

Total Mercury in Sediment Samples from Rio Grande Reservoir, SP, Brazil, by FIA-CV-AAS Technique in Sediment Cores Dated by Pb-210

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Abstract: The Rio Grande reservoir lies in the Southeast portion of the Metropolitan Area of São Paulo. As a consequence of the soil degradation, an expressive amount of sediments has been loading the reservoir since the beginning of its operation in 1935. In order to evaluate if the sediments contain an historical registration of anthropogenic activity, four sediment cores were sampled with a Piston Corer in the reservoir. The sediment cores with different depths¹ were sliced into 2 or 3 cm each, resulting in 70 samples. The sediment cores were dated by the ²¹⁰Pb method. Core 04 yielded a mean sedimentation rate of 0.63 cm.y⁻¹ (level 52.5cm, year 1919); core 12, a mean sedimentation rate of 0.97 cm.y⁻¹ (level 59.5cm, year 1939); the core 26, a mean sedimentation rate of 0.61 cm.y⁻¹ (level 54 cm, year 1910); and finally core 29, a mean sedimentation rate of 1.22 cm.y⁻¹ (level 80.5 cm, year 1932). Lower rates were related to the period prior to the water dam operation, when the loading of the sediments was less significant. Higher rates were related to rainy seasons and the urban expansion of the surroundings of the reservoir. Total Mercury concentration was evaluated in all 70 sediment samples by FIA-CV-AAS technique. When comparing Hg levels to the age of the sediments, it was observed the following: Core 04 - in the first 4 cm deep (1998 to 1962) Hg levels varied from 387 to 306 µg kg⁻¹. In the rest of the sediment column (1962 (4.5 cm) to 1919 (52.5 cm)) it was observed a mean concentration value of 180 µg Hg kg⁻¹. In the latter 6 cm of the core, Hg level reached values of 386 µg kg⁻¹. Core 12 - in this core only 7 sediment samples were evaluated showing a mean concentration value of 180 µg Hg kg⁻¹, corresponding to the age of 1998 to 1987 (0 to 15 cm deep). Core 29 - in the period of 1998 to 1988 (0 to 40.5 cm deep) Hg values ranged from 474 to 1718 µg kg⁻¹. A peak of 11586µg Hg kg⁻¹ occurred in 1977. At the end of the core (1932 - 80.5 cm deep), the values found were about 170 µg Hg kg⁻¹. Core 26 - in the first 5 cm of the core (1998 to 1993) a high value of 165 mg Hg kg⁻¹ was found. From 1993 to 1910 (5 to 54 cm deep) the Hg concentration values decreased until to reach the mean value of 200 µg Hg kg⁻¹. In conclusion, a significant variation on Hg concentration according to the depth was observed indicating that the reservoir was highly contaminated mainly in the first centimeters, during the 80's and 90's. This contamination was probably due to the release of industrial wastes into the dam during this period.

Key words: mercury, Sediments, Rio Grande Reservoir