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Hazard assessment due to intake of uranium contained in surface waters in a semi-arid region of Brazil

In Santa Quitéria city, part of the population uses surface water for human consumption. These waters do not undergo any treatment before consumption. As the region has a deposit of uranium, the assessment of water quality becomes an important issue. In the present study, the uranium activity concentration, (AC) in Bq/L, was determined by Arsenazo III method in water samples from six collection points. Univariate statistics showed differences between the soluble and the particulate fraction (soluble AC > particulate AC). The particulate fraction showed no variation in AC among the six points. On the other hand, the soluble fraction and the total fraction presented different AC between them. The multivariate statistics allowed to separate the soluble from the particulate fraction of the six sampling points, indicating that these tools allow differentiating the environmental behavior of the fractions. The same tools applied to the total fraction made it possible to differentiate the points, grouping them [(#1, #2); (#3, #4) and (#5, #6)]. The maximum mean value of AC found was 0.177 Bq/L, which corresponds to 25% of the chemical toxicity limit (0.72 Bq/L). The maximum mean dose rate, 2.25 $\mu\text{Sv/y}$, was three orders of magnitude lower than the limit value of dose for members of the public (1 mSv/y) and lower than the considered negligible dose rate (10 $\mu\text{Sv/y}$). The excess lifetime cancer risk was at the magnitude of 10^{-6} , two orders of magnitude smaller than the threshold considered for taking action. The assessment parameters used in this work indicate that the risk due to the uranium intake by the local population is negligible.

Primary author: Dr PEREIRA, Wagner (INB)

Co-authors: Dr SILVA, Ademir (UFRJ); Dr CARMO, Alessandro (CBPF); Dr KELECOM, Alphonse (UFF); Ms SCHENBERG, Ana (USP); Mr PY JÚNIOR, Delcy (INB); Ms CAMPELO, Emanuele (INB); LOPES, Jose (UFBA); Mr PADILHA FILHO, Lucas (UFRJ); Ms PEREIRA, Nádia (USP)

Presenter: Dr PEREIRA, Wagner (INB)

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