References

- Kumar Vimal, Singh Gulab, Rai Rajendra, 2005, Fly ash: A material for another green revolution, fly ash India, New Delhi.

• Lenntech, 2004, Water Treatment and Air Purification , Water Treatment, Published by Lenntech, Rotterdamseweg, Netherlands (www.excelwater.com/thp/filters/Water-Purification.htm).


• NJDEP, 1996, Soil Cleanup Criteria, New Jersey Department of Environmental Protection, Proposed Cleanup Standards for Contaminated Sites, NJAC 7:26D.

• Page A L, Elseewi A A & Straughan A R, 1979, physical and chemical properties of fly ash from coal fired power plants with reference to environmental impacts, Residue Rev, 71, 83-120.


- Thomas G. Chasteen, 2000, Department of Chemistry, Sam Houston State University, Huntsville, Texas 77341. Copyright 2000.
Aim of Present Investigation & Future Perspective

Natural radioactivity in the environment and its causing agents are drawing the attention of world community and are of importance due to the toxicity and the cause of lung cancer. The risk of lung cancer in miners, working in uranium mines is known for a long time and has been related to radon exposure. Thus study of natural radioactivity ($^{226}\text{Ra}$, $^{232}\text{Th}$ and $^{40}\text{K}$), radon and its daughters, (radon exhalation) is important for radiation risk assessment and felt necessary to measure the natural environmental radiation levels to have the base line for dose limit of public exposure. The potential hazard of radiation exposures to radon gas and its solid daughter products from natural background has been highlighted and has become a matter of concern. Environmental Protection Agency (EPA) and National Commission on Radiation Protection and Measurements, USA have issued guidelines. International Commission on Radiation Protection (ICRP) has put up a limit for radiation exposure.

This thesis elaborates the details of experiments conducted, instruments used and analysis of results in the present study. A coaxial n-type HPGe detector (EG&G, ORTEC, Oak Ridge, USA) at Inter-University Accelerator Centre, New Delhi (India) were used for the estimation of $^{226}\text{Ra}$, $^{232}\text{Th}$ and $^{40}\text{K}$ concentration ($C_{\text{Ra}}$, $C_{\text{Th}}$ and $C_{\text{K}}$) in the fly ash, soil and other samples. Radon exhalation rate is of prime importance for the estimation of radiation risk from various materials. “Sealed Can Technique” was adopted for radon exhalation rate measurements in fly ash, soil, and other building construction materials used in our country. The application of track detectors to the microanalysis of uranium in samples such as soil, building materials, rocks, water, plants etc. and to measure radon and its daughter products in indoor and outer environment is important for finding the source and to find ways to reduce them.

Recently various waste materials produced by power plants, chemical and metallurgical industry are being commonly used as building materials. Some recent practices are to use fly ash (waste product from thermal power plant) to produce Portland Pozzlan cement and in the production of bricks; to use phospogypsum (a by-
product of rock phosphate processing industry) in place of natural gypsum or calcium carbonate during manufacture of cement. Some of these waste products (furnace slag, fly ash and by product gypsum etc.) contain appreciable amount of natural radionuclides from uranium and thorium series. The indiscriminate use of waste material may thus cause enhancement of indoor radiation exposure and may be potential radiation hazards to the population. Radon data in developed countries is being collected since decades due to its implication in causing lung cancer. But India lacks in having systematic data and our efforts are in this direction. We plan to carry out systematic measurements in our state, neighbouring states for the measurement of total risk to human beings.

Another important part of this thesis is the measurement of heavy elements from the samples under investigation. Human beings are also exposed to heavy metals through inhalation of air pollutants, consumption of contaminated drinking water, exposure to contaminated soils or industrial waste, or consumption of contaminated food. Food sources such as vegetables, grains, fruits, fish and shellfish can become contaminated by accumulating metals from surrounding soil and water. Heavy metal exposure causes serious health effects, including reduced growth and development, cancer, organ damage, nervous system damage, and in extreme cases, death. Atomic absorption spectrometry is used for the detection of heavy element contamination.