

RARE EARTH ELEMENT ASSESSMENT IN A SEDIMENTARY PROFILE FROM JURUMIRIM RESERVOIR, SÃO PAULO STATE, BRAZIL, BY NAA AND ICP-MS

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There is a growing interest in the quantification of contaminants in sediments originating from anthropogenic activities. However, there are many elements that are not commonly monitored in the environment and are being increasingly used in various industrial sectors¹. Besides heavy metals, the interest in the determination of three rare earth elements especially (Gd, Tb and Yb) has increased considerably over the last few years. Rare Earth Elements (REE), in general, have been widely used in the production of CDs, TVs and as a contrast in Nuclear Resonance Magnetic Imaging Tests. A research project is being developed between CETESB (Environmental Company of São Paulo State) and IPEN in 3 important water supply reservoirs in the São Paulo State, for a wide ranging evaluation of rare earth elements, in sediment and pore water samples. In the present study the preliminary results for the Armando Avellanal Laydner reservoir, better known as the Jurumirim reservoir, are presented. Its operations for generating electrical energy started in 1962. It has a drainage area of 17.8 thousand km², with an extension of approximately 100 km in Paranapanema River and 40 km in the Taquari river. The basin occupation is characterized by a drainage area with 14% occupied by preserved vegetation, and therefore was chosen as a probable reference point for obtaining values that can be used as REE background values for this region, at the bottom of the profile.² In this study a 60 cm core sample was collected in January 2013 and sliced at every 2.5 cm. The sediment samples were dried at 40°C, ground in an agate mortar, sieved and again homogenized. The quantification of the REE elements in sediment and pore water of each slice of the profile was performed by ICP-MS technique. Instrumental neutron activation analysis was also applied to the sediment samples in order to determine the total concentration for some rare earth elements (Ce, Eu, La, Lu, Nd, Sm, Tb and Yb). The validation of the analytical methodology was performed by certified reference material analysis. The results obtained were compared to NASC (North American Shale Composite) reference values. The distribution pattern of light and heavy REEs in relation to chondrite normalization was also verified. Furthermore, the data of this study can be used to develop a sediment REE concentration data bank in water supply reservoirs and to establish CETESB legal limits for REEs.

REFERENCES

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- 2) CETESB, 2009. Relatório de Qualidade das Águas Interiores do Estado De São Paulo 2009 – CETESB. São Paulo