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OCCURRENCE OF ANTIBIOTICS IN U.S. BIOSOLIDS AND MANURE: A SOURCE RECONNAISSANCE

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ABSTRACT: Antibiotics have had a profound effect on overall human health, are important in maintaining health, and promote more rapid weight gain for livestock in confined animal feeding operations. However, increases in human antibiotic-resistant bacterial infections have prompted questions as to whether environmental dissemination of antibiotics, and consequently, the presence of antibiotic-resistant bacteria, is contributing to these increases. In a previous national stream and ground water reconnaissance study of pharmaceutical and organic wastewater compounds by the U.S. Geological Survey (USGS) from 1999 to 2000, at least one antibiotic was detected in approximately 50 percent of the samples analyzed, with concentrations generally less than 0.5 ìg/L. The results from the 1999-2000 study did not seem to adequately reflect the widespread human and veterinary usage and distribution of all the antibiotics commonly prescribed. In addition, the 1999-2000 reconnaissance study did not focus efforts on partitioning of antibiotics onto solids or degradation. This resulted in the expansion of this study in 2004 to include a source reconnaissance for pharmaceuticals and organic wastewater compounds in biosolids, manures, streambed sediments, and soils from both agricultural and urban sources. To address the distribution of antibiotics in solid media, an extraction method was developed where preliminary results indicate a greater number of fluoroquinolones, macrolides, sulfonamides, tetracyclines, and other antibiotics were detected in comparison to the earlier results from the 1999-2000 stream and groundwater reconnaissance. Several of these compounds had concentrations approximately equal to or greater than 50 ìg/kg in a 1-g sample (dry weight). Comprehensive results from the 2004 USGS source reconnaissance of antibiotics in biosolids and manures will be presented.

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