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Good RAD7 performance for high radon levels

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Abstract

A good performance of six RAD7 electronic devices was confirmed for detecting a wide range of Radon concentrations (32 to 280,000) Bq m⁻³, in air, soil and water. Two types of experiments were performed. Firstly the RAD7 detectors were tested in the laboratory using a high radon source from a confined uranium mineral inside a small sealed container, from which radon is diluted to other experimental chambers of different sizes. Evaluation of each radon concentration in the experimental chambers is achieved by means of a Ge (Hp) detector. In accordance with the reported sensitivity by the manufacturer of 0.4 cpm/PCi/L, a general expression was derived which permits to set criteria for choosing the expected counting errors in terms of time-counting intervals and radon concentrations. Secondly, the RAD7 performance was successful tested in a uranium mine under high environmental properties; where radon concentrations in air was up to 93 kBq m⁻³ and up to 285 kBq m⁻³ in soil. Short time-counting intervals of 5 minutes were chosen because the relative humidity inside the detector nearly reached values above 20% that may reduces the efficiency of the detector and increase the risk of damage it; temperature was also extreme slightly above 40 °C.

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