NAA AND XRF TECHNIQUE SEDIMENT ASSESSMENT FOR MAJOR AND TRACE ELEMENTS - TIETÊ RIVER, SÃO PAULO STATE, BRAZIL

Flávio R. ROCHA[1], Paulo S. Cardoso da SILVA[1], Lucas M. CASTRO[1], Sonia Maria Barros de OLIVEIRA[2], Déborah I. T. FÁVARO[1]

[1]Neutron Activation Analysis Laboratory (LAN/CRPQ), IPEN/CNEN, [2]Geoscience Institut, São Paulo University, São Paulo, Brazil, flavio@baquara.com

The Tiete River drains an area composed of six sub-basins (Alto Tiete, Sorocaba/Médio Tiete, Piracicaba-Capivari-Jundiai, Tiete/Batalha, Tiete/Jacaré and Baixo Tiete). Along its extension (1,100 km), its margins bathe 62 municipalities. In spite of all its historical contributions, hydroelectric potential and being one of the most economically important rivers in the state of São Paulo, the Tiete River is also one of the world's most polluted rivers. As a result of pollution problems observed over the last few decades, the aim of this study is to evaluate the concentration of some major and trace elements in surface sediment samples, in 07 points from its headwaters in Salesópolis until Porto Feliz municipality, passing through the São Paulo City Metropolitan Region (RMSP) where considerable amounts of industrial and domestic sewages discharges occur. For this purpose, two nuclear analytical techniques were applied and their respective elements analyzed were: INAA: As, Ba, Br, Ca, Co, Cr, Cs, Fe, Hf, Na, Rb, Sb, Sc, Ta, Th, U and Zn; XRF: major elements and loss of ignition. The INAA results were compared to the NASC reference values (North American Shale Composite) and regional basal values. The enrichment factor (EF) and geoaccumulation index (*GI*), to assess the presence of anthropogenic pollution sources, were used. EF >2.0 were obtained for the elements As, Hf and Zn for the points 04 to 07. At point 01, EF>5.0 were obtained for the elements Hf, Th and U and decreasing to EF>3.0 until point 07. In addition, the concentration of dissolved oxygen (DO), pH, conductivity and oxidation-reduction potential (ORP) in the sediment and water samples from all sampling points were measured. The results indicated the water quality degradation along the sampling points: DO varied from 8.5 at point 01(Tietê River headwaters) to 1.1 ppm at point 07 (Porto Feliz municipality); conductivity from 34.8 to 430 $\mu S\ cm^{-1}$ for the same points, with value of 690 at point 02 (Santana do Parnaiba municipality) and ORP changing drastically from 230 at point 01 to -400 mV at point 02. From the data of this study, it will be possible to diagnose the Tiete River sediment quality of the studied area. These results may be used for future corrective actions as well as to avoid further damage to the quality of this important river.