

**OCCURRENCE AND SOURCES OF ORGANIC WASTEWATER COMPOUNDS IN
STREAM WATER AND STREAMBED SEDIMENT, JOHNSON COUNTY, KANSAS, 2003-2004**

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ABSTRACT: A study of 60 organic wastewater compounds (OWCs) was conducted in streams throughout Johnson County, Kansas, during 2003 and 2004. OWCs were analyzed in 59 stream-water samples collected during base-flow conditions, 14 samples from municipal wastewater-treatment facility (WWTF) discharges, and 15 streambed-sediment samples. The objective of this study was to obtain a better understanding of the sources of OWCs (~~e.g., urban and rural~~) to streams in the study area. Results indicate that WWTFs with trickling filter secondary treatment processes were the largest source of OWCs to study area streams. Median total OWC concentrations in WWTF discharges with trickling filter secondary treatment processes were nearly an order of magnitude larger than concentrations from WWTFs with activated sludge treatment processes. With the exception of the fragrance compound acetyl-hexamethyl-tetrahydronaphthalene (AHTN) and selected flame retardants, nearly all individual compounds had significantly larger concentrations ($p < 0.05$, Mann-Whitney U) in discharges from trickling filter facilities compared to discharges from activated sludge facilities. Although OWC concentrations decreased from WWTFs to samples collected less than 500 m downstream from WWTF discharges, significant reductions of many compound concentrations were not observed until farther than 2,000 m downstream from WWTFs. As WWTF discharges were the source of more than 90 percent of streamflow during base-flow conditions and patterns were consistent across all watersheds, decreases in OWC concentrations generally are attributed to compound degradation or adsorption to streambed sediment. Of sites upstream from WWTFs, predominantly urban sites had significantly larger concentrations ($p < 0.05$, Mann-Whitney U) of cumulative and several individual OWCs than did predominantly rural sites. Streambed sediments were a substantial sink for OWCs and contained many compounds detected infrequently in stream-water samples. Because of their hydrophobic properties, polycyclic aromatic hydrocarbons (PAHs), PAH heterocycles, para-cresol, diethylhexyl phthalate, and sterols and stanols were detected at much greater frequencies in sediment than in water samples collected at the same sites. PAHs, para-cresol, detergent surfactants, and phthalates were detected in significantly larger concentrations ($p < 0.05$, Mann-Whitney U) at urban sites.

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