Trace element geochemistry and environmental implications in sediments from Halifax Harbour

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Contamination of surficial sediments in Halifax Harbour is evident in the distribution of anomalous metal concentrations (Cu, Zn, Pb, Hg, Cd), especially near major sewer outfalls, industrial sites, and old landfill sites. More than 50% of the total Cu, Pb and Zn in the sediments is potentially reactive as reducible or oxidizable metal. Five types of sediments have been identified based on geochemical characteristics; each type of sediment is indicative of specific sources of contamination such as primary contamination from sewers, secondary contamination from landfill sites, surface drainage, diagenetic remobilization, and biogenetic carbonates. Contaminants have been accumulating in sediments of Halifax Harbour for more than 100 years, with maximum concentrations of most metals being obtained in the decades between 1950 and 1980. Enrichments by metal contamination over background is about three times for Cu and Zn, ten times for Hg, and twenty times for Pb. Historical trends in changing contamination reflect changes in industrial activity, urban growth, changes in the use of metals in paints, domestic and industrial chemicals, and in the use of combustion fuels.