

**CHEMOMETRIC ANALYSIS OF POTENTIAL SOURCES OF
POLYCHLORINATED DIBENZO-P-DIOXINS AND DIBENZOFURANS IN
SURFICIAL SEDIMENTS FROM NEWARK BAY, NEW JERSEY**

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Keywords: Passaic River, Newark Bay, PCDDs, PCDFs, Chemometrics, Sediments

ABSTRACT

Polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs) measured in surficial sediments from the lower Passaic River and Newark Bay, New Jersey were compared to data reported in the literature for various known or suspected industrial, residential, and municipal sources using principal components analysis (PCA) and a relatively new technique, polytopic vector analysis (PVA). Comparisons were conducted to determine whether the PCDD/F residues typically found in a broad range of potential environmental sources could explain the presence of these chemicals in Newark Bay. The results of PCA modeling indicated that the congener and isomer fingerprint patterns in surficial sediments were similar to those found in municipal sewage sludge, municipal solid waste incinerator fly ash, pentachlorophenol, sodium pentachlorophenate, soils from scrap metal reclamation plants, combustion engines, and pulp and paper mill black liquor recovery furnaces. PVA modeling suggested at least four unique PCDD/F patterns in sediments, one of which closely resembled the PCDD/F fingerprint found in municipal sewage sludge. Differences between the patterns were largely explained by the distributions of the higher chlorinated compounds, as well as by 2,3,7,8-TCDD, 2,3,7,8-TCDF, and the penta-substituted isomers. Although it has been claimed that a former 2,4,5-T manufacturing plant is responsible for the presence of 2,3,7,8-TCDD and 2,3,7,8-TCDF in Passaic River and Newark Bay sediments, there is no evidence to indicate that a single source is responsible for this contamination.