

CHAPTER: 12

THE STUDY OF THE RADON, THORON LEVEL CONCENTRATION IN AND AROUND THE THERMAL POWER PLANT

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Abstract

Solid State Nuclear Track Detector (SSNTD) is used to determine the Radon, Thoron and its progeny concentration. Dosimeters are suspended indoor at the height of 2.5m from the ground surface. Radon, Thoron and its progeny concentration around the thermal power plant and steel plant dwellings near Bellary of Bellary District is noticed above the average level the value. The value of concentrations of radon and thoron in the area study varies from 111.7 Bqm⁻³ to 467 .3 Bqm⁻³ and 16 to 510 Bqm⁻³ respectively. This is because the main source of radon is burning of coal. Fly ash contains higher radioactive radon nuclides. Radioactive Radon gas causes lung cancer. According to WHO and EPA studies radon is the second largest causes lung cancer after smoking. The main study is to estimate the indoor inhalation dose radon, thoron and their progeny around the thermal power plant and steel plant indoor dwellings.

Key Words: Randon, Thoron, x-Rays, Thermal Power Plant, etc

Introduction

The effect of radiation on human beings is the matter of public interest, such as radiation found in the nature in the cosmic rays and arises from radioactive elements in the nature in the cosmic rays and arises from radioactive elements in the earth crust. Radiation associated with some human activities like using x rays radio nuclides in medicines and in industries also contributes. Many surveys on terrestrial gamma

radiation indoors and outdoor environment have been under taken by different countries.^{1,2,3,4} there are several isotopes of radon attention are normally focused on ²²²Rn Because it relatively long half-life (3.8days) and ²²⁰Rn (thoron half-life one minute). ²²⁰Rn is one of the most pervasive and indoor air concerns.

Particularly out serve area is inhalation of radon thoron and their progeny in working places in and around the thermal power plant of Bellary, Bellary dist. In thermal power plant burning coal which is produced Fly ash and it contains higher activity of radio nuclides. That flies ash used as building materials such as bricks, cement, sheets and land fillings etc. Many surveys on terrestrial gamma radiation indoors and out door environment have been under taken by different countries. Some survey says FA contains up to 10 times concentrated level of Uranium and Thorium compared to unburned coal. The knowledge of radio nuclides FA place in important role in health physics hence the main objective of the present study is to estimate the inhalation dose of radon, thoron and their progeny about workers and publics around the thermal power plant.

In addition to guide decision makers in solving some natural problem which may found anywhere in the world.

Methodology:

Radon, thoron and their progeny concentration in and around the working places of thermal power plant was measured using solid state nuclear detectors. The estimation of inhalation dose in mSvy⁻¹ may be provided using formula⁵.

$$D (\text{mSvy}^{-1}) = \{(0.17+9F_R)C_R + (0.11+32F_T)C_T\} \times 7000 \times 10^{-6}$$

Where F_R and F_T are the equilibrium factors for radon and thoron progeny respectively. Corresponding to the extracted ventilation rate.

Results and discussion:

The average concentrations of radon and its progeny in indoors and out door atmosphere around the thermal power plant were measured by SSNTD technique. The results are summarized in the table 1.

Table - 1: Average concentration of radon and its progeny.

Location and type of buildings	Indoor concentration		Outdoor concentration		Equaling effective dose (mSvy ⁻¹)
	²²² Rn Bqm ⁻³)	²²² Rd (mWL)	²²² Rn Bqm ⁻³)	²²² Rd (mWL)	
1 .Kudutini	60.8	0.68	25	0.35	1.6
a) Zink sheet building F- Kadapa					1.18
b) Concrete house F- Kadapa	45	8.59			1.2
c) Kadapa house F- Tiles	49	9.4			
1 . Thimlapura					
a)Asbestos sheet house F Kadapa	95	3.2			2.5
b) Kadapa house F- Tiles	174.9	4.3	42.5	2.6	4.50
c) Kadapa house F- Kadapa	111.7	0.4			2.9
2. Hosa daroji	467.6	40.9	150.6		12.32
a) kadapa house F- Kadapa					
b) Hut F- bare flooring	350	25	150.6		9.23

The data from the table shows that indoor radon and its progeny concentration is higher than outdoor concentration. The average indoor radon and the progeny concentration is different dwellings vary from 45 Bqm⁻³ 467 Bqm⁻³ with a median of 256 Bqm⁻³ and corresponding progeny vary from 0.4 mWL to 9.4 mWL with a median 4.9 mWL.

The outdoor Rn and its progeny concentration vary from 25 Bqm⁻³ to 150.6 Bqm⁻³with median of 87.5 Bqm⁻³ and corresponding progeny vary from 0.352 mWL to 6.8 mWL with a median 6.57 mWL

Higher concentration of ^{222}Rn and its progeny were observed in indoor and outdoor concentration at hosadaroji. This place is very near to thermal power plant and it lies between thermal power plant and jindal steel plant and also surrounding by hillocks. The Fly Ash is produced by thermal power plant is spread over entire area and some amount of Fly ash also deposited at this place. The FA contains higher activity of radio nuclides.

About the reasons we observed higher concentration of radon at this place. Lower concentration of ^{222}Rn and its progeny were observed Kudutini place because it is away from the thermal power plant and it is not surrounded by the hillocks. The concentration of ^{222}Rn at Thimmalapura is slightly less compare to hosadaroji because it is for away from jindal Steel plant so here concentration of ^{222}Rn is only by the thermal power plant.

Conclusions:

1. Higher concentration of ^{222}Rn and its progeny were observing at near thermal power plant.
2. Indore ^{222}Rn its progeny concentration is more compare to our door
3. Spreading of Fly Ash is main reason for increasing of ^{222}Rn and its progeny concentration
4. The concentration of ^{222}Rn and its progeny and inhalation dose due to these gases is higher than the global average.

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