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Temporal and spatial distributions of contaminants in sediments of Santa Monica Bay, California

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ABSTRACT

Contaminant inputs from wastewater discharge, a major source of contamination to Santa Monica Bay (SMB), have declined drastically during the last three decades as a result of improved treatment processes and better source control. To assess whether there have been concomitant temporal changes in the SMB sediments, a study was initiated in June 1997, in which 25 box cores were collected using a stratified random sampling design. Five sediment strata corresponding to the time periods of 1900, 1945, 1970, 1985, and 1997 were identified using radioisotope dating techniques. Samples from each of these strata were analyzed for metals, DDT compounds, polychlorinated biphenyls (PCBs), and total organic carbon (TOC). Sediment samples from the 1970, 1985, and 1997 strata were also analyzed for polycyclic aromatic hydrocarbons (PAHs) and linear alkylbenzenes (LABs). The magnitude of sediment trace metal contamination increased from 1900 to 1970. Metal concentrations were similar during the time periods of 1970, 1985, and 1997, although the mass emissions of trace metals from sewage inputs declined substantially during the same time period. Trace organic contamination in SMB was generally worst in sediments corresponding to 1970 or 1985 and showed a decline in magnitude in the 1997 stratum. Temporal trends of sediment contamination were strongest in sediments collected from areas near the Hyperion Treatment Plant (HTP) outfall system and on the slope of Redondo Canyon. The highest contaminant concentrations were present in sediments near the HTP 7-Mile Outfall in the 1970 stratum. Elevated trace metal and organic concentrations were still present in the 1997 stratum of most stations, suggesting that sediment contaminants have moved vertically in the sediment column since sludge discharges from the 7-Mile Outfall (a dominant source of contamination to the bay) ceased in 1987. The widespread distributions of DDTs and PCBs in SMB and highly confined distribution of LABs around the HTP outfall system were indicative of a dispersal mechanism remobilizing historically deposited contaminants to areas relatively remote from the point of discharge.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/1999AnnualReport/08_ar07.pdf