Interstitial Waters Near Waste-Dumping Grounds in New York Bight

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The studied area is used for conflicting purposes: disposal dredging, fishing, and recreation, activities that contribute to the contamination of associated sediments and their interstitial waters. In our study we collected sediment cores from 11 stations near dump sites. Additionally we took surface and bottom waters at each sampling site. The purpose of this study is to evaluate the mobility of heavy metals and organic matter.

The sediment in one 119 cm-long core is not from a site of significant recent deposition of fine-textured material. Cs-137 was not detected indicating that there was not a significant amount of post-1954 depositions in any of the samples.

The slight decreases in pH and drastic Eh decreases below the water/sediment interface are attributed to the activity of anaerobic bacteria. The black color and strongly reducing conditions in the pore waters (values to -440 mV, most values in the minus 200’s to 400’s mV range) contrast with mildly oxidizing to mildly reducing conditions in the pristine waters of the New York Bight (McKinney and Friedman 1967; Friedman et al., 1968).

Among the metals porewater shows a decrease in Mg, and increase in Si, K, Al, Fe, Cu, Ni, Mn, Co, As, Cd, and W. The organic matter consists of two groups of components: natural and pollutants (Mukhopadhyay et al., 1997). The natural organic matter includes lignin-rich humic particles, vitrinites derived from pre-existing sediments or rocks, fusinites or semifusinites from forest fires, exinites (spores, pollen, suberin, and cutin), phytoplankton (alginites), and fungal remnants (funginites). The anthropogenic components are fly and bottom ash, coke, coal, pitch, petroleum coke, fresh bunker as well as biodegraded crude oil, and amorphous organic matter derived from biodegradation of pre-existing organic matter.

Organic carbon in pore water varies from 0.04 to 4.0%. A strong correlation exists between organic matter and nitrogen concentrations. Organic content increases as particle size decreases.

References
