

Activity concentration of natural radionuclides (^{238}U , ^{226}Ra , ^{232}Th , ^{228}Ra , ^{210}Pb and ^{40}K) in soil amended with niobium tailings

R. M. Ayllon¹, J. K. Torrecilla¹, C.R. Saueia¹, M.B. Nisti¹, T. M. El Hajj², Furlan³ M. R., P. S. C. Silva¹

¹Instituto de Pesquisas Energéticas e Nucleares (IPEN – CNEN/SP). Av. Professor Lineu Prestes 2242, 05508-000 - São Paulo, Brasil. E-mail: rafaellayllon@gmail.br

²Universidade Federal de Alfenas (UNIFAL-MG), Rodovia José Aurélio Vilela, 11999, Poços de Caldas, Brazil

³Universidade de Taubaté (UNITAU – SP), Rua Quatro de Março, 432, 12020-270, São Paulo, SP, Brazil

Keywords: Environmental radionuclides, NORM, gamma spectrometry, soil analysis

The storage of tailing from anthropic activities like mining, which may contain radionuclide traces, is a problematic situation consequent from NORM industries activities and for which they seek alternatives. The study presented in this paper is related to carbonate deriving from niobium extraction. This carbonate is stored in dams, which can cause an increase in radionuclides and metals concentration, imposing restrictions on its use. To ensure the safe usage of the residue, it is assessed the activity concentration of ^{238}U , ^{226}Ra , ^{232}Th , ^{228}Ra , ^{210}Pb and ^{40}K in soil samples as well as mixture soil + carbonate, soil + carbonate + lime, soil + lime and soil. The techniques used were *gamma spectrometry* and *instrumental neutron activation analysis*. Activity concentration evaluation was performed before and after the tillage of lettuce (*Lactuca sativa*) and bean (*Phaseolus vulgaris*), and the soil-plant transfer factor was determined for lettuce. The study of radionuclides and metals availability in the soil solution is important for a better understanding of the mobility of contaminants in water/soil systems, in order to estimate the real environmental impact. Preliminary results show samples with niobium traces presented values within the recommended world values.