Estrogenic Activity through Secondary Treatment of a Wastewater Treatment Facility

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Abstract

Several natural and synthetic compounds are known as endocrine disrupting chemicals (EDCs), and some of these triggered physiological responses (intersex characteristics) in continuously exposed male fish. Many of these estrogenic compounds are found in significant levels within wastewater treatment plants and as a result, also in water systems downstream of plant outfalls. At the Ina Road Water Pollution Control Facility in Tucson, Arizona, a newly installed treatment system of denitrification followed by nitrification was put into place a year ago and has since run in parallel with the previous system of oxygenated activated sludge. The scope of this study is to track the estrogen activity through the areas of the plant where the two treatment systems run in parallel with the flows segregated, with a hypothesis that the anoxic conditions of the denitrification processes should serve to reduce the estrogenic activity by facilitating the breaking of aromatic rings. Using the Yeast Estrogen Screen (YES Assay), the estrogenic activity can be quantified as compared to a prepared standard. Utilizing this method of assessment, it was determined that the old process of using only oxygenated activated sludge observed an overall reduction of estrogen activity of 60%, whereas the new process of denitrification/nitrification saw a decrease of estrogenic activity of 98%. This result helps to support use of anaerobic denitrification processes as method for reduction of estrogenic activity.