A Reconnaissance for Hormone Compounds in the Surface Waters of the United States

Larry B. Barber[1], Greg K. Brown[2], Dana Kolpin[3], Jeffery H. Writer[4], and Steven D. Zaugg[5]

The occurrence of hormone compounds, such as 17-b-estradiol and testosterone in surface waters, has become a topic of concern because of potential adverse effects including disruption of the endocrine system of aquatic organisms. Sources of hormones to natural waters include disposal of effluents from municipal sewage-treatment plants and animal feeding operations. To evaluate the presence of hormone compounds in surface waters across the United States, a reconnaissance survey was conducted in spring 1999. Samples were collected from 24 streams in 19 States (Arkansas, Colorado, Georgia, Iowa, Illinois, Louisiana, Maryland, Minnesota, Michigan, Missouri, North Carolina, Nebraska, Ohio, Oklahoma, Pennsylvania, Texas, Utah, Washington, and Wisconsin). This survey included 14 streams from basins with intense production of hogs (2), poultry (6), dairy cattle (2), beef cattle (2), and mixed-animal production (2). In addition, streams from nine urban basins (including Denver, Dallas, Minneapolis, and Salt Lake City) and one mixed basin (Mississippi River near St. Francisville, Louisiana) were sampled. The samples were analyzed using continuous liquid-liquid extraction with selected ion monitoring gas chromatography/mass spectrometry (SIM GC/MS). Wastewater contaminants such as nonylphenol and triclosan were detected in 50% of the samples at part per billion concentrations. Specific analysis of steroid hormones using derivatization SIM GC/MS analysis indicated the presence of androgens and estrogens at part per trillion concentrations.

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[1]U.S. Geological Survey, Box 25046, MS 408, Denver Federal Center, Denver, CO 80225-0046 (lbbarber@usgs.gov)

[2]U.S. Geological Survey, Box 25046, MS 408, Denver Federal Center, Denver, CO 80225-0046 (gkbrown@usgs.gov)

[3]U.S. Geological Survey, P.O. Box 1230, Iowa City, IA 52244 (dwkolpin@usgs.gov)

[4]Centaurus High School, 10300 E South Boulder Rd., Lafayette, CO, 80026

[5]U.S. Geological Survey, Box 25046, MS 407, Denver, CO 80225-0046 (sdzaugg@usgs.gov)