Trace Metal Contaminants in Surficial Bottom Sediments of the Hudson River Estuary

Fatemeh Sayrafiezadeh, and William H. Harris,
Brooklyn College and The Graduate School and
University Center of the City University of New York

Previous studies indicate high concentrations of potentially toxic trace metals (Ag, Cd, Cu, Ni, Pb and Zn) in Hudson River estuarine bottom sediments and water (Williams et al., 1978; Bopp and Simpson, 1981; Klinkhammer and Bender, 1981; Olson et al., 1984; Squibb et al., 1991; NOAA, 1995). Sediment contamination in the Hudson River Estuary has been related to the industrial and municipal wastewaters discharged over the past few decades (Muller et al., 1982; Dujardin et al., 1991; NOAA, 1995). The present study, following 1992-improvement of source controls at municipal sewage treatment plants, focuses on the spatial variation of trace metal contaminants including Ag, Cd, Cr, Cu, Ni, Pb, Zn, V, and Mn and %Fe, and Total Organic Carbon (%TOC) in surficial bottom sediments of the Hudson River Estuary. Bottom sediment samples were taken from 97 stations along 33 cross-river transects spaced approximately one kilometer apart and extending from the Battery, New York (km 0) north to Haverstraw Bay (km 37). The sampling program was conducted in Summer, 1997 (maximum density stratification) and Fall, 1998 (near isothermal water column). The resultant longitudinal and cross-river environmental gradients show simultaneous increases in trace metal concentrations down river especially in the vicinity of several municipal sewage treatment plants. Trace metal concentrations were found to be greater than those of sediment quality guidelines established by the USEPA for bioassay toxicity evaluation (Long and Morgan, 1990; Long et al., 1995). Previous studies on sewage-derived bottom sediments in the New York Bight indicated a close association between trace metals and organic matter (Harris and Waschitz, 1982). Sediment particle size, total organic carbon (TOC) and proximity to anthropogenic sources were determined to be the main factors controlling present concentrations of trace metals analyzed in Hudson River Estuary surficial bottom sediments. This study has established a baseline data set for environmentally available concentration distributions of selected trace metals which may be useful in (a) future studies of correlates of benthic species richness and dominance (population density), and (b) may ultimately lead to more effective estuarine ecosystem management or restoration alternatives.

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