

EMPLOYING COMPOUND DISCOVERY TECHNIQUES TO DETERMINE OCCURRENCE AND FATE OF TRACE ORGANIC CONTAMINANTS IN LONG ISLAND RESIDENTIAL WASTEWATER AND NITROGEN REMOVING BIOFILTERS

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Onsite wastewater treatment systems introduce trace organic contaminants (TOrcs) to the environment through effluent discharge and incomplete contaminant removal (Carrara et al. 2008). With increasing population density and highly permeable soils on Long Island, onsite wastewater disposal has led to extensive nutrient pollution, increased eutrophication events along the coasts, and detections of TOrcs in groundwater, which often serves as the sole source of drinking water (Lee et al. 2021; Carrara et al. 2008). Nitrogen removing biofilters (NRBs) are alternative onsite wastewater treatment systems designed to remove reactive nitrogen from domestic wastewater, reducing the nutrient load to surface water (Gobler et al. 2021). Previous research has shown that NRBs also remove some TOrcs from domestic wastewater through chemical reactions, biotransformation, and sorption to NRB media (Clyde et al. 2021). The overall goal of this project is to use high resolution mass spectrometry and suspect screening approaches to identify and prioritize TOrcs in residential wastewater and track their fate in NRBs.

Screening of NRB influent and effluent at 11 sites has resulted in the tentative identification of more than 100 compounds in residential wastewater with varying degrees of confidence, 36 of which have been confirmed with analytical standards. The majority (64 compounds) have not been considered previously in NRB studies. Molecular feature extraction of all detected ions provided evidence that the composition of the extracted chemical fraction is unique to season, site, and sample type. Heat map and fold change investigations of molecular features highlight changing TOrc detection patterns and provide an opportunity to differentiate between contaminants that are removed and released by NRBs.

References

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