

Diurnal and Daily Variations of Indoor Radon Concentration in Malaysia

By:

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Abstract

Hourly variation in radon concentration in the bed room of a house was measured for three months. The radon concentration was found to vary throughout the day with a peak at about 6.00 am and a minimum at about 6.00 pm. The daily average varies from 0.3 to 1.3 pCi/l. This ranges is about the same as other works done in tropical countries. No seasonal variation was found.

1. Introduction

Radon is the sole gaseous radioactive element in the natural decay series. The most common and with the longest half-life (3.82 days) is ^{222}Rn . It decays from ^{226}Ra in the uranium series. Since it is radioactive, it does pose a radiation hazard and need to be monitored. It has been shown that more than 50 % of the dose from natural radiation received by human, comes from radon [1].

Being inert, it can easily diffuse out from the soil. Radon in the atmosphere can eventually get into buildings and contaminate the indoor environment. Beside emanating from the soil,

another source of radon is building material originating from the soil such as bricks, concrete and tiles. Radon emanating from the walls, floor and ceiling would increase the radon concentration in a room, especially those with limited air exchange with the outdoor air. Environmental conditions such as temperature and pressure could also influence the indoor radon concentration.

It would be useful to know how the indoor radon concentration varies with time throughout the day and compare it with the time when the room is occupied. For example, office and bedroom are occupied at different time of the day. This would help in the decision to decide whether remedial action need to be done.

2. Measurement

The room chosen for this study is a bedroom on the top floor of a two-storey link house. The walls are constructed with bricks and cement plaster. This is a common type of construction for residential units in Malaysia.

The indoor concentration were measured using an active radon monitor that gives hourly

readings. Detection is based on the alpha decay of radon detected by a surface barrier detector. The measurement was done during the months of February, March and April 2007.

3. Results

The hourly variation of the radon concentration in the test room for the three months of measurements, is shown in figure 1.

There is a maximum (at about 6.00 am) and a minimum (at about 6.00 pm) radon

concentration for each day. Initially, it was suspected that this was due to the windows being closed at night. Further testing shows that there is no differences between the windows being closed or opened.

There is no significant differences in radon concentration for the three months, as shown in Figure 1. There seems to be no seasonal influence in the radon concentration. This is also shown in Figure 2, which is the daily average radon concentration. More measurements need to be done to confirm this fact.

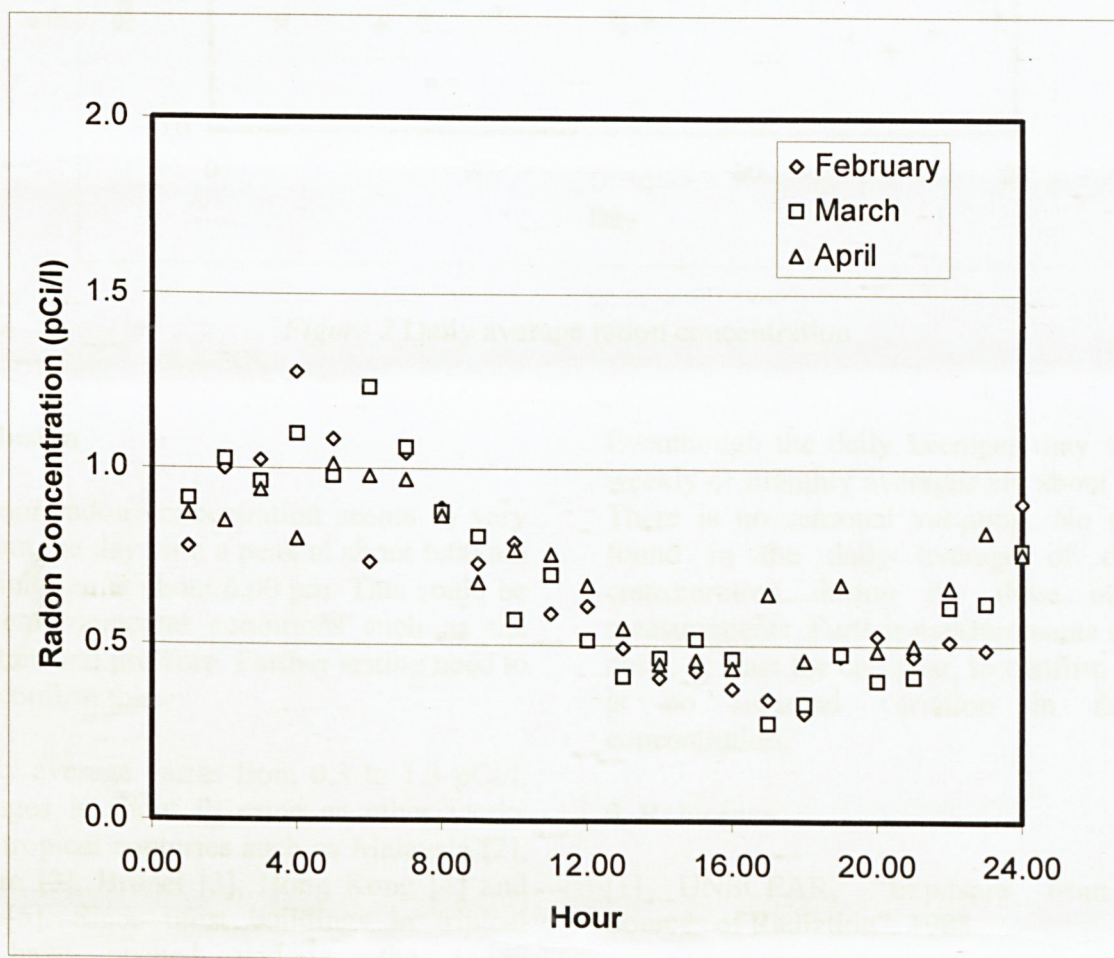


Figure 1 Diurnal variation in indoor radon concentration

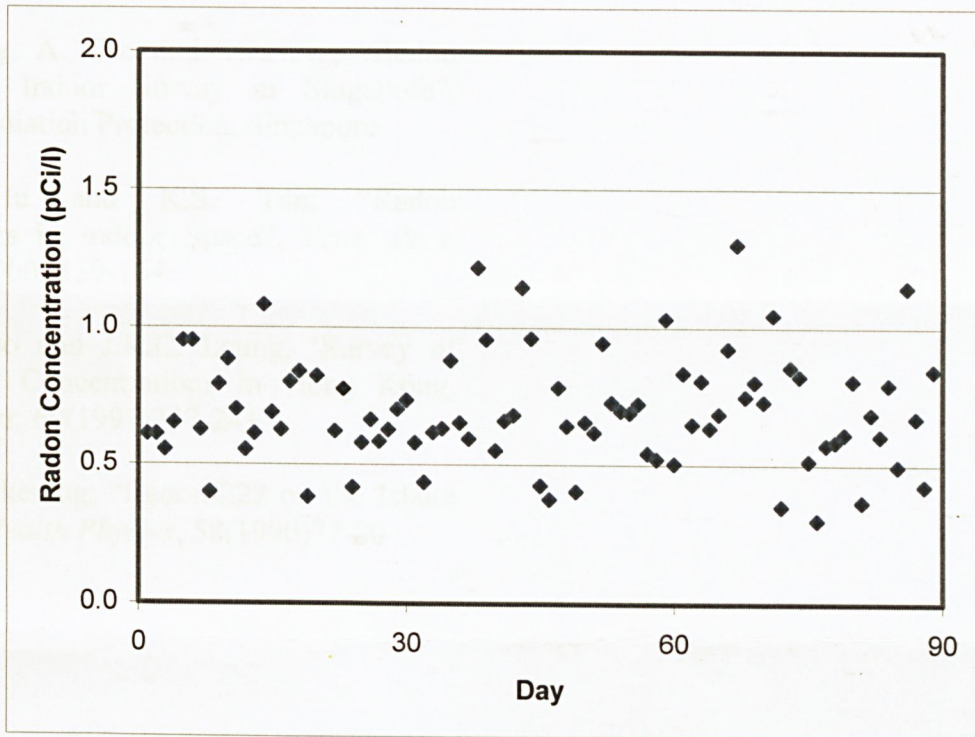


Figure 2 Daily average radon concentration

4. Conclusion

The indoor radon concentration seems to vary throughout the day with a peak at about 6.00 am and a minimum at about 6.00 pm. This could be due to environmental conditions such as the temperature and pressure. Further testing need to be done to confirm this.

The daily average varies from 0.3 to 1.3 pCi/l. This range is about the same as other works done in tropical countries such as Malaysia [2], Singapore [3], Brunei [3], Hong Kong [4] and Hawaii [5]. Since most buildings in tropical region have opened windows, the radon concentration can be expected to be low.

Eventhough the daily averages may vary, the weekly or monthly averages are about the same. There is no seasonal variation. No trend was found in the daily average of the radon concentration during the three months of measurements. Further measurements need to be done, at least for one year, to confirm that there is no seasonal variation in the radon concentration.

5. Reference

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