

**ORGANIC CONTAMINANTS IN ON-SITE WASTEWATER EFFLUENTS:
A COMPARATIVE STUDY OF SELECT DECENTRALIZED SYSTEMS AND
A CENTRALIZED TREATMENT PLANT RECEIVING A COMMON INFLUENT**

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ABSTRACT: Although numerous studies report the occurrence of select pharmaceuticals and personal care products (PPCPs) in centralized wastewater effluent discharges, few attempts have been made to understand PPCP introductions from more diffuse sources, including various on-site wastewater treatment technologies. To characterize relative PPCP discharges from common on-site systems and a municipal treatment plant, we employed several systems at the Baylor Wastewater Research Program (BWRP) site, located at the Waco Metropolitan Area Regional Sewerage System (WMARSS) in Waco, Texas, USA. This facility provided a one-of-a-kind setting to conduct such a study because common influent wastewater was diverted in WMARSS to the BWRP facility. Over a 7 week study at BWRP, influent wastewater was diverted to a model septic system (two-chambered 750-gallon tank), an aerobic system (a 1500 gallon multi-chambered system with a pretreatment tank, an aeration chamber, a final clarifier and an activated sludge process), and a septic system coupled with a subsurface flow wetland. We sampled influent wastewater and effluents from each of the three onsite technologies and the municipal treatment plant on weeks 1, 3 and 7, based on system specific differences in hydrologic residence times. Over 40 PPCPs were targeted for analytical quantitation in this study using solid phase extraction coupled with LC-MSMS and GC-MSMS. Average total effluent discharge levels of targeted PPCPs varied among treatment systems with septic (41.767 mg/L) > septic + wetland (4.854 mg/L) > aerobic (1.811 mg/L) > municipal (1.462 mg/L). None of the target compounds were completely removed by all four systems; removal efficiency varied among the technologies examined. Average percent removal for septic, septic + wetland, aerobic and municipal treatment plants were 29, 53, 62 and 73%, respectively. Carbamazepine was the only target analyte not consistently removed by any of the systems in this study.

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