DETERMINATION OF RADON-222 CONCENTRATION AND EMANATION RATE OF SOIL FROM TASIK PAYA BUNGOR, GAMBANG USING SOLID STATE NUCLEAR TRACK DETECTOR (SSNTD)

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ABSTRACT

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Since the decay of radon and its progenies contribute to 50% of naturally occurring radioactive materials and is the second leading cause of lung cancer, an assessment on the radiological risk in the perimeter of Paya Bungor lake, Gambang was carried out using Solid State Nuclear Track Detector (SSNTD) to evaluate the radon concentration and emanation rate of the area. A type of SSNTD, CR-39 was used, where it was exposed to be irradiated by alpha radiations for a month until retrieval. Etching process was done on the CR-39 using 6.0 M NaOH solution for 6 hours at 70 °C after retrieval to enhance the radon tracks left on the CR-39 which was then its density can be counted under optical microscope. From the radon track density, radon concentration and its emanation rate are calculated. The radon concentration in the area yields the average value of 27.47±2.77 Bq m^{-3} that ranges from 7.37 Bq m^{-3} to 63.09 Bq m^{-3}. While for radon emanation rate, the value obtained in this study has the average value of 0.51±0.051 Bq m^{-3} day^{-1}, with the range of 0.14 - 1.17 Bq m^{-3} day^{-1}. On the other hand, the value of the annual effective dose rate in the area is 0.261±2.77 mSv per year with the range value of 0.070 – 0.600 mSv per year. All of the values are quite low and does not exceed the world limit of radon concentration, radon emanation rate and annual effective dose rate recommended by UNSCEAR which is 200 Bq m^{-3}, 3.43 Bq m^{-3} day^{-1}, and 1.00 mSv per year respectively. Thus it can be concluded that the area is still safe for agriculture and plantation of future use. Other than that, a radiological risk distribution was assessed using isodose map to illustrate and to have an overview on the highest and lowest value of radon concentration, radon emanation rate and its annual effective dose rate in the map.

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