

International Conference on the Management of Naturally Occurring Radioactive Materials (NORM) in Industry



Contribution ID: 234

Type: **not specified**

Preliminary NORM study in phosphate industry in Mexico: uranium series activity concentrations

All minerals and raw materials contain radionuclides of natural origin. The most important of them for purpose of radiation protection are the radionuclides in the ^{238}U and ^{232}Th decay series and ^{40}K . Moreover, the activity concentrations vary considerably, according to the type of material and industrial activity in which they are used. For example, the phosphate rock used as raw material in the phosphate industry presents in its composition radionuclides of the U and Th natural series. The Mexican phosphate fertilizer is obtained by a wet reaction of igneous phosphate rock with concentrated sulphuric acid, giving as final product phosphoric acid, and dehydrated calcium sulphate as by-products. To characterize the radiological impact at different stages in the phosphate fertilizer production, in this study, samples of products in each stage were collected from a phosphate industry installation in San Juan de la Costa, BCS, Mexico. The samples analyzed consisted of raw material, concentrated product, and waste. The samples were radiologically characterized by gamma spectrometry and X-ray fluorescence techniques, in order to estimate their content of radioactivity and metal concentration. The measurements showed low activity concentrations of ^{226}Ra and ^{228}Ra . Also, the ^{238}U radionuclide concentrations found in the samples of raw material and concentrated phosphate product are more significant, 797 Bq/kg and 1197 Bq/kg, respectively, but they were always within the range reported worldwide.

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Session Classification: Session IV - Characterization in Industrial Facilities and in the Environment

Track Classification: NORM Characterization, Measurement, Decontamination