

Radon and Thoron Determination in Natural Ancient Mine Using Nuclear Track Detectors: Radiation Dose Assessment

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Abstract : Radon (and thoron) is a naturally occurring radioactive noble gas, having variable distribution in the geological environment. The exposure of human beings to ionizing radiation from natural sources is a continuing and inescapable feature of life on earth. Radon, thoron and their short-lived decay products in the atmosphere are the most important contributors to human exposure from natural sources. The aim of this study is to determine alpha-and beta-activities per unit volume of air due to radon (^{222}Rn), thoron (^{220}Rn) and their progenies in the air of ancient mine of Aouli in which there is no working activity is situated at approximately 25 km north of the city of Midelt (Morocco), by using LR-115 type II and CR-39 solid state nuclear track detectors (SSNTDs). Equilibrium factors between radon and its daughters and between thoron and its progeny were evaluated in the studied atmospheres. The committed equivalent doses due to the ^{218}Po and ^{214}Po radon short-lived progeny were evaluated in different tissues of the respiratory tract of the visitors of the considered ancient mine. The visitors in these mines spent a good amount of time. It was essential to let the staff know about these values and take the needed steps to prevent any health complications.

Keywords : radon, thoron, concentration, exposure dose, SSNTD, mine

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