



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: AZ901

Title: Measurement of Hormonal Activity and Volume Contribution of Treated Wastewater in Water from Wells Along the Santa Cruz

Focus Categories: Toxic Substances, Groundwater

Keywords: Groundwater Movement, Water Quality, Wastewater, Toxic Substances, Groundwater Quality Groundwater Recharge

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Congressional District: Fifth

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Abstract

Description of Problem: Hormonally Active Agents (HAA), also know as endocrine disrupters (ED), include a large number of natural and synthetic hormones, pharmaceuticals, pesticides, and industrial as well as household chemicals. HAAs have been detected in wastewater and appear to resist biochemical degradation, persist in the environment, and bioaccumulate. HAAs can adversely affect wildlife and many have caused the documented decrease in human semen quality and the increase in the number of breast cancer seen in women.

Wastewater has been incidentally recharged, for many years, in streams and dry riverbeds throughout the state of Arizona as a consequence of normal discharge from wastewater treatment facilities. Some municipalities have developed and now operate systems that promote recharge of treated wastewater for reuse purposes in controlled. In Pima County, the Roger Road and Ina Road Wastewater Treatment Facilities have discharged largely domestic effluent to the Santa Cruz River for decades. A total of 50,000 acre-feet per year (AFY) of treated effluent is discharge into the Santa Cruz riverbed. An additional 10,000 AFY of treated wastewater is recharged at the Sweetwater Underground Storage and Recovery Facility (SUSRF). This water is recovered after about six month's storage underground and reused for nonpotable purposes. The presence of wastewater effluent among waters withdrawn from wells along the Santa Cruz

River, downstream from the Roger Road and Ina Road Wastewater Treatment plants has never been examined directly.

Methods: This project proposes to establish the volume contribution of reclaimed water in wells proximate to the Santa Cruz River and correlate fractional effluent content with in vitro measurements of potential endocrine system disruption in the same samples. Water samples will be collected from wells located along the Santa Cruz River and tested for Dissolved Organic Carbon, pH and boron as well as for the presence of HAAs.

Objectives: The degree to which reclaimed waters contribute to local well water and affect quality characteristics in potable wells along the Santa Cruz River is not known. Proposed work will screen wells potentially affected by effluent disposal in the Santa Cruz River for the presence and activity of endocrine disrupting compounds. In vitro tests will be used to measure endocrine activity in whole-water samples and organic concentrates derived from those water samples. Waters that produce endocrine effects will be further examined to determine the fractional volume contribution of reclaimed water via measurement of boron isotope ratios. Correlations will be established between endocrine activity and percent contribution of reclaimed water in the samples tested.