



Article 2

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Hydrocarbon Hotspots in the Urban Landscape

Two central paradigms emerged from the EPA's Nationwide Urban Runoff Study in the early 1980s. One was that pollutant concentrations in urban runoff were more or less the same regardless of the contributing land use. The second was that urban runoff carried relatively few priority pollutants, most of which were metals.

Subsequent monitoring has generally reinforced both paradigms, particularly for conventional pollutants such as sediments, nutrients, and organic carbon. However, two recent research studies suggest that there may be major exceptions to these paradigms. The studies point to the existence of *hotspots* in the urban landscape that produce significantly greater loadings of hydrocarbons and trace metals than other areas.

Hotspots are often linked to places where vehicles are fueled and serviced, such as gas stations, bus depots, and vehicle maintenance areas. Others occur where many vehicles are parked for brief periods during the day (convenience stores and fast food outlets), or where large numbers of vehicles are parked for a long time (commuter parking lots).

Hotspots are evident in the data of Schueler and Shepp (1992). Their survey of oil and grit separators in suburban Maryland show the differences in the quality of pool water and trapped sediments in separators draining five different paved areas (Table 1). Gas stations and convenience stores had much higher levels of hydrocarbons and metals both in the water column and the sediments. Streets and residential parking lots, on the other hand, had much lower hydrocarbon and metal concentrations.

Gas stations were found to be an extremely significant hotspot for hydrocarbons. Composite priority pollutant scans at the gas station sites revealed the presence of 37 potentially toxic compounds in the sediment and 19 in the water column. Many compounds were polycyclic aromatic hydrocarbons (PAHs) that are thought to be harmful to both humans and aquatic organisms (Table 2). Non-gas station sites, on the other hand, recorded far fewer priority pollutants that had much lower concentrations.

Pitt and Field (1991) monitored metal and PAH levels in runoff from a number of sites in Mobile,

Table 1: Sediment and Pool Water Quality Found in Oil Grit Separators at Various Urban Locations (Schueler and Shepp, 1992)

Parameter	Gas Stations	Convenience Stores	All-Day Parking Lots	Streets	Residential Parking
Comparative Sediment Quality (reported in mg/kg of sediment)					
Total P	1,056	1,020	466	365	267
TOC	98,071	55,167	37,915	33,025	32,392
Hydrocarbons	18,155	7,003	7,114	3,482	892
Cadmium	35.6	17.0	13.2	13.6	13.5
Chromium	350	233	258	291	323
Copper	788	326	186	173	162
Lead	1,183	677	309	544	180
Zinc	6,785	4,025	1,580	1,800	878
Comparative Pool Water Quality (reported in µg/l)					
Total P*	0.53	0.50	0.30	0.06	0.19
TOC*	95.51	26.8	20.6	9.9	15.8
HC*	22.0	10.9	15.4	2.9	2.4
Cadmium	15.3	7.9	6.5	ND	ND
Chromium	17.6	13.9	5.4	5.5	ND
Copper	112.6	22.1	11.6	9.5	3.6
Lead	162.4	28.8	13.0	8.2	ND
Zinc	554	201	190	92	ND
ND = Not Detected		* in units of mg/l			