In this issue

Ubiquitous radon

Nuclear energy is generally associated in our minds with atomic bombs and the Chernobyl reactor accident. However, the record of safety over the last four decades in the varied applications of nuclear energy — power production, medicine, industry, or research — from which mankind is reaping enormous benefits, has been exemplary.

To keep a sense of perspective, we must bear in mind that everyone of us is subjected to exposure from the natural background radiation arising from cosmic rays, radioactivity in soil and building materials, as well as in our body. The average annual dose for the world population is about 2.4 mSv per capita, but it can be extremely variable, depending on a variety of factors. The average annual dose from man-made radiation to an occupational worker is of the same order as the average natural background dose (the permissible dose is 10 times greater), while for a member of the public it is hardly 0.5% of the same.

It is only during the last two decades or so that we have come to realize that over half of the total effective dose from natural background radiation comes from the inhalation of the naturally present and ubiquitous radon, thoron and their daughter products. In many countries (including Norway, Finland and Sweden) there are substantial populations who receive doses from this natural source which are much higher than would be permitted in occupational exposure. Several international scientific bodies are therefore devoting considerable attention to the problem.

A. Nagaratnam (**page 194**) reviews the occurrence of radon and daughters in the outdoor and indoor environment, their behaviour, the doses received from them, and the risk of lung cancer as a result of such exposures. Special attention is given to the situation in our country. The author concludes that indoor radon exposure is *not* a significant health risk in India.

Single-bubble sonoluminescence

Sonoluminescence (SL) is the phenomenon of light emission from cavitation fields. When a liquid sample is irradiated with high intensity ultra sound, gas/vapour bubbles grow and collapse, resulting in ultrasonic cavitation. The motion of such bubbles is highly nonlinear with collapse phase being a violent one. In this process energy amplification of eleven orders of magnitude can occur resulting in the potential for light emission. In recent experiments it has been possible to trap a single bubble in a resonant sound field and make it to emit light continuously. Thus, a light emitting bubble (LEB) has been discovered. The radiation from an LEB has shown some extraordinary physical properties. LEB emits light in highly synchronous flashes, whose duration has been estimated to be about 50 picoseconds. The peak powers have been measured to be in excess of 30 milliwatts. The spectrum of this light has been found to be broadband with high energy content in the ultraviolet. Black body fit to the spectra suggest bubble temperatures of in excess of 50,000 K. The extremely controlled conditions of LEB have enabled accurate determination of radius versus time history of highly nonlinearly oscillating gas bubbles. This will enable accelerated development of theoretical models to explain this interesting phenomenon. Such development will find use in explaining and controlling chemical reactions triggered by ultrasound; similarly, the exact nature of violent collapse is of interest in assessing damage to human tissue and cell during ultrasound diagnostics. Finally, there is a scope for developing LEB into a picosecond broadband light source with practical utility. Vijay H. Arakeri (**page 213**) reviews advances that have taken place in this field.