

HIGHLIGHTS and INITIATIVES



E E R C

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The EERC conducts unbiased,
analytical, and multidisciplinary
research designed to promote real-
world solutions to problems in the
fields of energy, environment, tech-
nology, and economic development.

APPOINTMENT. Outgoing Knoxville Mayor Victor Ashe recently appointed **Kimberly Davis** to Knoxville's Board of Environmental Appeals. City Council approved the five-year appointment in November. **Davis**, assistant director of EERC's Waste Management Research and Education Institute (WMREI), will serve as the board's Licensed Professional Engineer. The board, composed of five members, hears cases from contractors/developers who have been fined for practicing inadequate erosion and sediment control. Such deficiencies have caused illegal discharges into the municipal stormwater system. When contractors appeal fines assessed by the city, the board judges whether the assessed penalties are fair. For more information, see <<http://www.ci.knoxville.tn.us/boards/env-appeals.asp>>.

PROJECTS. **Kimberly Davis** and **Susan Pfiffner** (Research Assistant Professor with UT's **Center for Environmental Biotechnology** and **Center for Biomarker Analysis**) form part of a team of 18 scientists from the University of Tennessee, Oak Ridge National Laboratory, and five other research institutions, who compose the Indiana-Princeton-Tennessee Astrobiology Initiative (IPTAI). The scientists are examining deep underground environments that support living microbe communities. IPTAI is one of 16 teams that make up the NASA-funded Astrobiology Institute, an international research consortium. IPTAI will design instruments, data-logging systems, and algorithms for differentiating nonbiotic and biotic biogeochemical cycles on Earth and, potentially, on Mars. **Davis** and **Pfiffner**, who will coordinate education and public outreach for IPTAI's scientific research, are currently working on a related NSF-funded Research Experience for Undergraduates program, in which U.S. minority students team with South African students to examine extreme bacteria in South Africa's gold mines.

WMREI recently awarded a grant to Research Ecologist **Jack Ranney**, who is leading a project to establish Knoxville as a prototype for community-based invasive-species control. Pest plants are infiltrating Knoxville's greenways, damaging the natural environment, threatening human safety, thwarting maintenance efforts, and diminishing the appeal of scenery. **Ranney** and his partners are using presentations, along with results from a survey conducted last fall, to encourage Knoxville residents to adopt policy changes and implement control efforts, planning, and volunteer activities that target invasive non-native plants throughout the city. **Ranney** has used some of the developments from this project to teach classes at UT (journalism) and at West and Gibbs high schools. WMREI's long-term objective is to raise awareness of these problems in other Tennessee cities. **Ranney** is planning a Knoxville workshop for this fall, and his team is already developing posters and brochures. Several groups, including the City of Knoxville (greenways), the Izaak Walton League, the Tennessee Exotic Pest Plant Council, UT faculty, West High School, and others are partnering with Ranney on this project.

Safer Adhesive Alternatives



Each *Highlights and Initiatives* back page presents a closer look at one of our current projects or activities. This edition focuses on a report that identifies safer adhesive alternatives for foam fabricators and bedding and upholstered-furniture manufacturers.

continued on back >

Safer Adhesive Alternatives

Collaborative research produces a comprehensive assessment that gives manufacturers a clear view of safer, viable alternatives to conventional adhesives. • BY DAVID BRILL

“This research demonstrates that alternative adhesives that are better for human health and the environment are widely available.”

THOUSANDS OF U.S. FOAM fabricators and bedding and upholstered-furniture manufacturers use polyurethane foam in their products, but increasingly strict regulations and human-health and environmental risks associated with the use of traditional adhesives have forced these industry sectors to evaluate safer alternatives.

To help guide the evaluation process, EERC’s Center for Clean Products and Clean technologies (CCPCT) has teamed with the Institute for Research and Technical Assistance (IRTA) and the U.S. Environmental Protection Agency (EPA) to conduct a cleaner technologies substitutes assessment (CTSA) of alternative foam adhesives.

The CTSA provides upholstered-furniture and bedding manufacturers with comparative information on readily available adhesive alternatives.

The alternatives include one-part and two-part water-based adhesives, hot-melt adhesives, and adhesives based on the solvents acetone and n-propyl bromide. The report evaluates the alternatives in terms of performance, cost, and human and environmental health impacts.

“Our evaluation shows the importance of replacing solvent-based spray adhesives with safer alternatives,” says Mary B. Swanson, CCPCT research scientist.

These manufacturers have traditionally used 1,1,1-trichloroethane (TCA) as their adhesive of choice, but production of TCA, an ozone-depleting substance, was banned in 1996. Most manufacturers responded to the ban by shifting to methylene chloride (METH), a suspected carcinogen.

Then, in January 1997, the Occupational Safety and Health Administration (OSHA) introduced stringent regulations governing the use of METH, forcing many manufacturers to seek alternatives.

The CTSA’s performance component was based on visits to 32 foam fabricators and bedding and upholstered-furniture manufacturers in the United States. For the most part, the alternatives performed as well or better than TCA or METH adhesives.

From a human-health and environmental standpoint, hot-melt adhesives appear to pose the fewest risks, but they cannot be used in all applications. Water-based adhesives pose much lower risk than solvent-based adhesives, but their use may not be suitable for all applications.

“This research demonstrates that alternative adhesives that are better for human health and the environment are widely available,” says Katy Wolf, IRTA executive director. “Companies seeking alternatives should focus on the non-solvent based adhesives.” •

For more information, contact Mary B. Swanson at mwsanso1@utk.edu. To acquire a hard copy of the full report, contact Gail Farris at 865-974-4774 or gfarris@utk.edu. Access a PDF version of the report at <http://eerc.ra.utk.edu/what-new/new-report.htm>. Click on “Alternative Adhesives Technologies” under Case Studies. Additional case studies are available at: www.irta.us/epaadhfurncs.html and www.irta.us/epaadhmatrcs.html.

