR of Mahallat in addition to higher activity concentrations of indoor radon in thermal baths at a spa in Dehloran. The Applicant gave the important statements determining the dose workers are exposed to and for whom the radiation hazard of radon is more significant than for tourists and dwellers. The other part of the thesis is the application of the developed CFD technique to numerical simulation. Also, the applicant provided a comprehensive study to consider the most important factors affecting the indoor radon measurements and finding the critical zones for living by applying a radon map.

4. Information available in the thesis work

All information in the dissertation is based on the publications list of the applicant. He published five scientific papers and the cumulative impact factor of them is ~ 20 , which is an excellent record. The dissertation is an independent and comprehensive piece of work of a high academic standard. The dissertation contributes to new knowledge of the discipline.

5. Notes, comments, and questions on the thesis work


Overall, there are a little number of errors in the thesis work (e.g., some commas are missing), however, it does not deteriorate the quality of the thesis. The assessment of results and the discussion of the results should be longer and more detailed.

In summary, with this work, the applicant provided evidence of his suitability for individual research work and his professional understanding. I am pleased to recommend this thesis for acceptance into the doctoral public defending at the Pannonia University of Hungary.

I have the following questions to the applicant:

- (i) Please describe how the rooms with the well-ventilated or poor ventilated conditions can be quantified or recorded.
- (ii) Please explain the difference in the seasonal change of indoor thoron and radon in the Mashhad case study.
- (iii) Figure 22; The applicant wrote in the thesis: “The correlation analysis yielded a positive correlation ($R^2=0.361$) between average indoor radon and soil-gas radon concentrations.” Based on the results presented in Figure 22, (average data and error bars), I would observe no or very weak correlation between two quantities. If there is a correlation between the indoor radon and soil-gas radon concentrations, what is the scientific origin of it.

Faithfully yours,



Istvan Lagzi