ELEMENTAL AND RADIOLOGICAL CHARACTERIZATION OF FLOODED SOIL OF KUDENDA, KADUNA STATE. NIGERIA.

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DECLARATION

I declare that the work in this thesis titledElemental and Radiological characterization of flooded soil of Kudenda, Kaduna State. Nigeria hasbeen carried out by me in the Department of Physics. The information derived from the literature has been duly acknowledged in the text and list of references provided. No part of this thesis was previously presented for another degree at this or any other institution.

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CERTIFICATION

This thesis titled ELEMENTAL AND RADIOLOGICAL CHARACTERIZATION OF FLOODED SOIL OF KUDENDA, KADUNA STATE. NIGERIA by MUNIRAT BASHIR meets the regulations governing the award of Master'sDegree in Radiation Biophysics of physics department of Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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ABSTRACT

A survey of flooded soil of Kudenda area located at latitude 10.480^0N and 10.481^0N and longitude 7.394^0E and 7.395^0E in Kaduna State, Nigeria was conducted, in situ measurement and samples were taken in each of the grid area at depth 0-<5, 5-<25, 25-<50, 50-100cm.Composition and distribution of elements (As, Cr, Cu, Fe, Mn, Ni and Zn) were determined using Energy Dispersive X-Ray Fluorescence (EDXRF). The Pollution Load Index (PLI) being a measure of contamination factor by all the metals was found to be high but decreased (1.27-0.96) with increase in depth (0-100cm) even though the concentration of the metals increased with depth (25-<50cm) before decreasing indicating that the study area was polluted by all the observed heavy metals (PLI>1).Also, the activity concentrations of naturally occurring radioactive materials in the ^{238}U (^{226}Ra) and ^{232}Th decay chains and from ^{40}K were determined by means of a gamma-ray spectrometry system using Sodium Iodide thallium activated (NaI(Tl)) detector. The ranges of activity concentrations of ^{238}U, ^{232}Th and ^{40}K were found to be 8.1±3.6 to 45±4.4, 38±1.3 to 149.6±3.9 and 400.5±3.9 to 873.7±11.6Bqkg^{-1}, respectively. The results of this current study have been compared with the world mean values of 35, 30 and 400 Bq.kg^{-1}, respectively, specified by the UNSCEAR (2000). The absorbed gamma dose rate (*D*) in air at 1 metre above the ground surface was estimated to lie in the range 47.4±2.2 to 141.2±4.4nGy.h^{-1}; the outdoor annual effective dose equivalent (*AEDE*) was evaluated to vary from 0.06±0.003 to 0.17±0.005mSv.y^{-1}, which is higher than the worldwide effective dose of 0.07mSv.y^{-1}. Also, the values of the $Ra_{eq}$and the $H_{ex}$for all soil samples in the present work are lower than the accepted safety limit value of 370 Bq.kg^{-1} and below the limit of unity, respectively. The results indicate that the radiation hazard from primordial

radionuclides in all soil samples from the area studied is not significant but might add additional risk since no dose is safe in radiation protection.

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