WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2002MT3B

Title: Pharmaceuticals in Septic System Effluent

Project Type: Research

Focus Categories: Water Quality, Hydrology, Toxic Substances

Keywords: Human pharmaceuticals, septic effluent

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End Date: 09/30/2005

Federal Funds: $22,900

Non-Federal Matching Funds: $45,800

Congressional District: at-large

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Abstract

The proposed research will assess the occurrence of selected human pharmaceuticals in septic effluent. Discharges of human drugs and their metabolites from hospitals, production facilities, landfills and households enter the environment as sewage and industrial wastes. These effluents are treated at a wastewater treatment facility and then discharged to river systems or percolate as septic system effluent, leachate or disposal pond leakage to the underlying soil and groundwater system. The fate of unaltered parent compounds and excreted metabolites in the environment is poorly understood. Over 30 drugs have been detected at the ug/L to ng/L range in the waters of Europe, including the North Sea, lakes, rivers, and groundwater. However, little is known about the biochemical effects on either humans exposed to single or multiple "non-prescribed compounds" in their drinking water or on non-targeted aquatic biota.

The USGS, under the Toxic Substances Hydrology Program's National Reconnaissance of Emerging Contaminants, is sampling selected streams and wells for targeted veterinary and human antibiotics, human drugs, industrial and household wastewater products, and sex and steroidal hormones. Results of initial sampling are preliminary and still being reviewed as new laboratory procedures are developed. To date, only 55 wells and 7 effluent sites in 36 states have been sampled to evaluate groundwater susceptibility to impact from drugs.

Unfortunately, the potential for single and multiple discharges of sewage effluent from the over 17 million U.S. septic systems (Canter and Knox, 1985) to deliver drugs to the vadose zone and groundwater has not been evaluated. The research proposed here is intended to initiate that process by assessing the occurrence of selected compounds in 100 individual septic systems.

100 STEP systems will be sampled during the research period. Samples will be evaluated to identify selected drugs identified as USGS Target Compounds. Standard methods will be used to qualitatively and quantitatively determine drugs of interest.

Research results will provide a new and important data set that can be used to assess the present and expected range of concentrations of selected pharmaceuticals in septic system wastes. Results obtained from this work will be used to develop more detailed research efforts to determine the fate of septic effluent containing pharmaceuticals in coarse-grained soil and groundwater systems