

Quantitative analysis of 17 α -ethinylestradiol in wastewater influent and effluent in Bangor, Maine

Ethinylestradiol (EE2) is an endocrine disrupting compound that can negatively affect aquatic organisms. The presence of EE2 in the natural environment is due mostly to the release of wastewater effluent into natural water systems. Within those systems, EE2 has been shown to cause adverse growth and reproductive effects on aquatic species that reside there. It is important that there is a sound understanding of what concentrations of EE2 are leaving wastewater treatment plants (WWTP) and entering the environment in order to examine risks to species that live there. This study quantitatively analyzed concentrations of EE2 in influent and effluent water samples from the WWTP in Bangor, Maine, and evaluated the WWTP's effectiveness of removing EE2 from wastewater to assess environmental risk. Wastewater was collected by grab sampling method and EE2 was separated from the water using solid phase extraction. . There was an average EE2 removal efficiency of 49.7%, meaning the removal for EE2 was about 50% effective. This could have larger implications for other estrogenic compounds beside EE2. Concentrations of EE2 were determined with gas chromatography – triple quadrupole mass spectrometry. Concentrations of EE2 in influent ($0.076 \text{ ng L}^{-1} \pm 0.066$) and effluent samples ($0.038 \text{ ng L}^{-1} \pm 0.020$) were compared to the U.S. EPA's predicted no effect concentration (PNEC) of 0.1 ng L^{-1} . Samples were found to be below the PNEC value suggesting there was minimal risk to exposed organisms.

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