



CENTER FOR HEALTH EFFECTS OF ENVIRONMENTAL CONTAMINATION

2006 ANNUAL REPORT



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 to identify, measure, and prevent adverse health outcomes related to exposure to environmental toxins. CHEEC is comprised of faculty and researchers from The University of Iowa Colleges of Public Health, Engineering, and Liberal Arts and Sciences, and University Hygienic Laboratory. CHEEC is located administratively in the Office of the Vice President for Research at The University of Iowa.

CHEEC's mission, as described in the Groundwater Protection Act, is to *“determine the levels of environmental contamination which can be specifically associated with human health effects.”* Research, education, and service activities in 2006 fulfilling the mission include assembling data on the presence of contaminants in the environment, supporting laboratory work on the fate and transport of toxic substances, collaborating with researchers at public health registries conducting epidemiologic studies of disease, supporting research that increases the understanding of how toxins act at a cellular level, and participating in education and service activities of environmental health programming available to Iowans.

COVER PHOTOGRAPH: Michael Johnson, *New Corn, IA, 2003*

2007 MARKS THE 20TH ANNIVERSARY OF THE IOWA GROUNDWATER PROTECTION ACT AND THE ESTABLISHMENT OF THE CENTER FOR HEALTH EFFECTS OF ENVIRONMENTAL CONTAMINATION AT THE UNIVERSITY OF IOWA.

CHEEC continues to conduct and support water quality research directed at protecting the public health of Iowans. In 2006, work began on assessing drinking water quality in Iowa's private rural wells with the first year of data collection for the *Iowa Statewide Rural Well Water Survey Phase 2 (SWRL2)*, the only systematic statewide surveillance of private rural well water quality since 1988-89, when the original SWRL project was conducted. This three year project (2006-08) is led by CHEEC and involves county environmental health specialists, the University Hygienic Laboratory, the UI College of Public Health, the Iowa Departments of Public Health and Natural Resources, the U.S. Geological Survey, and Iowa State University. Work also began in 2006 to investigate the possible effects of drinking water disinfection by-products and nitrate levels on the risk for adverse reproductive outcomes. This is a collaborative effort between CDC National Birth Defects Prevention Study Centers, including the Iowa Registry for Congenital and Inherited Disorders. CHEEC will provide data management expertise and will help coordinate the exposure assessment component of these studies.

This annual report presents information on these and other CHEEC research and education activities during 2006. An example of a very successful ongoing activity is the CHEEC Grant Program. Since 1988, the Seed Grant Program has awarded over 120 grants for innovative environmental research, in many cases providing support for graduate students to conduct research leading to advanced degrees. These students have gone on to productive careers in environmental and health sciences in academia, government and the private sector. The Education Grant Program (est. 1996) has supported numerous professional and public workshops and conferences and grass roots education activities across the state.

As we plan for several activities in 2007 to celebrate the 20th anniversary of the Iowa Groundwater Protection Act and the establishment of CHEEC, we will continue to study emerging environmental health issues and will provide Iowans with information and education opportunities on those issues.

Pete Weyer, Ph.D. Associate Director





RESEARCH

IOWA STATEWIDE RURAL WELL WATER SURVEY PHASE 2 (SWRL 2)

In 2006, CHEEC, University Hygienic Laboratory, UI College of Public Health, United States Geological Survey, Iowa Departments of Public Health and Natural Resources, county environmental health specialists, and Iowa State University completed the first year of a three year study assessing the quality of water available to rural residents. 2006 focused on locating and sampling wells used in the 1988-89 SWRL study. Years two and three will randomly select wells statewide to investigate biological, inorganic and organic contaminants including commonly used herbicides and their degradates.

What has changed in twenty years from the original study?

- Many of the original SWRL wells no longer exist; owners drilled new wells or refurbished existing wells to meet water quality and quantity needs, or in many cases hooked up to a rural water system.
- The original SWRL study found nitrate contamination above the health advisory limit of 10 ppm in 18% of the wells. Preliminary results from the first year of SWRL 2 shows 8% of the wells exceeded that limit.
- Degradation compounds of commonly used herbicides are found in many wells. Parent compounds show up in 11% of the wells, while degradate compounds are seen in 46% of the wells. Newer laboratory methods are able to detect lower levels and more of these degradates. Both parent and degradates generally are found at very low levels.
- Bacteria are found in 50% of the wells surveyed. This is similar to findings of twenty years ago.
- Arsenic in low levels is appearing in 75% of the wells tested, but rarely exceeds concentrations that may be a health concern.

SEED GRANTS

CHEEC AWARDS APPROXIMATELY ONE-THIRD OF ITS ANNUAL ALLOCATION to pilot scale research. In return, these pilot studies generate ten dollars in external funding for every dollar invested. Seed funding provides hands-on learning opportunities for undergraduate and graduate level students enhancing their education experience and preparing them for their professional life.

CHEEC awarded the following seed grants in 2006:

DEMONSTRATION PROJECT FOR SOURCE-RECEPTOR MODELING OF VEHICULAR TOXIC GASES AND PARTICLES *Investigator:* Charles Stanier, Ph.D., Department of Chemical and Biochemical Engineering, University of Iowa

MOUSE MODEL OF EXPERIMENTAL ASTHMA USING (1→3)-β-D- GLUCAN DERIVATIVES *Investigators:* Nervana Metwali, Ph.D., Peter Thorne, Ph.D., Department of Occupational and Environmental Health, University of Iowa

DEVELOPMENT OF A SINGLE PARTICLE ANALYSIS TECHNIQUE FOR REAL-TIME MONITORING AND CHARACTERIZATION OF BIOAEROSOLS *Investigator:* Mark Young, Ph.D., Department of Chemistry, University of Iowa

POLYCHLORINATED BIPHENYLS ARE AN “OLD” ISSUE: TELOMERE TOXICITY ACCELERATES SENESCENCE AND PROMOTES CARCINOGENESIS *Investigators:* James Jacobus, Interdisciplinary Degree in Toxicology, Gabriele Ludewig, Ph.D., Department of Occupational and Environmental Health, Aloysius Klingelhut, Ph.D., Department of Microbiology, University of Iowa

THE PREVALENCE AND CONTROL OF FRAGRANCE COMPOUNDS IN IOWA DRINKING WATER *Investigators:* Keri Hornbuckle, Ph.D., William Wombacher, Department of Civil and Environmental Engineering, University of Iowa

SEED GRANT RECIPIENTS: WHERE ARE THEY NOW?

SARA KELLEY received a Master of Science in Civil and Environmental Engineering from the University of Iowa in 1999. CHEEC seed funding assisted in the completion of her thesis, titled *Bioaugmentation of the rhizosphere for enhanced phytoremediation of 1,4-dioxane*.

She currently works for Sebesta Blomberg & Associates as an Environmental Specialist providing environmental and engineering consulting services for industries across the United States. Her expertise is assisting clients with meeting complex air quality requirements. This past year she completed the permit application for the addition of a 50 million gallon ethanol production facility to an existing corn wet milling plant. Previously, Sara worked at the Linn County (Iowa) Public Health Department as an Air Permitting Engineer for six years. She reviewed Title V air permit applications in Linn County, assisted facilities with understanding compliance requirements of the permits, and inspected industries to confirm compliance with local, state and federal requirements.



DATA MANAGEMENT

ENVIRONMENTAL HEALTH DATABASES are a key 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)*. These support ongoing assessment of drinking water quality in Iowa, and are utilized by researchers studying the link between drinking water and adverse health outcomes, policy makers, and students whose interest and training are in public health.

In 2006, CDMC research efforts utilizing CHEEC's environmental health and computer database expertise are:

- full database and applications development for SWRL Phase 2, a collaborative research effort sampling private rural drinking water wells.
- research and data management support for Muscular Dystrophy Surveillance Tracking and Research Network (MDSTARNet) in cooperation with the Iowa Registry for Congenital and Inherited Disorders; funding provided by the Centers for Disease Control and Prevention (CDC).
- research and database management on the Comprehensive Assessment of Rural Health in Iowa (CARHI) in collaboration with the UI Departments of Geography, Occupational and Environmental Health, and Family Medicine. Funding is provided by the CDC.

SERVICE/EDUCATIONAL ACTIVITIES

CHEEC STAFF ARE ENGAGED in environmental health service and education activities through committee membership, organizing and funding educational programs, and answering environmental health questions from the public. Education is a key theme throughout the Groundwater Protection Act and CHEEC continues providing educational programming on environmental health to the public.

In 2006 CHEEC staff served on the steering committee and was a partial financial sponsor for *The Governor's Iowa High School Water Summit and Scholarship Program*. \$10,000 in college scholarships was awarded. The competition targeted high school students who have an interest in water resources and who have an awareness of the broad array of challenges facing communities in protecting Iowa's water resources today and in the future.

The following seminar was held on the UI campus in 2006:

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Richard Whitman, Ph.D., and Meredith Nevers, *U.S. Geological Survey*
Co-sponsored by the U.S. Geological Survey and Iowa Department of Natural Resources

In 2006, CHEEC staff gave professional presentations at state and regional conferences highlighting CHEEC research projects. Center staff serve on the advisory boards of the statewide Ambient Water Quality Monitoring and the Lake Nutrients Standards Technical Advisory Committee. Center staff provided external reviews for numerous academic journal articles and National Academy of Sciences publications.



WHO WE ARE

CHEEC CENTER STAFF

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CHEEC

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