

## DREDGING AND DISCHARGE: CONTAMINANT HISTORY IN THE LOWER PASSAIC RIVER

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Beginning with the American Industrial Revolution, the Lower Passaic River in northern New Jersey has been subject to industrial discharges laden with contaminants. Coincident with this industrial development was the construction and subsequent neglect of an extensive shipping channel along much of the length of the lower river. As solids settled in the abandoned channel, thick silty sediment beds were created, contaminated with a variety of organic and inorganic constituents, notably 2,3,7,8-TCDD. Current estimates place this inventory at over 8 Mm<sup>3</sup> of sediment and over 30 kg of 2,3,7,8-TCDD in the lower 8 miles of the river alone.

To understand historical contaminant loads to the river, several sediment cores were collected from the Lower Passaic River and dated radiometrically. These cores provide a record of concentration trends over time along the main axis of the river and can be used to describe contaminant fate and transport. Combining these sediment cores with an extensive set of historical measurements, a conceptual site model (CSM) was constructed for the river. Some of the major conclusions of the CSM include:

- Tidal mixing homogenizes suspended solids throughout the river prior to deposition in the sediment beds, resulting in similar contaminant concentrations and patterns in the dated cores between river miles 1 and 12.
- Contaminant loads to the river have varied over time with peak mercury loads occurring between the 1950s and 1960s while peak 2,3,7,8-TCDD and Total PCB loads occurred in the 1960s and 1970s.
- PAH contaminant loads have been relatively constant over the past 25 years with concentrations similar to upriver samples, indicating an on-going upriver source.
- Natural recovery is proceeding very slowly. Tidal reworking of the legacy contaminated sediments sustains concentrations of 2,3,7,8-TCDD in recently deposited sediments at more than an order of magnitude greater the current background loads.