

## A Comparative Study of Indoor Radon Concentrations between Dwellings and Workplaces in the Ko Samui District, Surat Thani Province, Southern Thailand

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**Abstract :** The Ko Samui district of Surat Thani province is located in the high amounts of equivalent uranium in the ground surface that is the source of radon. Our research in the Ko Samui district aimed at comparing the indoor radon concentrations between dwellings and workplaces. Measurements of indoor radon concentrations were carried out in 46 dwellings and 127 workplaces, using CR-39 alpha-track detectors in closed-cup. A total of 173 detectors were distributed in 7 sub-districts. The detectors were placed in bedrooms of dwellings and workrooms of workplaces. All detectors were exposed to airborne radon for 90 days. After exposure, the alpha tracks were made visible by chemical etching before they were manually counted under an optical microscope. The track densities were assumed to be correlated with the radon concentration levels. We found that the radon concentrations could be well described by a log-normal distribution. Most concentrations (37%) were found in the range between 16 and 30 Bq.m<sup>-3</sup>. The radon concentrations in dwellings and workplaces varied from a minimum of 11 Bq.m<sup>-3</sup> to a maximum of 305 Bq.m<sup>-3</sup>. The minimum (11 Bq.m<sup>-3</sup>) and maximum (305 Bq.m<sup>-3</sup>) values of indoor radon concentrations were found in a workplace and a dwelling, respectively. Only for four samples (3%), the indoor radon concentrations were found to be higher than the reference level recommended by the WHO (100 Bq.m<sup>-3</sup>). The overall geometric mean in the surveyed area was  $32.6 \pm 1.65$  Bq.m<sup>-3</sup>, which was lower than the worldwide average (39 Bq.m<sup>-3</sup>). The statistic comparison of the geometric mean indoor radon concentrations between dwellings and workplaces showed that the geometric mean in dwellings ( $46.0 \pm 1.55$  Bq.m<sup>-3</sup>) was significantly higher than in workplaces ( $28.8 \pm 1.58$  Bq.m<sup>-3</sup>) at the 0.05 level. Moreover, our study found that the majority of the bedrooms in dwellings had a closed atmosphere, resulting in poorer ventilation than in most of the workplaces that had access to air flow through open doors and windows at daytime. We consider this to be the main reason for the higher geometric mean indoor radon concentration in dwellings compared to workplaces.

**Keywords :** CR-39 detector, indoor radon, radon in dwelling, radon in workplace

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