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Origins of ^{137}Cs and ^{133}Xe in Soils from two Campuses in University of Douala-Cameroon

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This paper presents an evaluation of ^{238}U , ^{235}U , ^{137}Cs and ^{133}Xe in soils from two campuses in university of Douala-Cameroon using gamma spectroscopy based Broad Energy Germanium Detector (BEGe6530). The mean activity of ^{238}U , ^{235}U , ^{137}Cs and ^{133}Xe in soils from two campuses in university of Douala-Cameroon were 40.16 ± 8.98 , 3.39 ± 0.33 , 0.46 ± 0.33 and 0.14 ± 0.16 Bq/kg for Campus 1; and 31.45 ± 12.24 , 3.02 ± 1.00 , 0.30 ± 0.26 and 0.35 ± 0.24 Bq/kg for Campus 2, respectively. In terms of health scrutiny, the absorbed dose rate in air at 1.0m above the ground was measured using an In situ survey meter and the annual effective dose was calculated. The mean values of the absorbed dose rate were 71.43 nGy/hr and 62.72 nGy/hr for Campus 1 and 2, respectively. The estimated average of the outdoor effective dose for Campus 1 and 2 were 87.60 $\mu\text{Sv/y}$ and 76.93 $\mu\text{Sv/y}$, respectively. The results obtained in both sites were found to be relatively high than the save limit of 70 $\mu\text{Sv/y}$ by UNSCEAR. The observed traces of ^{137}Cs and ^{133}Xe in the studied samples call for future investigation to seek for the origin of these radionuclides.

The National Radiation Protection Agency (NRPA) within the activities planned in the Cameroon INSSP: "Establish and maintain national capability to provide technical support to front line detection capabilities and to categorize and characterize suspected radioactive material" will carry out investigations, considering that the radioactivity from the fallout nuclear tests since 1986 in the Sahara reached as far as West Africa (Nigeria) and the Central African Republic to the south. More than 210 nuclear tests were carried out in North Africa between 1960 and 1996. However, no research has been carried out in Cameroon in this domain after the Chernobyl catastrophe in 1986 and the Fukushima accident in 2011.

Keywords: Radioactivity, radionuclide, soil, Broad Energy Germanium Detector, effective dose, nuclear Fallout

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