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# NATURAL RADIOACTIVITY CONTENT AND DOSE ASSESSMENT IN A "BLACK SPOT" SAND NON-STUDIED NEW LOCATION IN ESPÍRITO SANTO STATE, BRAZIL

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The main external source of irradiation to the human body are the naturally occurring radioactive elements in soils and rocks, namely $^{40}$K and the radionuclides from the $^{238}$U and $^{232}$Th series, so external gamma dose estimation due to the terrestrial sources is essential. In Brazil, the sands from Espirito Santo State are well-known for the high content of natural radioactivity. In a previous work, the authors determined natural radionuclides concentrations in several sands from Great Vitoria Region. Further, a new unstudied location was found, approximately 50 km farwell of "Areia Preta" Beach in Guarapari municipality. The location is called "Black Spot", in reference for its very high natural radioactivity. The New Black Spot is located in one of the islands of the archipelago of Vitória, namely Ilha do Frade Island. The studied sands are constituted mainly by minerals as ilmenite, rutile, zircon and monazite, sources of $^{238}$U and $^{232}$Th among others rare earth and sands of the silica group. Superficial black sand samples of approximately 1kg were collected at several locations throughout the "Ilha do Frade" island. The samples were dried and sealed in standard 100-mL HDPE polyethylene flasks and stored in order to obtain secular equilibrium in the $^{238}$U and $^{232}$Th series. All samples were measured by high resolution gamma spectrometry after a 30-days ingrowth period. Preliminary results show major concentrations for this site reaching $3200 \pm 200$ Bq.kg$^{-1}$ for $^{226}$Ra, $20000 \pm 1300$ Bq.kg$^{-1}$ for $^{232}$Th and $2000 \pm 200$ Bq.kg$^{-1}$ for $^{40}$K. For these concentrations, the radium equivalent is $30000 \pm 1400$ Bq.kg$^{-1}$. The calculated external and internal hazard indexes are, respectively, $86 \pm 13$ and $94 \pm 14$ and the dose rate in air is 16.6 mSv.y$^{-1}$. All obtained values indicates that the New Black Spot sand has quite a very high content of the radionuclides $^{226}$Ra, $^{232}$Th and $^{40}$K.