Molecular markers in urban stormwater runoff

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ABSTRACT

Stormwater runoff contains many pollutants that are potentially toxic to aquatic organisms. To increase our ability to trace land-derived contaminants, we conducted studies to determine whether several compounds, including sulfur-containing polycyclic aromatic hydrocarbons (S-PAHs) (benzothiazole and its derivatives as well as dibenzothiophene), nitro-PAHs (N-PAHs), and triphenylene that are associated with automobile tire residues and exhausts are relatively unique to urban runoff discharges. Samples of stormwater runoff from Ballona Creek (City of Los Angeles) and Santa Ana River (City of Santa Ana), and final effluents from four major wastewater treatment plants, City of Los Angeles Hyperion Treatment Plant (HTP), Orange County Sanitation District (OCSD), County of Los Angeles Joint Water Pollution Control Plant (JWPCP), and City of San Diego Point Loma Wastewater Treatment Plant (PLWTP), were collected during the 1997/ 1998 wet-weather season. Among the potential marker compounds examined, 2- (4-morpholinyl)benzothiazole, dibenzothiophene, and triphenylene were detected only in the Ballona Creek runoff samples during three storm events, while benzothiazole and 2- (methylthio)benzothiazole were present in both runoff and effluent samples. N-PAHs were absent in both runoff and wastewater samples. Biodegradation experiments indicated that N-PAHs, 2-(mercapto)benzothiazole, and 2-(4-morpholinyl)benzothiazole were degraded rapidly upon exposure to sunlight; hence their use as molecular markers in open environments was deemed doubtful. Dibenzothiophene and triphenylene also degraded quickly in sunlight-exposed seawater samples, but remained abundant in exposed sediments after six months of exposure.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/1999AnnualReport/27_ar25.pdf