



WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: Chemical Mixtures: Consequences for Water Quality

Duration: September 1, 1997 to August 31, 2000

Fiscal Year 1997 Federal Funds: \$12,970

Non-Federal Funds Allocated: \$25,961

Principal Investigator, University, and City:

William H. Benson, University of Mississippi, University, MS

Congressional District No: District No. 1

Water Problem, Need for Research:

Non-polar organic pesticides and organic metals are released into the aquatic environment and partition from surface water into sediment due to their hydrophobic nature. These non-polar chemicals have the potential to bioaccumulate in aquatic organisms exposed by direct contact with the sediment or indirectly through food. Recently, the U.S. EPA has proposed to establish guidelines for assessing sediments based on the concentrations of bioaccumulative chemicals in benthic invertebrates. The toxicity threshold values for bioaccumulative chemicals have typically been based upon single chemical studies. However, it is rare that a chemical occurs alone in the aquatic environment, particularly sediment. At the present time, there is limited knowledge regarding the bioaccumulative nature and effects of chemical mixtures. Furthermore, the mechanisms by which mixtures of bioaccumulative pesticides and metals elicit adverse effects are poorly understood.

The overall goal of the proposed research is to evaluate the interactions of "real-world" bioaccumulative chemical mixtures having the potential for toxicological effects not predicted from single chemical toxicity experiments. The model compounds, dieldrin, chlorpyrifos, and methyl mercury will be evaluated using the amphipod, *Hyallea azteca*. Bioconcentration data along with toxicological indices will be used to determine the critical body residue threshold concentrations at which toxicological effects occur. This proposal directly addresses Mississippi Water Research and South Atlantic-Gulf Region priorities related to water quality, particularly with respect to needs addressing protection of water and sediment from environmental degradation.