

EXTERNAL EXPOSURE DUE TO PHOSPHOGYPSUM PLATES USED AS BUILDING MATERIAL

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Phosphogypsum is a by-product of processing phosphate ore into fertilizer with sulfuric acid. Brazilian annual production of phosphogypsum reaches 5.4 million tons. The recycling of the phosphogypsum waste is very important from the social-economic point of view and also regarding environmental preservation. Until now it is produced in large amounts and there is no adequate final destination in agreement with the demands of the environmental legislation in force. Nevertheless, one of the possible uses of phosphogypsum is as building material. This by-product can contain naturally occurring radionuclides, particularly ^{40}K and gamma emitters comprised in the uranium and thorium series; hence its use as a building material has radiological implications. In order to assess the feasibility of the use of a building material mainly constituted by phosphogypsum, an experimental house was built with phosphogypsum plates. The aim of this study is to assess the external exposure for residents at a house constructed with phosphogypsum plates. Samples of this material were analyzed by high resolution gamma spectrometry for their ^{226}Ra , ^{232}Th , ^{210}Pb and ^{40}K activity concentration. The radium equivalent activity and external and internal hazard indices were also calculated. The activity concentrations results varied from 15.9 to 392 $\text{Bq}\cdot\text{kg}^{-1}$ for ^{226}Ra , 26.1 to 253 $\text{Bq}\cdot\text{kg}^{-1}$ for ^{232}Th , and 27.4 to 852 $\text{Bq}\cdot\text{kg}^{-1}$ for ^{210}Pb . The results of ^{40}K were lower than 81 $\text{Bq}\cdot\text{kg}^{-1}$. Radium equivalent activity results varied from 55.8 to 759 $\text{Bq}\cdot\text{kg}^{-1}$. Both external and internal hazard indices were above the recommended limit from the United Nation Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) for exposure due to conventional building materials.