



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2003KY18B

Title: Occurrence and Distribution of Mercury in Mammoth Cave National Park - Phase II

Project Type: Research

Focus Categories: Groundwater, Sediments, Solute Transport

Keywords: mercury. karst, bioaccumulation

Start Date: 03/01/2003

End Date: 02/28/2004

Federal Funds: \$9666.00

Matching Funds: \$20296.00

Congressional District: Kentucky 2nd

Principal Investigators: Webb, Cathleen Joyce

Abstract: Atmospheric deposition of mercury from power plant emissions, a major input of mercury into the environment, is coming under closer scrutiny by regulatory agencies. With increasing demand for power, applications for many new power plants are currently being considered around the country, including over twenty new applications in the Commonwealth of Kentucky. An understanding of the current levels of mercury is critical, particularly in a karst aquifer system (such as in South-central Kentucky) where transport of contaminants can be rapid. The overall vision and scope of this project are to understand the physical and geochemical processes that govern the fate and transport of mercury in a karstic aquifer system. Mercury mobility in surface water and ground water are of great concern because of toxic effects on the environment. Mercury is a persistent, bioaccumulative toxin, with significant impacts on aquatic species, such as mussels. The specific research in this proposal will examine mercury transport in ground water and surface water in Mammoth Cave National Park. Results will be complemented by an investigation of the extent of bioaccumulation of mercury in fish and mussels. Finally, attempts will be made to correlate levels and distribution of mercury in fish and mussels with levels of mercury measured in the atmosphere, water and sediments of the study site. This proposed research is part of a larger program of mercury-related work that the principal investigator has undertaken in 2001-2002. Two research proposals were submitted and funded. Occurrence and

Distribution of Mercury in Mammoth Cave National Park - Phase I was funded by the United States Geological Survey (USGS) 104B program of the Kentucky Water Resources Research Institute for \$9,725. A closely related proposal entitled Evaluation of Mercury Bioaccumulation in the Green River Ecosystem was funded by the National Park Service (NPS) for \$236,105 under a joint program of the USGS and the NPS. This three-year project will run from October 1, 2003 through September 30, 2006. The initial pilot project funded by the KWRRI last fall was instrumental in the success of this grant. Unfortunately, while the future project commits extensive resources and continuity to the overall research program, a funding gap does exist for the spring and summer of 2003. This Phase II funding request will bridge this gap and, furthermore, will be supplemented by a complimentary funding request which is being sent to MCNP by the principle investigator. Phase I effectively began in August 2002. Funding from the USGS 104B Phase I grant was effective in June, 2002. The final permit approval was signed in late July, 2002. Monthly water samples from Mammoth Cave have been collected. Two sets of sediment samples have also been collected. Samples of clams (*Corbicula*) were provided by Dr. James Layzer of USGS/Tennessee Technological University. Fish tissue samples of liver and muscle were collected from fish provided by Dr. Philip Lienesch of Western Kentucky University. Additionally, laboratory work to characterize mercury transport in a karst system has recently begun. Phase II of this project is a seamless continuation of work began in Phase I.

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