

Sources and pathways of polycyclic aromatic hydrocarbons in St. John's most famous body of water

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Polycyclic aromatic hydrocarbons (PAH) of natural and anthropogenic origin are among the largest class of known and suspected carcinogens and mutagens in the environment. Because of the hydrophobic and lipophilic nature of PAH, sediments and particulates are excellent "repositories" for these compounds in aquatic systems. Sediments also therefore offer the best means of evaluating the relative contributions of PAH sources in these systems as a function of space and time. Our approach in the evaluation of PAH sources in environmental samples is to utilize, in addition to molecular distributions, the variations in the ratios of $^{13}\text{C}/^{12}\text{C}$ in *individual* PAH.

Molecular analyses and carbon isotopic characterization of *individual* PAH were performed on sediments collected from several stations in the St. John's Harbour. The overall abundances of PAH observed in the Harbour make it

one of the most heavily contaminated estuaries in North America. Comparison of the molecular and isotopic compositions of the sedimentary PAH to similar signatures of various potential primary and secondary PAH sources in the Greater St. John's area enabled quantitative assessment of the relative contributions of petroleum-related sources (e.g., crankcase oil, fuel oils) and combustion-related sources (e.g., woodburning and automobile exhaust) to the PAH inventory of the Harbour. Although significant input of petroleum-related PAH may be expected from shipping and crankcase oil disposal, our estimate of this contribution rarely amounted to 50% of the total PAH. For most of the Harbour sediments, combustion sources (car emission and woodburning) are the dominant contributors, possibly as a result of extensive snow dumping and discharge of untreated effluent from sewers.