Anomalies of Cd, Pb and Zn in the São Francisco River Basin, State of Minas Gerais, Brazil

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The São Francisco River Basin covers an area of 233,564km^2 drainage areas of the northwestern part of Minas Gerais State. This basin drains a lot of main cities, important mining regions of Fe, Mn, Au and limestones, large areas of Eucalyptus reforestation, commercial soy, cotton and sugar cane crops, pastures and native forests enclaves of the Cerrado biome. The local population is estimated in 8 million inhabitants distributed in 246 municipalities, with 30% in Belo Horizonte metropolitan area, the state capital. Archean and Paleoproterozoic from the Quadrilátero Ferrífero (the Iron Quadrangle) and Archean Granite-gneiss Complexes to south, quartzites and conglomerates of the Espinhaço Supergroup to the east, Limestone and meta-pelitics rocks of the Bambui Group and lateritic in the north-central, and filitics rocks of the Brasília shield in the west make up the geological basement of the basin. In a survey conducted by the MultiUse Geochemistry Project of Brazil Geological Survey were collected 1587 stream sediments samples in 150km^2 sub-basins and 484 soil samples collected in a 25x25km grid in campaigns conducted in September 2008 to May 2010. The analyses were made by ICP-MS. This work has defined the regional backgrounds for Cd, Pb and Zn in soil, 0.010ppm, 11.050ppm and 7.000ppm and in sediment, 0.030ppm, 13.100ppm and 25.000ppm, respectively. The trend curves of sediments allow us to define the anthropogenic and geogenic sources. Concomitantly at this work, other researchers conducted studies with the sediments collected in the Formoso River and along the course of the São Francisco River between Três Marias Dam and Pirapora town. Both results indicated values above the legal parameters for these elements (160x to the Cd, 60x to the Zn and 8x to the Pb). The values obtained in Formoso river (maximum of 1.126ppm, 25.750ppm and 12.630ppm) confirm the anthropogenic origin of Cd and Zn, probably related to agrochemicals. The obtained values for the São Francisco River (35.000ppm, 291.000ppm and 5,947.000ppm) indicate a strong contribution of the Zn beneficiation Plant located near the Três Marias Dam, which has been in operation for over 50 years. The Environmental Liabilities, due to improper deposition of tailings into the river in the beginning of operations is still

present and active in the bottom sediment until the present day, contaminating it for more than 100km in length along the course of the São Francisco River, what can be clearly seen on the overlaid maps.

References

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