

## **NCER Assistance Agreement Annual Progress Report**

**Period Covered by the Report:** October 2003 – April 2005 (revised)

**Date of Report:** 16 May 2005

**EPA Agreement Number:** R – 82942901 – 0

**Title:** U.S. Environmental Protection Agency Experimental Program to Stimulate Competitive Research (EPSCoR) From the Commonwealth of Kentucky, SIP

**Investigators:** David S. White

**Institution:** Murray State University

**Research Category:** EPA EPSCoR

**Project Period:** October 2001 – September 2005

### **SIP**

#### **Description:**

**Objective:** The objective of the SIP has been to enhance competitive research in environmental problems in the Commonwealth of Kentucky under the management of the EPA EPSCoR Subcommittee of the Kentucky Statewide EPSCoR Committee through information exchange activities, fellowships, and review processes to assist the investigators of the SEER Projects as they address research on environmental and human health biomarkers and use of biomarkers for pollution prevention in Kentucky.

Because of some time of year issues in beginning the research in the fall and logistics of the accounts for the SEER grants, SEER research was not fully underway until January 2002. Originally we had planned to hold a Special Conference on Biomarkers in May of 2002, but with the late start, the KY EPSCoR Committee agreed to move the first Conference to 2003 followed by a second conference in May 2004. This proved to work out very nicely. The 2003 Special Conference was held in conjunction with The Kentucky Statewide EPSCoR Conference at the Hyatt Regency in Lexington Kentucky May 11-12. Three internationally known biomarker researchers (Patrick Hatcher, Timothy Fennell, and Margaret Whalen) agreed to be invited speakers (with Hatcher also being a keynote speaker for the entire conference). Each of the 4 SEER Co-PIs presented results to date, which was followed by an open forum discussion. The 2004 second Special Conference on Biomarkers was held on May 13, 2004, also in Lexington in conjunction with the Kentucky Statewide EPSCoR Conference where the following presentations were made:

Darrell Winner, US Environmental Protection Agency, National Center for Environmental Research, Washington, DC: *An overview of EPSCoR and other research programs at EPA*

Prasada Rao Kodavanti, US Environmental Protection Agency, Research Triangle Park NC: *Are PBDEs the New PCBs: A Neurotoxicology Perspective.*

Harrell E. Hurst and Steven Myers, Department of Pharmacology & Toxicology, University of Louisville School of Medicine, Louisville, KY: *Biomarkers for Air Pollutants: Development of Hemoglobin Adduct Methodology for Exposure Assessment.*

Howard Whiteman and Bommanna Loganathan Departments of Biological Sciences and Chemistry, Murray State University, Murray, KY: *Developmental Stability in Amphibians as a Biological Indicator of Chemical Contamination and Other Environmental Stressors*.

Russell A. Barnett, Kentucky Institute for Environmental and Sustainable Development (KIESD), University of Louisville, Louisville, KY: *An overview of the Biomarker Presentation to the Kentucky Environmental Quality Commission*.

On March 5, 2004, we presented results of the two SEER research projects to date to the Kentucky Environmental Quality Commission (KEQC). The Kentucky Environmental Quality Commission is a seven-member citizen advisory board that works to strengthen the public role in solving environmental problems in our communities and the state and that serves as an advisory board to the governor and other state officials on environmental matters. Presentations to the Commission usually are limited to 15 minutes including time for commissioner questions. Questions about the research and its implications wound up lasting for 45 minutes, and the Commission was extremely impressed by the research and the results to date. A summary of the meeting was presented at the 2004 Statewide EPSCoR conference (see above). Results of the meeting were made available statewide on the KEQC web site. In summary, the following recommendations were made to the EQC. "Environmental biomarkers should reflect the types (and potentially suites) of contaminants and/or problems likely to be encountered in Kentucky or that have been identified as regional or aerial concerns. In general biomarkers do not duplicate but complement monitoring efforts. It should be kept in mind that biomarkers can identify that there is a problem but, depending on the type, may not immediately pinpoint the exact cause. In the example of the salamander developmental stability, asymmetry is an exposure biomarker, indicating that a stressor is present, but not the stressor. Many molecular biomarkers, however, are specific to the alteration of a biochemical pathway and demonstrate direct relationships between exposure and effect. While biomarkers for human health concerns have progressed dramatically over the past 5 years, biomarkers for ecological health are in their infancy. We would suggest the following as a starting point.

Potential biomarkers (aquatic or terrestrial systems) (invertebrates, fish, mammals) include

- Nitrogen contamination from agricultural/urban runoff
- Herbicide/pesticide contamination (particularly Atrazine)
- Endocrine disruptors
- Polycyclic Aromatic Hydrocarbons (PAHs):
- Polychlorinated biphenyls (PCBs)
- Heavy metals, particularly mercury, cadmium, and tin
- Petroleum byproducts (other than PAHs)

Members of the KY EPA EPSCoR Committee continue to meet regularly with SEER grant investigators both in Louisville and in Murray. The committee is tracking publication of the results and new proposals being developed. To date, we have been satisfied with the progress being made.

Other progress includes a revamping of the web site, which is now connected to the Kentucky EPSCoR site and is searchable through the AERC web site. The site location has migrated to

<http://www.murraystate.edu/qacd/cos/hbs/epaepscor-program.htm> and also can be accessed at [http://www.kyepscor.org/ky\\_epscor\\_programs.htm](http://www.kyepscor.org/ky_epscor_programs.htm). All reports are maintained on the website including the 2004 reports for the SIP and both SEER grants. Two members of the KY EPSCoR Committee (White, Farrell) were re-elected in 2005 to 3-year terms on the Statewide Committee, which has provided a broader outlet for the importance of long-term funding for environmental research in the Commonwealth.

There have been no changes in key personnel with the exception of addition of new members of the KY EPA EPSCoR Committee in 2002 (see previous reports).

State matching funds through the Kentucky Statewide Committee for the 2001-2003 budget year were held up in the Kentucky legislature (no State budget passed) through April 2003 slowing some aspects of the research. All funds were released to us in April; however, we did not expend as much of the supplemental undergraduate/graduate student funding and travel funding as we had planned for both years. Thus we asked for and have received two, one-year no-cost extensions to the entire project. Both SEER grants plan to take advantage of students and travel this during the final year. Otherwise, funding is approximately on schedule with no expected variance from the originally negotiated total cost estimates.