

***N*-nitrosamines in surface water and groundwater of the Pearl River Delta, South China: spatial distribution, source analysis and cancer risk assessment**

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N-nitrosamines in natural water have attracted considerable attention in recent years due to their high carcinogenicity and frequent occurrence. To delineate the spatial distribution, identify the sources and assess the cancer risk of *N*-nitrosamines in the waters of the central Pearl River Delta (South China), eight *N*-nitrosamines were analyzed in 41 samples from river water, groundwater, and aquaculture pond water. The most abundant *N*-nitrosamines were *N*-nitrosodibutylamine (NDBA), *N*-nitrosodimethylamine (NDMA), and *N*-nitrosodiethylamine (NDEA). The pond water had the highest total *N*-nitrosamine concentrations (Σ NAs) (mean: 112 ± 40.0 ng/L), followed by the river water (58.6 ± 32.4 ng/L) and groundwater (22.1 ± 26.0 ng/L). The highest concentrations of Σ NAs in the river water and groundwater were observed in industrial wastewater impacted areas. In the river water, NDEA and NDBA might originate from the common sources of industrial activities or they have similar environmental behavior, NMOR might derive from the industrial wastewater discharge, while NDMA might originate from the wastewater discharge and formation sources. In the groundwater, the pH showed a significant correlation with NDMA, NDEA, and NMOR. On-site leakage of *N*-nitrosamines was the dominant source in the groundwater. *N*-nitrosamines posed a mean incremental lifetime cancer risk of 2.79×10^{-5} and 1.25×10^{-5} due to the direct usage of river water and groundwater as drinking water, respectively. Significant cancer risks from NDMA and NDEA rather than other *N*-nitrosamines were found in both river water and groundwater.