

Center for Health Effects of Environmental Contamination

20+ YEARS  
of Research, Education  
and Service



## MISSION

The University of Iowa Center for Health Effects of Environmental Contamination (CHEEC) is a multidisciplinary environmental health research center dedicated to supporting and conducting research that identifies, measures and prevents adverse health outcomes related to exposure to environmental toxins. CHEEC is comprised of faculty and researchers located in the University of Iowa Colleges of Public Health, Engineering, and Liberal Arts and Sciences, and University Hygienic Laboratory. CHEEC's mission, as described in the Iowa Groundwater Protection Act, is to "determine the levels of environmental contamination which can be specifically associated with human health effects."

Cover painting: Fred Easker, *Autumn View Near Matsell*



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Since 1988, CHEEC has been involved in developing and maintaining water quality databases, conducting health effects research, funding environmental research through a Seed Grant Program and a Cooperative Research Program, supporting educational programs, conferences and workshops, and providing service to the state.

## WATER QUALITY DATABASES AND CHEEC RESEARCH

Development of the Iowa municipal drinking water supply database was the first project undertaken by CHEEC. This database contains information gathered from a variety of state and federal sources, and includes annual updates from Safe Drinking Water Act monitoring. Municipal supply water quality data (1930s – present) and source and treatment information (1900 – present) have been used by researchers at academic institutions, state and federal agencies and engineering firms for a variety of Iowa-based research projects. Some examples include:

- Nitrate and disinfection by-products (DBPs) and cancer risk – National Cancer Institute, Mayo Clinic, The University of Iowa (UI)
- Nitrate and risk for birth defects – National Institute for Environmental Health Sciences, Texas A&M University, UI
- DBPs and risk for birth defects – National Birth Defects Prevention Study Centers, Centers for Disease Control and Prevention



- Water treatment processes/source water characteristics to model exposures to DBPs – American Water Works Association Research Foundation, University of Colorado, UI

The CHEEC Data Management Center designs, develops and maintains databases for UI and state agency researchers conducting environmental surveillance activities and epidemiologic studies of adverse health outcomes and environmental exposures. Some examples include:

- Agricultural Health Study – UI Dept. of Epidemiology, National Cancer Institute
- Muscular Dystrophy Surveillance, Tracking and Research Network – UI Dept. of Epidemiology, Centers for Disease Control and Prevention
- Iowa Statewide Rural Well Water Survey – Iowa Dept. of Natural Resources, Iowa Dept. of Public Health
- Comprehensive Assessment of Rural Health in Iowa: Carroll County Well Water Study – Iowa Dept. of Public Health, Centers for Disease Control and Prevention



## SEED GRANT PROGRAM

In 1989, CHEEC established a Seed Grant Program providing support for pilot studies developing innovative approaches and methods for environmental health research. The program is open to all Iowa colleges and universities, and promotes the involvement of students in research activities. To date, almost 80% of seed grants awarded included support for graduate students, with 40 M.S. and Ph.D. theses and at least 45 peer-reviewed publications resulting in part from CHEEC seed grants. Since 1989, 113 seed grants have been awarded totaling \$2,000,000. Through 2008, ~ 40% of seed grant projects have garnered a total of over \$17,000,000 in funds from federal, state and private sources for larger scale research. Examples of CHEEC seed grant projects include studies of

- adverse health outcomes (birth defects, cancer, asthma, etc.) associated with environmental exposures
- environmental exposures (drinking water ingestion, dermal exposures, indoor and outdoor air, animal confinements, etc.)
- environmental sampling and analytical techniques (passive air samplers, immunoassays, molecular

methods, etc.) environmental remediation techniques (phytoremediation, etc.), and environmental exposure and fate and transport models

## COOPERATIVE RESEARCH PROGRAM

CHEEC established a Cooperative Research Program in 1999 to provide matching funds for research on emerging environmental issues of importance to Iowans. Cooperators have included the U.S. Geological Survey, the Leopold Center for Sustainable Agriculture, the ISU Department of Agricultural and Biosystems Engineering, the Iowa Department of Natural Resources Water Monitoring Program, the Iowa Department of Public Health, the UI Colleges of Engineering, Public Health and Medicine, and the University Hygienic Laboratory.

Cooperative research projects have focused on

- surveillance for emerging water contaminants
- surveillance of private well water quality
- fate of compounds in wastewater treatment
- exposure to air contaminants in hog production facilities
- recreational water exposure to bacteria



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## EDUCATIONAL ACTIVITIES, CONFERENCES AND WORKSHOPS

CHEEC provides support for and helps organize, host and conduct public education programs on a wide variety of environmental issues. Examples of education programs CHEEC has co-sponsored include

- The Johnson County Water Festival – Iowa City Community School District
- The Governor's Iowa High School Water Summit and Scholarship Program
- Ecological Lawn and Garden Fair – UNI Center for Energy and Environmental Education
- Onsite wastewater workshop – Taylor County Department of Public Health
- Integrated Pest Management Training for Iowa's Public Schools – ISU Extension
- Regional Teens Against Tobacco Use Training– Mid Eastern Council on Chemical Abuse

CHEEC sponsors an ongoing seminar series and conducts professional conferences on environmental issues of interest to Iowa. Since 1988, almost 80

seminars have been held, and several conferences have been conducted, including:

- Water Quality, Agriculture and Public Health (1991)
- The Media's Role in Communicating Health Risks: What's in the Water? (1994)
- Safe Drinking Water – Iowa's Future (1994)
- Iowa Conference on Emerging Environmental Health Issues (1997)
- Endocrine Disruptors and Pharmaceutically Active Compounds in Drinking Water (2000)
- Iowa Conference on Emerging Infectious Diseases (2004)
- Keep it Small Keep it All: Cultivating the Bioeconomy at the Local Scale (2008)

CHEEC co-sponsors professional meetings at the state level, and has also been involved in sponsoring workshops on both the regional and the national levels. Some examples include:

- Understanding the Impacts of Large Scale Swine Production: An Interdisciplinary Workshop (1995: primary sponsor – UI College of Public Health)





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- Agriculture and the Environment Conferences (1997, 1998, 2000: primary sponsor: Iowa State University Extension)
- Atrazine and the Health of Humans and Wildlife: State of the Science and Future Research Needs (2005: primary sponsor – University of California, Berkeley)

### SERVICE ACTIVITIES

CHEEC staff provides service to the state of Iowa by contributing expert advice on various issues to legislative study committees, participating on technical advisory committees (TACs) for state agencies, and working with county and local governments and NGOs on environmental health issues. Some examples of service activities include:

- Iowa Department of Natural Resources Ambient Water Monitoring Program TAC, Brownfields TAC, Lake Nutrient Standards TAC
- Governor's Task Force on Air Toxics

- Johnson County Onsite Wastewater Systems Advisory Committee
- Des Moines Water Works Water Utility / Agribusiness Focus Group
- Iowa Water Quality Action Plan Steering Committee
- Cedar River Watershed Coalition Committee

*Pete Weyer, Ph.D. Associate Director*



## 2007-2008

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### DATA MANAGEMENT AND RESEARCH

Environmental health databases are a central component of Center operations. CHEEC created and maintains computerized databases on Iowa water quality, including the *Iowa Historical Municipal Water Treatment and Supply Database*, the *Municipal Analytical Water Quality Database*, and the *Statewide Rural Well Water Survey (SWRL)*. The municipal databases are up-to-date through 2008. They continue to be utilized in conducting drinking water quality and health effects research in Iowa. In 2007-2008 this research included:

- **Exposure Assessment Method for Disinfection Byproducts in Drinking Water in the National Birth Defects Prevention Study**

**Collaborators:** National Birth Defects Prevention Study centers, U.S. EPA, and the University of North Carolina

**Funding Agency:** National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention (CDC)

- **Comprehensive Assessment of Rural Health in Iowa: the Carroll County Well Water Study**

**Collaborators:** Carroll County (IA) Environmental Health Department, Iowa Department of Public Health, and the University Hygienic Laboratory

**Funding Agency:** Iowa Department of Public Health and National Center for Environmental Health

- **Nitrates, Nitrites and Nitrosatable Drugs and the Risk for Selected Birth Defects**

**Collaborators:** Texas A&M University, The University of Iowa Registry for Congenital and Inherited Disorders, and National Birth Defects Prevention Study centers.

**Funding Agency:** National Institute for Environmental Health Sciences

- **SWRL Phase II**

**Collaborators:** Iowa Department of Natural Resources, University Of Iowa Hygienic Laboratory, UI College of Public Health, and County environmental health specialists.

**Funding Agency:** Iowa Department of Natural Resources



- **MDSTARNet:**

**Collaborators:** Centers for Disease Control and Prevention (CDC), Iowa Registry for Congenital and Inherited Disorders, Iowa Department of Public Health, and researchers from Arizona, Colorado, Georgia, and New York.

**Funding Agency:** Centers for Disease Control and Prevention

## SEED GRANTS

CHEEC awards approximately one-third of its annual allocation to pilot scale research. In recent years, pilot studies generate ten dollars in external funding for every dollar invested. Seed funding creates a valuable learning environment for undergraduate and graduate level students.

CHEEC awarded the following seed grants in fiscal year 2007 and 2008:

- **Transformation and Fate of Manufactured Metal Nanoparticles in Aqueous Environments**

**Investigator:** Vicki Grassian, Ph.D., Department of Chemistry, The University of Iowa

- **Evaluation of Adenovirus Real-Time and Conventional PCR Assays to Detect Fecal Contamination in Water and to Identify Its Source**

**Investigators:** Margaret Chorazy and Gregory Gray, MD MPH, Department of Epidemiology, The University of Iowa

- **Evaluation of Enterococci and Bacteroides Real Time PCR Assays for Measuring Recreational Water Quality in Iowa with a Source Tracking Perspective**

**Investigators:** Lucy DesJardin, Ph.D. and Nancy Hall, B.S., MT, University Hygienic Laboratory, The University of Iowa

- **A molecular Microbiological Search for Active Biphenyl Dioxygenases in Polychlorinated Biphenyl-contaminated Sediments**

**Investigators:** Timothy Mattes, Ph.D. and Keri Hornbuckle, Ph.D., Department of Civil and Environmental Engineering, The University of Iowa



## 2007-2008

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- **Paraquat-Mediated Generation of Endogenous Neurotoxins Resulting from Dopamine Oxidation**  
Investigator: Jonathon Doorn, Ph.D., Division of Medicinal and Natural Products Chemistry, College of Pharmacy, The University of Iowa
- **Exploratory Studies of a Novel Pathway for the Formation of halo-organic Disinfection By-Products**  
Investigator: Richard Valentine, Ph.D., Department of Civil and Environmental Engineering, The University of Iowa
- **Arsenic Speciation in Iowa's Groundwater and Surface Water**  
Investigator: Donald Simmons, Ph.D., University Hygienic Laboratory, The University of Iowa
- **Determining the Mechanistic Effects of the Physical Properties of Nanocrystalline Zeolites on Cell Toxicity**  
Investigators: Aliasger Salem, Ph.D. Department of Pharmaceutics, Sarah Larsen, Ph.D. Department of Chemistry, The University of Iowa

- **Mechanisms of Perfluorooctanesulfonamide- Induced Oxidative Stress in Female Rats**  
Investigators: Wei Xie Ph.D., Hans-Joachim Lehmler, Ph.D., Department of Occupational and Environmental Health, Douglas Spitz, Department of Radiation Oncology, The University of Iowa

## EDUCATION AND SERVICE ACTIVITIES 2007-2008

CHEEC hosts and funds seminars, conferences, and educational programming. In the past two years these were:

- A conference titled *Keep it Small Keep it All: Cultivating the Bioeconomy at the Local Scale*. Speakers discussed the bioeconomy on local and regional scales, emphasizing environment and health opportunities and challenges.
- Organizing *CHEEC's 20th Anniversary Symposium*. Symposium participants identified and discussed past CHEEC accomplishments and laid out future strategies and areas of emphasis for environmental and public health research and programs.

- Financially supporting a radon education effort targeting new mothers. The pilot program was titled *Efficacy Assessment of Distributing Radon Education Materials to Parents of Newborns in the State of Iowa*
- Partially supporting the following conferences and activities: *Leopold Center 20th Anniversary Celebration*, *An Endangered River Runs Through Us: Three Iowa River Journeys*, and *Writing Science at the Writing University*.

**The following seminars were hosted on the University of Iowa campus:**

- **Pyrethroids: A Potential Peril?**  
Kathy Kuivila, United States Geological Survey  
co-Sponsors: U.S. Geological Survey
- **Environmental Exposure to Estrogenic and Other Myco and Phytotoxins**  
Corinne Hoerger, Swiss Federal Research Station for Agroecology and Agriculture  
co-Sponsors: U.S. Geological Survey

- **Nutrient Transport and Retention in Wetland and Aquatic Ecosystems**

Greg Noe, United States Geological Survey  
co-Sponsors: U.S. Geological Survey

- **Sustaining Iowa: Making the Connection between Food, Health and the Land**

Preston Maring, Kaiser Permanente Medical Center  
co-Sponsors: Leopold Center for Sustainable Agriculture ISU, Center for Energy and Environmental Education UNI

In the past two years, CHEEC staff served on the steering committee for *The Governor's Iowa High School Water Summit and Scholarship Program*. This scholarship competition targeted high school students who have an interest in water resources. Center staff continued serving on the advisory boards of the statewide Ambient Water Quality Monitoring and the Lake Nutrients Standards Technical Advisory Committee.

## WHO WE ARE

### **CHEEC Center Staff**

#### **Xin Lu**

Applications Development & Support

#### **Jiji Kantamneni**

Systems Administration & Systems Programming

#### **David Riley**

Program Coordinator

#### **Pete Weyer, Ph.D.**

Associate Director

#### **Scott Lyman**

Applications Development & Support

#### **Nicholas Wade**

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### **Executive Committee**

Gene Parkin, Ph.D., Center Director

Sarah Larsen, Ph.D.

Gabriele Ludewig, Ph.D.

Charles Lynch, M.D., Ph.D.

Paul Romitti, Ph.D.

Richard Valentine, Ph.D.

Pete Weyer, Ph.D.

Michael Wichman, Ph.D.

### **Advisory Committee**

David Bennett, Ph.D., UI Department of Geography

Trudy Burns, Ph.D., UI Department of Epidemiology

Jim Ellerhoff, Iowa Department of Agriculture and Land Stewardship

Kelley Donham, D.V.M., UI Institute for Rural  
and Environmental Health

Lois Dusdieker, M.D., UI Department of Pediatrics

R. William Field, Ph.D., UI Department of Occupational  
and Environmental Health

Keri Hornbuckle, Ph.D., UI Department of Civil  
and Environmental Engineering

Bernard Hoyer, Iowa Department of Natural Resources  
(Committee Chair)

Ken Sharp, Iowa Department of Public Health

Don Simmons, Ph.D., University Hygienic Laboratory

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