**Organic Wastewater Compounds in Drinking Water Wells Impacted by Septic Systems**

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**Abstract**
Domestic wastewater contains numerous contaminants that have been linked to endocrine disruption. These compounds are discharged to septic systems through the use of products such as pesticides, plastics, and household products, as well as excretion of pharmaceuticals and endogenous estrogens. Silent Spring Institute has been investigating water contamination issues from wastewater disposal on Cape Cod, Massachusetts, for over 10 years. The shallow aquifers of Cape Cod are particularly vulnerable to contamination from septic systems, the predominant form of wastewater treatment in the region, because of the porous nature of the soils and the close proximity between septic drain fields and groundwater levels. Such contamination is of concern because groundwater is the sole source of drinking water on Cape Cod.

In this study, we tested for 92 organic wastewater compounds (OWCs) in samples from 20 public drinking water supply wells and 2 distribution systems throughout Cape Cod that encompassed a range of likely wastewater impacts. OWCs were detected in 15 of 20 wells and both distribution systems. Eighteen OWCs were detected, including 9 pharmaceuticals, 1 insect repellent, 5 organophosphate flame retardants, 2 perfluorinated chemicals and 1 alkylphenol. The most frequently-detected chemicals were sulfamethoxazole (antibiotic) and PFOS (perfluorinated compound in consumer products and used in commercial/industrial applications). For some chemicals, detected concentrations spanned the range of concentrations detected in other U.S. drinking water supplies. In particular, for two pharmaceuticals (sulfamethoxazole and dilantin), the highest concentrations in this study equaled or exceeded the maximum concentrations in previous studies. Wells with higher nitrate and boron concentrations and more extensive residential development in their recharge areas were generally associated with more frequent detections and higher concentrations of OWCs. While septic systems were likely the primary source of these contaminants, other sources of groundwater contamination are possible; for instance, a municipal airport may have been a source of PFOS and PFOA to two of the wells. Our results provide some of the first results documenting septic system impacts on drinking water supplies and have implications for wastewater management planning and protection of similarly vulnerable water supplies.