

Spatial Variability of Factors Influencing the Distribution of Triclosan in Sediments and Water of an Urbanized Estuarine Embayment

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Triclosan (TCS) is a broad spectrum anti-microbial compound added to many consumer and personal care products. TCS enters water bodies primarily through wastewater treatment plant (WWTP) effluent and may be introduced by combined sewer overflows or surface water runoff. In estuarine waters, TCS adsorbs onto particles and may be preserved for long periods of time after deposition to sediments. The spatial variability and factors influencing deposition of TCS in marine ecosystems are the subjects of this research with a focus on Greenwich Bay, a sub-estuary of Narragansett Bay, Rhode Island. Sample locations were chosen using a statistically randomized, tessellated hexagonal grid design. After extraction and cleanup, sediment and water samples were derivatized and analyzed by GC/MS-EI. Overall, results show a high correlation to the sediment organic carbon content ($r^2 = 0.79$). Locally elevated sediment concentrations of TCS in Greenwich Cove, which directly receives effluent from a local WWTP, provide evidence that it is a major source of TCS to the area. Dissolved water concentrations were spatially variable, suggesting there may be other discrete sources of TCS to Greenwich Bay, or that additional factors outside the sub-embayment may have a role in TCS flux to this area. A sediment core collected from the center of the bay shows a sustained decline in TCS concentration from approximately 1990 to the present. This corresponds with increases in sewer connections and improvements in WWTP technologies employed in the watershed.