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Book review

Radon Measurements by Etched Track Detectors: Applications in Radiation Protection, Earth Sciences and the Environment, Saaed A. Durrani, Radomir Ilic: World Scientific Publishing Co. Pte. Ltd, Singapore, 1997. ISBN 981-02-2666-7, 387 pp.US $58.00 (Hard bound Edition).

The book under review is the outcome of an international co-ordination on the theme which is chosen as the title for the book. S.A. Durrani and R. Ilic, Editors of this volume, acted as co-ordinators of this project. I do not believe this project had the sanction of an international agency. It was a collaborative effort by a dedicated group of workers, more or less as a labour of love as claimed by the editors in the preface.

The book is divided into four sections: (i) Introduction, (ii) Etched Particle Track Methods, (iii) Applications in Radiation Protection and Environment, and (iv) Applications in Earth Sciences. The sections are divided into chapters which are written as review articles by expert authors in the field. The first three chapters form the core of this book and the material is organised in a most comprehensive and logical manner. The first chapter is about radon and its properties, its origin and transport. The second chapter complements the first as its authors give a logical sequence of radon emanation and transport in soil-air and groundwater based on geological considerations. By all means, the third chapter is the most important contribution to the book from the point of view of an experimentalist. Radon measurement techniques are described in great detail with greater emphasis on passive devices. The most extensively used radon sensors are solid state nuclear track detectors (SSNTDs), alpha card, electret detector, thermoluminiscent detectors, ion chambers, proportional counters and activated charcoal. This chapter includes very useful information about manufacturers of these devices and covers a wide range of literature survey.

There are four chapters in the second section "Etched Particle Track Methods" and the state-of-the-art is discussed in detail by S. A. Durrani. Most of the contents of this chapter are derived from his book *Solid State Nuclear Track Detection* (Pergamon Press), which will serve as a useful reference supplement to this book. Radon monitoring devices based on etched track detectors, commonly known as radon dosimeters, are described by R. Ilic and T. Sutej. The detection efficiency, performance of radon dosimeters and their detection limits are given in a quantitative manner. The crux of the problem is how to reveal the latent tracks registered in a given SSNTD. This is an art beautifully described by L. Tommasino in terms of chemical and electrochemical etching. The last chapter of this section discusses calibration and standardisation procedures. Inter-comparisons of passive radon detectors are important to ensure compatibility between results obtained by different groups. Radon reference levels, action levels and regulations are summed up in only one paragraph. However, a more elaborate description is required in view of ICRP recommendations.

Radon studies are being carried out globally in the indoor environment of dwellings to assess the health hazard of radon and its daughters. The third section of the book focusses on this problem. The two articles by G. Jonsson describe the results of indoor radon and soil radon surveys carried out by him in Sweden. It is revealed by the author that radon does not behave like a faithful mistress. Its fluctuations in a house, nay, even in a room are quite transitory and complex. Experimental results are illustrated with diagrams to show diurnal and seasonal variations.

Radon risk estimates to the underground miners during the last century led eventually to the development of radon dosimetry and adoption of mitigation techniques. Radon induced cancer causes 20,000 deaths annually in USA according to an EPA survey. This chapter fails to impress and falls short of survey articles already written by various authors on this theme. Another chapter of this section focusses on high radon levels in nature. A comparative study is made of high level radiation areas worldwide and radon concentration levels in dwellings are also compared. Radon-induced health effects are discussed in the last chapter of this section. Again, it is based on studies carried out on miners. It is a well written qualitative description only and quantitative models on radon induced lung cancer are not incorporated or discussed.

"Applications in Earth Sciences" is the last section of the book and includes five chapters. Most of these techniques are at an early stage of development as claimed by the editors in their conclusion. It is quite

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fascinating that radon is identified as a useful precursor for earthquake prediction. The reviewer of this book has collected lot of data in N-W Himalaya over the last decade but earthquake prediction seems to elude him till this date. Radon and its role in geochemical and geophysical exploration is highlighted in the remaining chapters. Mapping of radon has been used to locate buried or hidden faults on volcanic sites. The technique of etched track detection is being used in mineral exploration. It is anticipated that location of oil and gas deposits may become possible by monitoring radon over probable sites. Another fascinating application of radon will be to locate geothermal energy sites keeping in view the dwindling energy sources of the world. All this and much else is described with fervour in the last section of the book.

After concluding remarks and future outlook (future is always uncertain, however), the editors have given an exhaustive glossary of terms used in the book. Considering the craze for radon surveys in soil, groundwater and indoor environment, I would highly recommend this book as a reference text for all those involved in radon surveys. I wish a cheaper paperback edition will also be published soon for university students in third world countries as radon has lot of potential for exploitation. I congratulate the editors and authors for their collaborative efforts in writing this book and the publishers for nice, flawless printing.

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