CHAPTER-6

SUMMARY AND CONCLUSIONS
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On the basis of investigations carried out during the present study following conclusions can be drawn:

➤ The PAEC (WL) and radon concentrations used in our calibration experiment are more than those normally found in the environment, except in some mines. However, the calibration results show that the relation is linear and hence the calibration graph can be extrapolated and also used for smaller concentrations. Nevertheless, it is essential to expose the detector for a longer time (2-3 months) so that a statistically significant number of tracks may be obtained. Further, a large area of the exposed detector should be scanned so that at least 300 to 500 track holes are counted.

➤ The calibration factor for the LR-115 type II plastic detector in BARE on card is found to be 625 T cm$^{-2}$ d$^{-1}$/WL with a relative SD of 18%. The calibration factor for a BARE detector on cup is 570 T cm$^{-2}$ d$^{-1}$/WL with a relative SD of 21%. These two values are very close to each other within one SD.

➤ The calibration factor for the LR-115 type II plastic detector inside the cup with a membrane is found to be 0.116 T cm$^{-2}$ d$^{-1}$ per (Bq m$^{-3}$) for radon only with a relative standard deviation of 11%.

➤ It is seen that the values of calibration factor for our LR-115 type II detector are slightly more than those reported by Ramachandran et. al., (1980). This difference
may be due to the use of different manufacturing batch and also due to differences in etching conditions. Hence, it is desirable to have detectors from each batch calibrated before using them for environmental radon measurements.

- Ventilation plays an important role in reducing indoor concentration of radon and its progeny.

- White washing or coating material on the walls reduces the indoor concentration of radon and its progeny. Oil paint reduces the value of PAEC more than 5.5 times.

- Flooring material also reduces the diffusion of radon into the dwelling. Mosaic flooring can reduce the value of PAEC by about 4 times.

- Thus by sealing the ground effectively by good quality flooring material and protecting the walls by good quality paint can provide cheap method of mitigating indoor radon in dwellings.

- There is an effect of air drought in increasing the signal of radon and its progeny.

- There is a variation of PAEC during the different months of the year. The value of PAEC is maximum during winter season and it is minimum during summer season. The average of the values of PAEC during winter and summer seasons is equal to that during the monsoon season. Hence it is desirable that measurements are made during the monsoon season in order to give a long term representative value of PAEC to calculate the annual effective dose-equivalent received by the general public.
- The value of PAEC is found to be less on the first floor as compared to the value of PAEC on the ground floor suggesting that there is a positive contribution of ground surface in the enhancement of indoor radon and its progeny concentration through diffusion as a 'soil gas'.

- Burning of coal results in the enhancement of radioactivity in the atmosphere.

- Among the cities studied for the concentration of radon and its progeny, Saharanpur is found to have the maximum mean value (11.5 mWL) of PAEC. Other cities have values ranging from 5.9 to 7.2 mWL. Further investigations of soil samples of Saharanpur are required.

- Among the building materials the effective radium contents is maximum for fine aggregate and minimum for portland cement.

- Fly ash samples collected from two different power stations exhibit different mass and surface radon exhalation rates.

- The value of effective radium content in fertilizers varies from brand to brand. Within the same brand it varies from manufacturer to manufacturer.

- The phosphate fertilizer has the maximum value of effective radium content.

- Application of fertilizers to the field enhances the effective radium content of the soil.

- The effective radium content of the soil samples collected from a barren land is about 3 times smaller than the value of effective radium content of the soil samples collected from a crop field.
The vertical profile of the effective radium content of soil samples collected from different depths does not show any definite pattern. However, it seems that the value of effective radium content decreases as we go downwards because the value of radium at 14 feet depth is about 2.4 times lower than the value found at the surface.