

This column intentionally left blank

Natural doses from radionuclides in ground waters from Guarany aquifer, South America

D. M. BONOTTO

Instituto de Geociências e Ciências Exatas, UNESP, Rio Claro, Brasil (dbonotto@rc.unesp.br)

This investigation was carried out within the Paraná sedimentary basin, involved the sampling of 77 pumped tubular wells, and was realized with the purpose of evaluating the radioactivity in the Brazilian part of Guarany (Botucatu-Pirambóia, Tacuarembói, Misiones) aquifer. The radioactivity due to ^{222}Rn , ^{226}Ra and ^{228}Ra belonging to U and Th decay series was investigated in ground water samples (20 kg stored in polyethylene bottles for ^{228}Ra analysis, and 6 kg stored in glass bottles fitted with inlet and outlet stopcocks for ^{222}Rn and ^{226}Ra analyses). The technique used for quantifying ^{222}Rn and ^{226}Ra was based on the emanation procedure (Bonotto and Caprioglio, 2002). The water samples for ^{228}Ra analysis were filtered through a 0.45 μm Milipore membrane, divided into two aliquots of almost equal volume, with a ^{133}Ba radioactive tracer being added to one aliquot. Ra coprecipitation on $\text{Fe}(\text{OH})_3$ was used, being gamma spectrometry utilized for evaluating the ^{228}Ra activity (Mancini and Bonotto, 2002).

A statistical analysis was performed for the obtained data, which showed that all radionuclides are lognormally distributed, with the following modal activity values: 22.9 Bq/L for ^{222}Rn , 0.13 Bq/L for ^{226}Ra , and 0.002 Bq/L for ^{228}Ra . The population-weighted activity concentration for ^{222}Rn , ^{226}Ra , and ^{228}Ra corresponded to 14.64, 0.186 and 0.004 B/L, respectively, being calculated considering the estimated population utilizing these ground waters. Dose factors reported by WHO (2002) allowed calculate an annual total committed effective dose due to these radionuclides as 0.13 mSv. However, different dose factors reported by IAEA (1996) generated a higher annual total committed effective dose corresponding to 0.21 mSv. Since the recommended reference level of committed effective dose is 0.1 mSv from 1 year's consumption of drinking water, it is extremely important to take into account the data source for dose factors, mainly for radiation dose calculations focusing Guarany aquifer. This is because such waters are extensively used for drinking purposes, serving approximately to 8.5 million people in Brazil (Chang, 2001).

References

- Bonotto, D.M. and Caprioglio, L. (2002) *Appl. Radiat. Isot.* **57**, 931-940.
- Chang, C.H. (2001) <http://www.ana.gov.br/guarani/gestao>
- IAEA (1996) *Safety Series* **115**, 353 pp.
- Mancini, L.H. and Bonotto, D.M. (2002) *Appl. Radiat. Isot.* **57**, 591-600.
- WHO(2002)http://www.who.int/water_sanitation_health/GDWQ/Radio/radioasp.htm