

Hormones and Nonionic Surfactants in Septic and Soil Samples: Analytical Methods and System Evaluation

Benjamin D. Stanford, and Dr. Howard Weinberg

UNC-CH, School of Public Health/Dept. of Env. Sciences and Engineering

The field of emerging contaminants in the environment is a rapidly expanding area of research that has the potential to greatly impact human society and both local and global ecosystems. With growing numbers of medicines, personal care products, and other chemicals being used together with increased demand on the use of recycled wastewater it becomes ever more pressing that we understand the ultimate fate of these compounds in our environment. Measurable levels of endocrine disrupting compounds (EDCs) and pharmaceutically active compounds in environmental waters have been reported in numerous studies and have been shown to cause sexual and developmental abnormalities in vertebrate and invertebrate aquatic species at environmentally relevant concentrations. Specifically, compounds such as steroid hormones and nonionic surfactant metabolites are of particular interest because of their high use in North Carolina (meat production, medicine, household, and industry byproducts), their high level of potency at low concentrations, and their potentially harmful effects on the environment and on consumers. Although a few studies indicate that some of these EDCs could be partially removed or transformed during sewage and septic treatment, many of these compounds are still being found in the environment and in drinking water supplies. Very little information is known about the fate and transport of such EDCs through septic systems and their impact on groundwater and surface water supplies. Ongoing research will be presented which covers development of a sensitive and reproducible method for quantification of human steroid estrogens and nonionic surfactant metabolites in septic and soil samples, the use of a yeast estrogen screen (YES) bioassay for determining overall estrogenicity of septic samples, and the application of the methods to assess removal of estrogenicity from different types of septic treatment.