#### 2002 ANNUAL REPORT



Center for Health Effects of Environmental Contamination

#### THE CENTER FOR HEALTH EFFECTS OF ENVIRONMENTAL

**CONTAMINATION (CHEEC)** at The University of Iowa (UI) continued its commitment to interdisciplinary research, service, and education activities in 2002. CHEEC's contributions extend throughout the university community and state. Achievements in 2002 reflect CHEEC's mission to determine the levels of environmental contamination which can be specifically associated with human health effects.

A 2001 faculty report to the UI Office of the Provost concluded, "Interdisciplinary teaching, service, and research at Iowa contribute the very best to our students and society." CHEEC's staff, executive committee, and advisory committee are committed to that challenge by supporting and initiating innovate and collaborative research, organizing and supporting educational opportunities, and providing service for environmental health endeavors. "Interdisciplinary teaching, service, and research at Iowa contribute the very best to our students and society."







#### Research

## 2002 was an engaging year for CHEEC research programs past seed grant projects generated additional extramural funding and newly awarded grants supported a diverse array of research.

A stated goal of the UI Office of the Vice President for Research is to *"Foster interdisciplinary and collaborative projects that could have significant bearing on institutional objectives or that go beyond established departmental or collegiate relationships."* The CHEEC Seed Grant Program actively pursues this goal by promoting cooperation across the campus. A typical proposal includes collaborators from many academic units who provide the expertise necessary for successful research endeavors. Seed grants support undergraduate and graduate students in academic pursuits that are vital to their professional development, while faculty investigators frequently incorporate seed grant research results into their curricula.

In the past 5 years, results from CHEEC seed grant projects have been used to develop larger scale research proposals, which in turn have generated \$3,241,000 in extramural funding. Included is \$1,500,000 for research in the College of Engineering, \$1,100,000 for research in the College of Public Health, and \$641,000 for research in the College of Liberal Arts and Sciences.



Fiscal year 2002 seed grant recipients are conducting innovative laboratory and field studies on water, air, and soil contaminants. The following projects received seed grants.

#### Cephalosporin Resistant E. coli in Iowa Waterways

INVESTIGATOR: PL Winokur, Department of Internal Medicine, The University of Iowa SUMMARY: Cephalosporin resistant CMY-2 E. coli have

been identified in food animals and humans from Iowa. Preliminary studies suggest that waterborne transfer may play a role in transmission of this resistance. Sixty Iowa surface waterways will be sampled monthly and E. coli expressing CMY-2 will be identified. Sites repeatedly contaminated with CMY-2 E.coli will be intensively studied to pinpoint possible sources of contamination. Candidate contaminating facilities will be identified, and groundwater, fecal waste and soil contamination will be analyzed.

The Fate of Metolachlor, Atrazine, and Pendimethalin During Phytoremediation with Prairie Grasses

INVESTIGATORS: JB Belden, TA Phillips, JR Coats,Department of Entomology, Iowa State UniversitySUMMARY: This study will investigate the fate of the common herbicides metolachlor, atrazine, and pendimethalin in soil that has been planted with prairie grasses. Grasses grown

in soil fortified with a radiolabeled herbicide will be placed in a sealed acrylic chamber. Volatile organic metabolites and CO2 will be analyzed throughout the experiment. In addition, plants and soil will be analyzed for total radioactivity, parent compounds and major metabolites after a remediation period.

#### Pollutants of Emerging Concern in Iowa Air

**INVESTIGATOR**: KC Hornbuckle, Department of Civil and Environmental Engineering, The University of Iowa **SUMMARY**: Atmospheric deposition of persistent organic pollutants (POPs) to agricultural crops is an important process in human exposure to POPs through the food chain. In order to quantify potential human exposure to these compounds, atmospheric monitoring is necessary. More than 100 air samples will be analyzed for trace level concentrations of potentially hazardous air pollutants of emerging concern. Analytical methods will be designed and tested for flame retardants, oil additives, current use pesticides, fragrance materials, plasticizers, and veterinary pharmaceuticals at trace levels in ambient air. Exploratory Studies of Nitroso Compound Formation and Occurrence as a New Class of Disinfectant By-products in Drinking Water and Wastewater **INVESTIGATOR:** RL Valentine, Department of Civil and Environmental Engineering, The University of Iowa SUMMARY: Until recently it was believed nitroso compounds in drinking water and wastewater were due to contamination of the source water. Recent observations indicate that N-nitrosodimethylamine (NDMA), a particularly potent carcinogen, can be produced during drinking water and wastewater treatment. Studies at Iowa have recently elucidated a novel formation pathway that involves reactions of chlorine, ammonia, and dimethylamine that support the hypothesis that NDMA is a new disinfectant by-product. This research proposes that NDMA is but one representative of a new class of disinfectant by-products, and that other types of nitroso compounds may also formed by a similar mechanism in chlorinated and chloraminated drinking and wastewater.



Uptake and Metabolism of Acetanilide Herbicides by Hybrid Poplar Trees

INVESTIGATORS: C Just, J Schnoor, Department of Civil and Environmental Engineering; M Wichman, J Vargo, University Hygienic Laboratory, The University of Iowa SUMMARY: Engineered planting of hybrid poplar trees may be able to intercept and treat herbicide contaminated groundwater. Laboratory studies involving hydroponic microcosms and isotopically labeled herbicides will determine plant toxicity and fate pathways for various herbicide mixtures. Mass balances will be completed and the identities of metabolites will be determined using a variety of analytical techniques. The project will test the efficacy of hybrid poplar tree use to remediate contaminated agrichemical facilities.

### Education and Service

**CHEEC fulfills crucial** service and education missions by funding educational programs, by planning and hosting public and professional educational events, and by participating in various state committees on environmental health and public health.





# CHEEC provided funding for the following educational programs in 2002:

Expanding Integrated Pest Management Training for Iowa's Public Schools

J DeWitt, M Shour, Iowa State University Extension **SUMMARY**: This program promoted awareness of Integrated Pest Management (IPM) by hosting a free workshop for Iowa school districts. Presentations covered IPM principles and methods, the effects of pesticides on target and nontarget organisms, pesticide safety, and guidelines on how to implement IPM in a school district. These techniques encompass both indoor and outdoor school environments.

#### Midwest Agricultural Safety & Health Forum

**CO-SPONSORS:** Iowa's Center for Agricultural Safety and Health, Wellmark Foundation, NIOSH Agricultural Centers, Humanities Iowa, CHEEC

**SUMMARY:** This conference brought together academic researchers and public health practitioners from Colorado, Illinois, Iowa, Minnesota, Nebraska, and Wisconsin to discuss issues related to agricultural health and safety surveillance, intervention, advocacy, education and outreach for rural populations. Special sessions were dedicated to rural women's health issues and working with the media.

CHEEC sponsors a continuing seminar series on environmental health issues. In 2002, Robert Bringolf of the Department of Animal Ecology at Iowa State University presented "Evaluation of an Assay for Environmental Estrogens in Effluents from Iowa Wastewater Treatment Facilities". This seminar was co-sponsored by the UI Department of Civil and Environmental Engineering.

CHEEC staff is routinely involved in environmental health service and education activities. In 2002, staff participated in the Des Moines Water Works ongoing discussion group on water quality and agricultural issues. This group, comprised of drinking water utility managers, agribusiness leaders and public health professionals, is currently focusing on emerging contaminant issues. In addition, CHEEC staff made numerous presentations around the state on water quality and public health issues.

CHEEC staff participated in state and regional planning efforts for biomonitoring programs. Supported by seed funds from the Centers for Disease Control and Prevention, researchers from the University of Iowa Hygienic Laboratory, UI College of Public Health, Iowa Department of Public Health, and a consortium of Midwestern public health laboratories began initial planning to increase capacity for biomonitoring.

#### **CHEEC Data Management Center**

The CHEEC Data Management Center (CDMC) develops and maintains environmental exposure databases. In 2002, CDMC staff began updating the Iowa Historical Municipal Water Treatment and Supply Database through telephone surveys of municipal water treatment plant operators. This update keeps CHEEC at the forefront of national drinking water databases for use in environmental health research.

In 2002, CHEEC participated in the planning and implementing the Iowa Community Private Well Study. As part of CHEEC's cooperative research program, this study is investigating drinking water quality in private wells for communities that are not served by a public water supply. Approximately 60 communities are participating in this pilot research effort. Collaborators are the University of Iowa Hygienic Laboratory, the U.S. Geological Survey, the Iowa Department of Natural Resources, county environmental health specialists, and the UI Environmental Health Sciences Research Center. Other CHEEC research efforts included: 1) continued collaboration with the American Water Works Association Research Foundation and the University of Colorado to model disinfection by-products in drinking water distribution systems; 2) collaborative work with the UI Department of Geography on a project titled *Water Quality Protection in Agroecosystems: Integrating Science, Technology, and Policy at the Watershed Scale* funded by the U.S. Department of Agriculture; and 3) CDMC computer systems support for the *Agricultural Health Study*, which is being conducted by the UI College of Public Health.

