

Quantifying polycyclic aromatic hydrocarbons (PAHs) in wastewater at the Bangor, ME wastewater treatment plant

Polycyclic aromatic hydrocarbons (PAHs) are a broad group of organic pollutants originating from the combustion of fossil fuels and other industrial sources. Wastewater treatment plants are designed to remove organic matter from wastewater before it is discharged into the environment, however they are not designed specifically to target micropollutants like PAHs. This investigation aimed to identify and quantify the presence of five PAH compounds (benzo(a)pyrene, naphthalene, pyrene, fluoranthene, phenanthrene) at the municipal wastewater treatment plant in Bangor, Maine. Samples were taken at three points throughout the treatment process (influent, mid-treatment, effluent) to assess potential removal of these compounds. Grab samples extracted using a density separation microextraction were analyzed using a tandem gas chromatograph-mass spectrometer (GC-MS). No significant removal or addition of PAHs was seen across treatment phases, and most of the target PAHs were in concentrations within EPA health hazard limits. However, benzo(a)pyrene was found in concentrations above EPA toxicity limits in samples from each treatment phase. Trends in PAH data were potentially masked by low extraction efficiencies of around 2%.

Advisor: Carey Friedman