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**Cover**  
Totemic Theory #3 ©2000 by Bill & Clarissa Hudson, courtesy of Stonington Gallery, Seattle, WA. The front cover and section divider pages depict details from this 6-foot-tall, three-dimensional, acrylic-on-canva totem pole. The image elements are derived from Alaskan Native artist Clarissa Hudson’s button blankets. (photos: Kathy Sauber)
Toxicology graduate students Jing Shao (right) and Francesca Noel Hudson work in the lab.
ENTERING A NEW MILLENNIUM

Fresh challenges for a new era

During the 1999–2001 biennium, as we crossed the centuries and millennia, we also made some important transitions within our Department and School. We can now look back and assess changes that we were anticipating two years ago.

In 1999, Dr. Pat Wahl was beginning her tenure as dean of the School of Public Health and had just launched a multiyear development plan. She has led an effort to identify priorities for research, teaching and service, and to strengthen ties with the public health practice community in Washington state and the region. In June 2000, Dr. Dave Kalman became chair of the Department of Environmental Health and joined the school in expanding internal programs and external partnerships.

This period saw major national changes in health issues, environmental concerns, and political leadership. While the public continues to be concerned about protection of health and preservation of environmental quality, we need to make sure that the benefits of our interventions are evident and meaningful to average citizens. We need to connect our theoretical work with tangible public health benefits and balance our research with other social and personal needs.

The five feature stories in this report describe some of our efforts. Five alumni profiles illustrate how our students are making a difference in the broader world.

The twin revolutions in molecular genetics and digital technology continue to reshape our lives, challenging us with new problems to manage, from computer viruses to ethical dilemmas about the proper use of biotechnology. At the same time, these technologies offer previously unimagined access to information, communication tools, and medical benefits.

The academic world is struggling to adjust to these changes. While “lifelong learning” has always been a part of our values as scholars and teachers, this model of educational development is emerging as a personal and social imperative. How will it change the way we teach, do research, and provide services?

Our Department has a distinctive orientation to many of these questions. Since legislation was enacted in 1963, the Department has received support from funds paid by employers and workers into the industrial insurance fund, appropriated biennially by the state Legislature. The intent was that some portion of workers’ compensation funds go toward preventing future occupational injuries and disease. The law also provided for an advisory committee with members from state agencies; business, labor, and medical associations; and other University departments to review our Department’s programs (see page 56 for a list of current members).

This mandate to provide teaching, conduct research, and offer services related to the safety and health of Washington workers and employers has shaped our growth and continues to influence our activities. Our connection with real-world problems places us in a position to be among the first to recognize and respond to change.

As we enter the new millennium, we aim to expand and improve the societal benefits of our work, recognizing that external partners are essential in this undertaking. We encourage readers whose imaginations are engaged by this report to contact us and join in future efforts in environmental and occupational health.

OUR MISSION

To identify agents in the environment and the workplace that affect human health

To elucidate their mechanisms

To develop strategies for confronting their effects

To share the knowledge obtained

In addressing this public health mission, our goal is to promote excellence in education and research.
James Blessman decided to specialize in occupational medicine out of a frustration that he couldn’t do enough for his patients as an internal medicine trainee. “I was often called to see individuals with end-stage organ damage; they were asking me to help, and for the most part it was too late,” he recalls. “This led me to the preventive medical specialty, occupational medicine.” He found out about occupational medicine “late in the game,” but was fortunate enough to get accepted in two programs, one in Chicago and the University of Washington.

A Michigan native, he packed himself and his then-pregnant wife into a too-small Honda hatchback and headed west. He wasn’t disappointed.

“I was able to rub elbows with many of the individuals who were actually writing in the field” such as Linda Rosenstock, Scott Barnhart, and Bill Danieii. “Coming from a community hospital, this was a big deal to me.” He was also impressed by the quality of the other candidates in the program. His class included Joel Kaufman and Matt Keifer, both now on the DEH faculty. “My colleagues were an inspiration then and continue to be to this day,” James recalls.

After graduating from the residency program in 1989, he returned to Detroit and joined the faculty of Wayne State University. In 1996, he was asked to serve as the medical director for City of Detroit employees. Under his direction, the city has saved $20 million in occupational safety and health costs in the past five years. Last year, Wayne State made him director of the Division of Occupational Medicine and interim residency director for the occupational medicine residency program.

He is board certified in internal medicine and occupational medicine. His research specialties are low back pain and occupational stress. “Needless to say my life is currently very exciting and I feel blessed and honored to serve in the capacity that I do.” He encourages medical residents and graduate students to find a balance in their lives. He has been married 16 years and has four children, is active in his church, and plays bass guitar.

His advice to those currently in training includes: “enjoy your stay; you are working with a good group of individuals who will likely be able to open doors for you in the future.” He considers preventive medicine a “noble field that requires that your efforts be focused.” He cautions residents not to expect instant gratification, because people “don’t know that they have not developed problems because of your efforts.”

He would urge today’s students to develop skills in “learning how to learn quickly” and effective communication. In occupational medicine, information is changing rapidly “and you need to know how to keep pace with it.” He has found that “there is little that you can do by yourself; you have to be able to work effectively with others.”
OUR DEPARTMENT

In the Department of Environmental Health, we identify, seek to understand, and help manage the effects of the environment on human health by ...

- evaluating and controlling workplace hazards
- maintaining a safe supply of food and drinking water
- discovering the mechanisms of occupationally and environmentally related diseases
- improving methods for treatment and disposal of solid and toxic wastes
- researching how the environment interacts with genetics to influence human health
- studying how environmental chemicals affect the health of children
- educating the next generation of occupational and environmental health professionals

ACADEMIC PROGRAMS

Environmental Health Technology students learn to identify major sources of contamination in water, air, soil, and food and take appropriate prevention, control, and communication measures. Students may achieve a Master of Science degree. One PhD pathway is also suitable for Technology program students.

Industrial Hygiene and Safety students study health hazards found in the workplace, such as chemicals, airborne particles, noise, vibration, ergonomic factors, and safety hazards. They learn to recognize these hazards, evaluate the possible health risks, and implement effective control measures. The program offers a PhD degree and two Master of Science tracks: industrial hygiene and safety/ergonomics.

The Occupational and Environmental Medicine residency trains physicians in occupational and environmental medicine through clinical, didactic, and practicum components. The program is accredited by the Accreditation Council for Graduate Medical Education and leads to a Master of Public Health and board eligibility in Occupational Medicine.

The Toxicology program focuses its study on the adverse effects of chemical exposures on human health, and engages in basic and applied research on the molecular, genetic, and biochemical mechanisms underlying these effects, together with the behavioral consequences and risk analyses associated with environmental and workplace toxicant exposures. Both master’s and doctoral degrees are offered.

The Department’s Undergraduate program offers two Bachelor of Science degree paths. One focuses on sanitary hazards associated with drinking water, wastewater, food, housing, and insects and rodents. The other focuses on chemical and physical hazards associated with indoor and outdoor air, water, soil, and the workplace.

See Department’s organizational chart on page 2
Service Programs

The Field Research and Consultation Group conducts field-based research and provides occupational and environmental health and safety consultation to companies that request assistance. Consultants observe work practices, collect samples or other data, obtain laboratory analyses, and, in some cases, coordinate medical examinations. Consultations include a final report summarizing findings of worksite evaluations and recommendations for controlling workplace exposures. The Field Group also works with companies to design and evaluate effective control strategies. These services are funded by the state’s Medical Aid and Accident Funds.

The Environmental Health Laboratory provides chemical analytical services to Washington’s employers, labor groups, and governmental organizations. It also performs chemical analyses and provides consultation related to occupational and environmental health to researchers within the University. The Laboratory has been accredited by the American Industrial Hygiene Association since 1977.

Centers and Institutes

The Center for Ecogenetics and Environmental Health (CEEH), funded by the National Institute of Environmental Health Sciences (NIEHS), pulls together more than 50 faculty from 18 UW departments to study how environmental factors interact with genetics to influence diseases such as cancer, birth defects, asthma, and chronic neurological diseases. A key focus is to understand how different people metabolize drugs and chemicals, which can affect their disease susceptibility or resistance. The Center, in collaboration with the Institute for Public Health Genetics, supports a research and outreach effort that addresses the ethical, legal, and social issues related to the collection and use of genetic information.

Within the CEEH, the Community Outreach and Education Program (COEP) helps the public understand how genetic and environmental factors interact to produce disease. COEP’s projects include:

- A curriculum that uses environmental health sciences as a framework to integrate science, social studies, and English. Students share their experiences through statewide videoconferences.
- Statewide distribution of a School to Work curriculum, which raises awareness of health and safety issues for working teenagers. The goal of this collaborative project between the Department of Environmental Health and the Washington state Department of Labor and Industries is to work with teachers statewide to prevent work-related injuries in teenagers.
- Community partnerships, including a collaboration with the Shoalwater Bay Tribe to develop a shellfish monitoring management plan.
**Center for Chemically Related Illness**, part of the Occupational and Environmental Medicine program, seeks to offer the best diagnosis and treatment of patients with chemically related illness, improve public understanding of such illness, and conduct research on this topic. Patients are usually referred through the workers' compensation system.

**The EPA Northwest Research Center for Particulate Air Pollution and Health** (PM Center) is one of five in the country funded by the EPA. The Center addresses health effects of particulate matter air pollution. Its researchers are from the departments of Environmental Health, Atmospheric Sciences, Biostatistics, and Civil and Environmental Engineering (UW and Washington State University). The PM Center emphasizes partnerships with the Puget Sound Clean Air Agency, Environmental Protection Agency Region 10, Washington state Department of Ecology, and the US Centers for Disease Control and Prevention.

**The Institute for Risk Analysis and Risk Communication** (IRARC) works to improve risk assessment methods and the scientific foundations supporting risk assessments. Three research programs fall under IRARC:

- **The Center for Child Environmental Health Risks Research** is funded by the US Environmental Protection Agency (EPA) and NIEHS to further knowledge of children's susceptibility to toxicants.

- **The Consortium for Risk Evaluation with Stakeholder Participation** (CRESP) works with the US Department of Energy (DOE) to advance cost-effective cleanup of the nation's nuclear weapons production facility waste sites. A goal is to give affected parties a greater understanding of the scientific and technical basis of environmental management decisions.

- **The Center for the Study and Improvement of Regulation** is funded by Carnegie Mellon University to merge the study of pollution, risk, public health, technology, economics, organizations, and history to improve environmental health and safety regulations.

**The International Scholars in Occupational and Environmental Health** is a training program based in the Occupational and Environmental Medicine program. The Center is funded by the National Institutes of Health through the Fogarty International Center and NIEHS and by NIOSH. It supports research and training partnerships with faculty and scientists in Vietnam, Thailand, Nicaragua, and Costa Rica.

**The Northwest Center for Occupational Health and Safety** is one of 16 education and research centers funded by the National Institute for Occupational Safety and Health (NIOSH). It supports graduate and continuing professional education in industrial hygiene, safety, occupational medicine, and occupational health nursing. The Center serves as an educational resource for Washington, Oregon, Idaho, and Alaska.
The Occupational Epidemiology and Health Outcomes Program conducts research to improve medical care, update treatment guidelines, and provide information on treatment outcomes to injured workers and their physicians.

The Pacific Northwest Agricultural Safety and Health Center (PNASH) conducts research, develops interventions, and provides professional education to improve the safety and health of Northwest workers in farming, fishing, and forestry. To meet these aims, Center researchers work closely with colleagues at Northwest universities and in collaboration with employers, labor, community organizations, and government agencies. The PNASH Center is funded by NIOSH and the state of Washington.

The Policy Analysis and Program Evaluation Initiative works closely with the state Department of Labor and Industries (L&I), and with business and labor to improve the quality of occupational safety and health policies and programs in Washington. An interdisciplinary team is assembled for each project, based on its needs. Research activities include focus groups, qualitative interviews, site visits, content analysis, program evaluations, and other consultation.

The Superfund Basic Research Program is a NIEHS-sponsored, interdisciplinary program involving faculty, staff, and graduate students from DEH, Civil Engineering, Biochemistry, Forestry, and Microbiology. The goals are to develop biological markers to assess people’s exposure to toxicants and susceptibility to disease, to assess physiological damage in humans and wildlife, and to develop new technology to remediate contaminated sites.

The UW/OSHA Training Institute Education Center offers high-quality, hands-on training on standards mandated by the federal Occupational Safety and Health Administration (OSHA) and state agencies in Washington, Oregon, and Alaska. Training is offered via traditional classroom and distance learning technologies.

David Bonauto, attending physician, and Paul Darby, resident, of the Occupational and Environmental Medicine program examine patient x-rays.
WHAT WE DO...

AND

WHO WE SERVE
A century or more ago, anthropologists sought to preserve objects of Native American heritage using the best tools they had—preservatives based on compounds of arsenic, lead, and mercury. Today, museums are faced with having potential human health risks in their collections.

The toxicity of old pesticides has taken on a serious new meaning since the passage of the federal Native American Graves Protection and Repatriation Act. The 1990 act entitles Native American tribes to claim human remains, and funerary, sacred, or patrimonial objects (those that are part of their cultural inheritance) back from museums.

Ceremonial use
Dr. James Nason, professor of Anthropology and curator of Pacific and American Ethnology for the University of Washington’s Burke Museum, was concerned about turn-of-the-century pesticide residues in the Burke’s collections. As chair of repatriation operations for the Museum, he knew that many of the sacred objects might be put back into active ceremonial use. Ceremonies can last up to four days, with important roles performed by tribal elders who could be particularly susceptible to toxic effects.

“We had an obvious ethical—and probably legal—obligation to inform recipients of any potential hazard,” he said. To detect and weigh the severity of the hazard, the Museum needed to find a non-destructive analytical testing procedure that would preserve sacred objects often made of leather, fur, feathers, or other perishable materials. The Burke turned to the Environmental Health Laboratory.

The lab’s initial assistance focused on measuring arsenic, lead, and mercury contamination, using a hand-held x-ray fluorescence (XRF) spectrometer. The machine is so small and sensitive that it can take readings by only gently touching the artifact without causing harm. It is what is called a “non-destructive” testing method.

The spectrometer relies on the emission of characteristic x-rays from each element. The lab first ran calibration tests by adding known amounts of the toxic elements to surrogates for the artifacts, provided by Nason. Then the Museum tested about 400 artifacts. Nearly half had residues of arsenic, mercury, or both.

The next step was to determine how much pesticide residue might rub off, said Laboratory Director Rolf Hahne. The presence of arsenic, mercury, or lead alone doesn’t necessarily pose a human health hazard. That depends on whether the pesticides are tightly bound into the artifact’s structure, or if they can rub off on the skin and be absorbed or ingested, or if they can become dislodged and become airborne and inhaled.

The third step was drafting guidelines for contact with the object. Since the degree of handling varies from object to object, depending on ceremonial use, the guidelines described three levels of contact—infrequent, moderate, and frequent. Exposure guidelines were developed using the Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels for arsenic and mercury, and EPA guidelines for lead.

Tribal involvement
The Quinault Indian Nation, located on the Pacific coast near Grays Harbor, had been working with the Burke on the repatriation of eight sacred or ceremonial objects when the contamination was discovered. The objects include a drum, two rattles, an eagle-feather headdress, a sea otter sash, and a cedar-bark head ring.

The Tribe was motivated to mitigate the contamination—or make it less harmful—because “It was
very important to us to bring these sacred objects home,” said Guy Capoeman, a Quinault Nation council member and chairman of the Tribe’s repatriation committee. “The University gave us a wonderful opportunity,” he said. “They offered to give our staff training in how to clean artifacts, in case we get objects returned from other museums. We jumped right on that.”

This summer, Leilani Cubby, the Quinault Nation’s cultural coordinator, sat down with Nason to test and clean the objects. Of the eight Quinault artifacts, only one—the sea-otter sash—seems so permeated with mercury and arsenic that it probably can’t be used ceremonially, Capoeman said.

If a ceremonial object tests positive for contamination, the Tribe has several choices, according to Nason. The Tribe could try cleaning the objects. It could use the artifacts for display and replication, but not for ceremonial use. Or it could allow ceremonial use, but require long sleeves or gloves to minimize skin contact. A less acceptable option would be for the Museum to use a sealant to trap
the residues. These ceremonial objects “are living things that are supposed to breathe,” Nason said.

“The Burke and the (Laboratory) staff were more than willing to help us,” Capoeman said. The relationship was so close and respectful that the Tribe wants to invite University staff to a ceremonial dinner when the objects are finally returned. The Tribe is in the final stages of federal approval, and hopes to finish the process this fall.

“The technology has helped us preserve a vital part of our heritage and culture,” Capoeman said. “It was a blending of the new and the old that is helping us bring these objects home.”

**UW in the forefront**
The UW has one of only four or five such analytical testing projects in North America, said Nason, who is involved in several national committees. “We know as much about this as anyone in the world and have far better data than most.”

The joint work between the Laboratory and the Museum is continuing. They will work together to analyze exposure risk, and have requested grant support. The project started with arsenic and mercury, but unanswered questions remain about fumigants and organic pesticides used from the 1930s through 1950s.

More also needs to be known about whether subsurface contamination—pesticides that traveled deep into the wood of a rattle or the pores of a drum skin—can rise to the surface.

**For further reading**
Burke Museum:
http://www.washington.edu/burkemuseum/
Environmental Health Laboratory: http://depts.washington.edu/envhlt/cont_ed/ehlab.html
Hahne R, Nason J. Evaluation of total and removable levels of arsenic, mercury, and lead in natural history museum artifacts as a preface to preparing guidance for the handling of repatriated artifacts. American Industrial Hygiene Conference & Expo, June 2001, New Orleans.
http://www.aiha.org/abs01/01exp2.html
National NAGPRA database:
http://www.cast.uark.edu/other/nps/nagpra/
Ann Wawrukiewicz has found her ideal job—one that puts her desire to help people together with her fascination with indoor air quality. As indoor air program coordinator for Region 10 of the US Environmental Protection Agency, she answers questions from the public about mold, asthma, carbon monoxide, and volatile organic compounds.

She works with schools to assess and improve their indoor air quality, and organizes workshops for the community. “I have always found indoor air quality just plain interesting,” she says. The public contact and fieldwork allow her to see the direct results of her work.

The EPA’s indoor air program is a nonregulatory outreach and education program. Ann’s territory extends through Washington, Oregon, Idaho, and Alaska.

Ann first became involved with EPA as a part-time volunteer intern during the summer between her first and second years in the Technology graduate program. She spent some of her time with the indoor air program and found that “I liked the subject from the start.” She was hired into an EPA enforcement job after graduation, but kept her interest in indoor air. Last year, her current job opened and “it was really a perfect fit.”

Her UW coursework provided a good general background in the health effects of indoor and outdoor air pollution. She regularly uses the skills she learned in exposure assessment and risk assessment courses when she needs to evaluate someone’s potential indoor exposures. Information from her industrial hygiene classes helps her “immeasurably” in the field. She feels the strong general knowledge she gained in the program makes it easier to “distill out the key points of the subjects into language a nonscientist can understand.”

The most important thing she learned in graduate school was critical thinking. “In my job, so much information passes by my desk, and a lot of it comes from people who have a product to sell. It’s really important for me to look behind that and figure out if this is something that will help people or make their air quality worse.” Her professors in Environmental Health emphasized taking an analytical and critical approach to articles and information, “and it serves me really well today.”

She took a broad range of classes, including those in her Technology major and Industrial Hygiene and Safety, plus public affairs and environmental law courses outside the Department. The range of classes, combined with a practical thesis project, gave her a broad base of knowledge and experience. “This approach isn’t for everyone, but I’m really glad I took advantage of the variety.”

From her position inside a federal agency, Ann considers DEH graduates to be solid candidates for entry-level positions. She also sees them moving easily into indoor air quality jobs at state and county health departments, and nonprofit agencies such as the American Lung Association.
Researchers in the Department’s largest center, the Center for Ecogenetics and Environmental Health (CEEH), reached beyond the controlled environments of their laboratories last year to engage in challenging discussions of racial disparity, poverty, and pollution.

At the request of the National Institute of Environmental Health Sciences (NIEHS)—part of the National Institutes of Health and the major federal funding source for environmental health sciences research and community outreach—the CEEH hosted a regional Town Meeting. Dr. Kenneth Olden, director of the NIEHS, and a half dozen of his key staff came to Seattle for the event. This was the fourth NIEHS-sponsored Town Meeting, and the first in the Pacific Northwest.

Planning for the Town Meeting took researchers to the Yakima valley, tribal lands, and industrial neighborhoods, said Associate Professor Thomas Burbacher, director of the Center’s Community Outreach and Education Program (COEP).

As a result of the process, the CEEH expanded its outreach program in new directions. The Center, based in the DEH and funded by NIEHS, already had a seven-year track record with school outreach. Through the Town Meeting, the Center began working with community groups that had more complex agendas.

Environmental justice was a key theme of community testimony at the Town Meeting—Healthy Environments, Healthy Communities—which was held September 29–30, 2000 at Mount Zion Baptist Church in Seattle and attended by more than 200 people. The two-day event included workshops, discussion circles, an open microphone session, and presentations by more than 20 community groups, youth groups, and tribal nations.

**Community Issues**

Workshops and discussion circles brought researchers, legislators, and community members together to discuss health risks of pesticides to agricultural workers and their families, contamination of seafood by marine toxins and chemical pollutants, hazardous waste sites, culturally appropriate research strategies, and links between indoor and outdoor air pollution and asthma.

Community members urged investigators to become advocates for disease prevention, not just providers of scientific data. “We want to see decisions based not on risk assessment but on prevention,” said Carol Dansereau of the Washington Toxics Coalition. “We need community-based research, not community-placed research. We’re being studied to death,” Yolanda Sindé of the Community Coalition for Environmental Justice (CCEJ) told researchers at the Town Meeting. “We do need research,” Sindé added, “but we also need action once we get the information. We need researchers to work with the communities to find solutions to the problems as well.”

![Top to bottom: Eric Dinh, YMCA EcoLeaders; Yolanda Sindé, CCEJ; Carol Dansereau, Washington Toxics Coalition](image-url)
While he was in town, Olden met with members of the Shoalwater Bay Tribe and visited Seattle's South Park neighborhood, which has a high percentage of low-income and minority residents, and high levels of air, noise, and chemical pollution from freeways, airports, and industry.

“I acquire a sense of urgency by hearing people testify at these meetings,” said Olden. “So-called intractable environmental problems can be solved through investment in fundamental science and new technologies,” he said. “Ultimately, the American people have to decide how many cases of cancer or Parkinson’s disease are acceptable.”

That sense of urgency has led to action by NIEHS and CEEH staff. In the months following the Town Meeting, center staff began work on several community projects.

**Shoalwater Bay project**

In collaboration with the Shoalwater Bay Tribe on the Washington coast, the CEEH has requested funds from the NIEHS to develop a Shellfish Monitoring Management Plan. “We’re looking at the overall health of the bay, using shellfish as our medium,” said Garry Burns, the Tribe’s environmental director. Information from the study will provide a foundation for future work addressing the high rate of pregnancy loss among members of the Shoalwater Tribe. The grant application was a direct result of the Town Meeting, specifically the opportunity to meet with Olden, said Burns. “We had a very productive meeting with him face-to-face.”

**Youth network**

CEEH staff organized a videoconference that allowed students from across Washington state to participate in the Town Meeting. The videoconference project, called the Youth Network for Healthy Communities, was so popular that it has become a continuing project. By summer 2001, 18 middle and high
school teachers and their classes had participated in three conferences. “Students researched environmental health issues in their communities, ranging from impacts of Superfund sites to the health effects of wildfires, the environmental impact of diesel power generators, and E. coli bacteria,” said COEP Curriculum Manager Jonathan Sharpe.

**Health justice network**
As a result of the Town Meeting, CEEH staff became actively involved in this coalition, which is committed to addressing health justice issues, such as disparities associated with race, class, and ethnicity. The coalition is planning a conference for January 2002, and members have begun presenting workshops on health disparity in Washington state, said COEP Manager Chetana Acharya.

**Healthy schools roundtable**
CEEH staff participated in the planning of the Healthy Schools Roundtable, organized by the Institute of Children’s Environmental Health and EPA (Region 10) with the goal of finding ways to better protect children’s environmental health in schools. Roundtable participants included state agencies, parents and parent-teacher organizations, educator and school administrator organizations, indoor air experts and activists, and state representatives.

**Healthy futures project**
COEP staff are working with the Institute for Children’s Environmental Health to involve young people throughout Puget Sound in researching environmental health issues.

**For further reading**

Charlie Cunniff of the Environmental Coalition of South Seattle explains community concerns to U.S. Congressman Jim McDermott, Ken Olden, and Dave Eaton.
Walt Rostykus’ job is to make the workplace safe for the people who work there. Specifically, his role at Humantech, a Michigan-based engineering and consulting firm, is to assist large companies with the implementation and delivery of effective ergonomics programs.

Ergonomics addresses the interaction of people and their environment, or the practice of fitting the workplace and tools to the person doing work. In his experience, to develop an ergonomics program, Walt has found it important to understand a corporation’s culture and values.

Walt enjoys applying environmental health science to real needs and situations encountered in the workplace, and making the end result intuitive and usable by the client. “For me the constant change and challenge keeps it interesting.” He loves the opportunity to “work with good people, do good things, travel, and constantly be learning.”

After his graduation from UW, Walt worked for Hewlett Packard and Compaq Computers, managing environmental health and safety programs within corporate worldwide organizations.

His UW training gave him insight about the integration and overlap of the disciplines of Industrial Hygiene, Occupational Health Nursing, Occupational Medicine, Occupational Safety, and Environmental Health.

The other valuable skill he learned at UW is writing. He encourages students to take courses in communication, marketing, organizational effectiveness, project management, and international politics. “Practice your presentation skills. You’ll need them,” he advises.

Within Environmental Health, he urges students to take a broad range of class subjects. “Don’t limit yourself to one discipline. For example, get a balance of exposure to IH (industrial hygiene), safety, and environmental health topics.” He suggests students gain as much real-world experience as possible by volunteering for field projects, and pursuing an internship or a part-time position related to environmental health.

Once graduates enter the work force, he encourages them to find a mentor to provide feedback and coaching. A good goal is to obtain professional certification within five years after completing school, he said.

Walt believes students should think globally, and pick up an understanding of occupational and environmental issues, approaches, and standards in other countries. “Take a foreign language. It will come in handy.” Emerging opportunities include addressing issues with distant workers, the service sector, high turnover, global standards, and an aging workforce.

His final bit of advice is to “maintain a hobby or activity, and find a way to escape the stresses of work.” His hobbies include hiking, sailing, kayaking, scuba diving, mountain biking, hot air ballooning, and home brewing.
Silicosis is one of the oldest known occupational diseases, yet in certain occupations and certain parts of the world, silica dust continues to shorten the lives of workers. Several Department of Environmental Health researchers are involved in national and international efforts to better understand and control silica exposure.

**Cancer potential**
Fine dusts containing silica from industrial sources such as quarries, ceramics, and construction materials can cause silicosis, a scarring of the lungs. In the past 15 years, several researchers, including the Department’s Professor Harvey Checkoway, have become concerned that even low-level silica exposures can cause lung cancer. During the late 1980s and early 1990s, Checkoway directed an epidemiological study of lung cancer and silicosis risks in the diatomaceous earth industry in southern California. Diatomaceous earth is a light, fragile siliceous material used in water and beverage filters.

The study team included DEH co-investigators Nicholas Heyer (now at Battelle), Paul Demers (now at the University of British Columbia), and Associate Professor Noah Seixas. The study found strong dose-response trends for silicosis and for deaths from lung cancer and nonmalignant respiratory diseases. Data from the diatomaceous earth study have since been used by the National Institute for Occupational Safety and Health (NIOSH) to make risk assessments for lung cancer and silicosis, the results of which may eventually be incorporated into the Occupational Safety and Health Administration’s (OSHA’s) occupational standard setting.

In 1996, the International Agency for Research on Cancer (IARC) invited Checkoway to serve on its working group to review evidence for the cancer-causing potential of silica. He chaired its epidemiology subcommittee. The IARC review concluded that crystalline silica from occupational exposures is carcinogenic to humans. The most convincing evidence was for lung cancer.

**Construction safety**
Silica exposures are greater in construction than in any other American industry. The Department’s Mary Ellen Flanagan is part of a nationwide effort to develop a database of silica exposures for workers during specific construction tasks. Rock drilling, sand blasting, concrete cutting, and demolition of concrete and masonry structures generate silica dust.

The database could be used as OSHA develops new construction standards in response to the IARC findings. Researchers generally need a large database of exposure information to get beyond “what’s the exposure?” to “what’s the solution?” said Flanagan, who did much of the database design for a team from the American Conference of Governmental Industrial Hygienists (ACGIH).

Her database, which is now maintained at West Virginia University, includes more than 500 samples, with information on tasks, tools, indoor or outdoor environment, and control measures. By next year it should be available to contributing researchers on the World Wide Web.

Flanagan is part of the department’s Field Research and Consultation Group, which has
worked with labor and management in several construction trades to reduce silica exposure. The group has conducted controlled studies at the International Masonry Institute in Seattle and conducted field studies at job sites.

Masons and bricklayers were happy to participate in the study “because we have been exposed so much,” said Mark Maher of the Masonry Institute. “We want to have a healthy, long-term workforce, and we want our workers to enjoy a long retirement.” He described the Field Group research as “a real win-win thing” that provides the University a place to do its research, and the masons an opportunity to have their questions answered.

That has happened in several trades in the construction industry, Seixas said. “The industry came to us. They recognized that they had a problem, and it was one the Department could address through training and research.”

The industry has a voice in developing the Department’s continuing education courses, such
as a recent class entitled “Current Issues in Construction Safety,” which addressed silica control.

**Asian miners & stonecutters**
The International Scholars in Occupational and Environmental Health program has brought two researchers from southeast Asia to campus to do silica research, and has trained others in Vietnam and Thailand.

Tanongsak Yingratanasuk, director of the Industrial Hygiene program at Burapha University in Thailand, studied in Seattle the past two years, earning his Master of Science degree in Industrial Hygiene and Safety under Seixas’ direction. His thesis was an assessment of lung diseases and silica exposure at a stone carving company in Thailand.

Phan Hong Son, of Vietnam’s National Institute of Occupational and Environmental Health, is on campus now, studying silicosis incidence in his country using a geographic information system (GIS). He is also working on a chest radiology grant with Associate Professor Scott Barnhart.

Although many Asian countries have adopted occupational health and safety standards, some lack the technology to conduct workplace evaluations, said Associate Professor Matthew Keifer, director of the UW’s International Scholars program. “We are giving the countries the information they need to make the workplace safer,” he said.

The International Scholars program is funded by NIOSH and by two programs within the National Institutes of Health: the Fogarty International Center and the National Institute of Environmental Health Sciences (NIEHS).

**For further reading**


As a staff scientist and toxicologist at Targeted Genetics Corp., Sally Thompson’s job is to evaluate the safety of gene therapy products that could change the lives of people with genetic diseases such as cystic fibrosis and hemophilia.

A preclinical toxicologist, she conducts safety evaluations of gene therapy products and works with the Food and Drug Administration on product development. One of the appeals of the rapidly changing field of biotechnology is that she is constantly learning.

After receiving her PhD in 1996, she began working as a research scientist at another Seattle biotechnology company. She moved to Targeted Genetics two years ago.

Sally had a Doctor of Veterinary Medicine degree when she entered the PhD program in Toxicology. She worked in Terry Kavanagh’s laboratory, analyzing the effects of oxidative stress on the immune system and on development. She used mouse models to understand how the immune system responds to low doses of methylmercury.

She considers teamwork to be one of the most important things that she learned at the Department of Environmental Health. She found the Kavanagh lab to be a “cohesive group” that worked well together on a daily basis and on grant-preparation deadlines. She also benefited from the diversity of research taking place in the Department. At Targeted Genetics, her work team includes scientists in a variety of disciplines and corporate partners, who have exposed her to the business side of biotechnology.

She sees a bright future for research scientists in biotechnology, both locally and worldwide. Now in a position to recruit staff scientists at Targeted Genetics, she has some suggestions for the Department’s current graduate students. One is to get a perspective of the whole animal model, including physiology, rather than focusing solely at the molecular level. Her second suggestion is to focus on writing and presentation skills. “Get as much writing and reviewing experience as you can.” A third suggestion is to balance work and life outside of work.

Sally has found a job where she can work part-time, allowing her to spend four days each week with her two sons. With her husband and sons, she enjoys fishing, playing baseball, going to Mariners games, and hanging out on the beach. “I have to admit the one thing that I enjoy most about working part time is that we can take a leisurely walk to the local library once a week,” she adds.
We’ve all heard the warnings on bad-air days—young children, the elderly, and those with respiratory problems are asked to stay indoors. Does that really protect them? Research projects from Assistant Professor Sally Liu’s laboratory are challenging that conventional wisdom by investigating how the air quality inside the homes of susceptible people correlates with outdoor air quality and health effects.

Liu is working under two grants from the US Environmental Protection Agency (EPA), which has the goal of protecting the public—especially sensitive populations—from exposure to harmful air pollution.

Policy making

When the EPA set its standard for fine particulate matter (PM2.5) in 1997, critics said it was overprotective, not based on sound science, and questioned whether sensitive populations were really exposed to the dirty air, because their health problems forced them to stay inside. The EPA didn’t know much about exposures of such people or the exact health effects of fine particulates, Liu said.

Her study recruited elderly subjects (average age 75) with heart and lung problems, children with asthma, and healthy elderly controls—107 in all—and studied them over one to three 10-day periods. Her study is the largest of its kind funded by the EPA.

The research subjects wore monitors to measure their personal exposure to fine particulate matter, nitrogen dioxide, sulfur dioxide, organic chemicals, and other components of air pollution. They each kept an activity diary, recording what they were doing every 15 minutes, and a pollution event diary, recording when they cooked, if they burned the toast, whether the windows were open, and whether they vacuumed, burned candles, or built a wood fire. They also recorded how well they felt each day and which medications they took.

The study took place from fall 1999 through spring 2001. The project team included environmental scientists, engineers, pulmonologists, chemists, toxicologists, and biostatisticians from the University of Washington, Washington State University, Lawrence Berkeley National Laboratories, and agencies such as the state Department of Ecology, Puget Sound Clean Air Agency, and EPA. Much of the fieldwork was done by departmental graduate students and about two dozen undergraduates.

Researchers took health and employment histories, daily urine and breath samples, pulmonary function tests, pulse readings, blood pressure, blood oxygen-saturation levels, and electrocardiograms. They also measured air quality inside and outside the house, and measured the air exchange rate in the home using a tracer chemical.

The hypothesis was that higher exposures to particulate matter and organic compounds from combustion would be associated with measurable differences in cardiovascular tests and symptoms.

Early findings

Early findings showed a correlation between poor air quality and symptoms. “We saw lower heart rate variability on bad PM (particulate matter) days,” Liu said, “but we can’t really say exactly what caused the health effects.” Professor Dan Luchtel is conducting toxicological tests with a special mouse model that is similar to elderly humans with cardiovascular problems to better understand the trigger mechanisms. Departmental researchers, headed by Professor Dave Kalman, are also doing biomarker studies with the urine samples to better understand how much of the
outdoor pollution gets inside homes and into human bodies.

Air quality measurements showed that indoor air could be as bad as that outdoors. Small particles that were generated outside in the atmosphere found their way indoors. The smallest particles, those that cause the greatest health concern because they are breathed deeper into the lungs, behave almost like gases and closing the windows and doors doesn’t keep them out. Nearly half (44%) of the personal exposures came from outdoors. “We see infiltration on bad air days. People are told to stay inside, but that may not be enough to prevent exposure,” Liu said.

**Health recommendations**

About half the elderly subjects lived in single-family homes and half in senior housing. Pollutant exposures were generally lower for those who lived in senior housing where meals were served in a central dining room. Continuous readout air quality monitoring showed dramatic spikes when people cooked or ran vacuum cleaners. This information suggests that senior citizens with severe heart or respiratory illnesses might consider moving to housing that provides meals and housekeeping services, so they could leave the apartment during vacuuming.

While the second-year data are still being analyzed, the first year’s findings can be useful to
EPA. “Our goal is to give EPA a good indication of what sources to control in a regulation, and what components in the PM the regulatory agency should focus on,” Liu said. Already, researchers have identified the most important outdoor particulate and indoor pollution sources and how much they contribute to poor air quality.

Kalman identified another ground-breaking aspect of the study. “For the first time, we are expecting to describe how particularly vulnerable individuals experience their environment, in quantitative and statistical terms. This will enable policy makers to consider not only regulations to protect the general public, but also to understand how additional protection for those at highest risk might be achieved.” He suggested that additional efforts may have to be made to control in-home sources of air pollution.

For further reading


Tanya MacFarlane’s job is to protect the health of residents and vacationers on the Kitsap Peninsula, including tracking down the sources of disease outbreaks. She is passionate about her work.

She inspects restaurants, schools, festival booths, summer camps, and swimming pools. In addition, she teaches food safety classes, food manager certification classes, and safety classes for pool operators. She works as a consultant to a Native American tribe, and investigates food-borne illnesses and complaints from the community. “My personal challenge is to become the best communicator I possibly can. I particularly enjoy helping food workers find procedures for preparing food that keeps the food safe throughout the process.”

Sometimes her job requires her to be a detective, investigating the source of food-borne illness. She uses the time-honored who-what-where-when-why-and-how technique to find out who got sick, what they ate, and when. Food-borne illness can often be easily identified by knowing the food consumed, the incubation period, and the symptoms and duration of the illness. However, positive identification requires follow-up laboratory identification.

Although only a year out of school, Tanya has become involved in professional activities as editor of the Washington State Environmental Health Association’s newsletter. She also chairs the publications committee for the association’s annual educational conference. She began work in Kitsap County in April 2000, only a month after finishing her coursework. She had already gained experience as a sanitarian through an internship with Public Health Seattle-King County. She also worked as a research assistant in the Department’s Environmental Health Technology program, doing air sampling.

Tanya found the Department’s undergraduate classes to be specific and practical. Many of her instructors had worked as sanitarians and offered “a tremendous amount of information about the field.” As an undergraduate she learned to do a restaurant inspection, a pool inspection, and a rodent/housing survey.

She also learned communication skills, and discovered that the quality of her work is “directly proportional to my ability to listen, observe, speak, write, and demonstrate.” She encourages students not to be shy about talking with their instructors. “I found that each one was available for one-on-one interaction.” She also encourages students to take advantage of internship possibilities.

“The area of environmental health is so huge that you can make your experience whatever you want it to be, so be creative,” she advises. “Complete a research project. Get a job as a research assistant and work with professors and graduate students on a project that you feel passionate about. Do two internships if you have the time.”
Suppose your doctor wanted to try a promising new medicine, but wasn’t sure how you would respond. Suppose your job involved exposure to a chemical that causes reactions in only a small percentage of people, and you wanted to know if you would be one of them.

Your genetic makeup may determine how well you respond to a new medicine or whether a chemical exposure will make you sick. Professor Curt Omiecinski and his laboratory colleagues are studying the interrelationships of toxicology with genetics.

**Genes and the environment**
The human genome consists of about 3 billion bases, or building blocks of DNA, Omiecinski said. Although people share a high degree of genetic similarity, everyone’s genetic code is different. Genetic variation at the level of single base changes between common genes is termed a single nucleotide polymorphism, or SNP (pronounced “snip”). SNPs and other types of genetic alterations likely contribute to differences in the way individuals respond to chemical exposures or their risk of suffering from adverse drug reactions.

To predict an individual’s chemical response profile, researchers need to understand how the body processes the chemical and how the “genetic fingerprint” of the individual affects these processes.

The laboratory has characterized polymorphisms (different forms) based on single nucleotide changes in several different enzymes that help the body break down and eliminate poisons. For example, they have discovered SNPs in an enzyme system termed epoxide hydrolase—actually a family of enzymes that metabolize certain cancer-causing chemicals. The laboratory has also worked with researchers in the UW medical genetics program and discovered SNPs in an enzyme named paraoxonase, which is responsible for metabolizing certain pesticides and neurotoxins.

Omicinski is director of the Department’s Toxicology program and also directs the biomarker laboratory, which is an arm of the DEH Center for Ecogenetics and Environmental Health. Epidemiological studies are being conducted to determine potential associations of these genetic variants with diseases such as lung cancer and Parkinson’s.

Together with collaborators from other parts of DEH, Epidemiology, and the Fred Hutchinson Cancer Research Center, the Department’s molecular biomarker laboratory is working to examine individual differences in genetics and how they affect relative risks of environmentally associated diseases.

**Microarrays**
Professor Omiecinski is using DNA microarrays or “chips,” to provide instant information about how someone’s genes respond to a particular drug or poison. This new technique is a powerful method that enables the lab to study the phenomenon of genetic variation as it relates to an individual’s ability to detoxify chemical substances. A cell exposed to a poison may start producing large quantities of enzymes used to break down toxic substances or to repair DNA. Our genes control enzyme production. By tracking certain enzymes it is possible to determine how a cell’s genes react to a particular exposure. Previously, investigators could examine changes in the enzyme production, or expression, of just one or a few genes at a time, Omiecinski said.
Postdoctoral Fellow Tao Wang uses a fluorescence microscope to study enzyme activity in mouse liver cells

inset: Curt Omiecinski, director of the Department's Toxicology program

The new microarray technique can show the expression of thousands of genes simultaneously—potentially the entire human genome—in response to an exposure.

The chip testing procedure involves the use of small glass slides that contain robotically applied arrays of up to 50,000 densely packed spots of DNA. Each spot represents sequences from a different gene. The microarrays can be “probed” with various RNA samples collected from cells or tissues that have been subjected to chemical or drug treatment. The RNA samples are labeled with colored fluorescent dyes and incubated with the DNA arrays to determine which genes are expressed (turned on) and how they respond to a particular exposure. A gene that is active will glow on the slide. The more active it is, the brighter it will glow. The biological picture is captured as binary data that computers can analyze. The Omiecinski laboratory has been using microarray experiments to study environmental chemicals that act as gene inducers, increasing gene expression in liver cells. The liver is the body's pri-
mary organ for detoxifying or metabolizing chemical substances. Understanding the impact of gene inducers could help researchers and physicians predict how someone will respond to a drug or chemical.

**The future**

In addition to the cultured cell approaches, the DNA microarray technology may eventually replace animal tests, which are now used to evaluate the safety or toxicity of chemicals and drugs.

The overall scientific area encompassed by these genomic approaches as they apply to toxicology is termed “toxicogenomics.” Together with the other investigators in the DEH Toxicology program, Omiecinski is engaged in a variety of toxicogenomic strategies to advance basic science with the ultimate goal of better predicting risks and outcomes of chemical exposures.

**For further reading**


Omiecinski laboratory Web site: http://faculty.washington.edu/cjo/


WHERE
WE’VE
BEEN ...

AND WHERE
WE’RE
GOING
Our first biennial report two years ago had an image of a cell on the cover, emphasizing the scientific nature of our work. This time we feature a contemporary Native American artist, Clarissa Hudson, who uses her Tlingit heritage in innovative and thought-provoking ways. The new possibilities from creative uses of traditional elements mirrors our approach to the content of this report—in which we seek to find new opportunities to make a difference using both established and emerging public health science.

**Continuing achievements**

**Students**

During the last two years, 29 students received undergraduate degrees, 38 M S degrees, 6 MPH degrees, and 5 PhDs. The outstanding undergraduate students were Leonard Di Toro in 2000 and Shireen Assaf in 2001. The outstanding graduate students were Ed Doran in 2000 and Francesca Noel Hudson in 2001. Twenty-one papers were published by students in academic journals. Many other students received honors, which are summarized on pages 39 and 40.

**New educational initiatives**

A five-year training grant has been awarded to the Department of Environmental Health and the Department of Health Services for a joint graduate program in occupational health services research. The program offers doctoral and postdoctoral training and students will be able to participate in research conducted in the Occupational Epidemiology and Health Outcomes program.

We have reworked our PhD offering in the Industrial Hygiene track to apply more broadly to recognition, assessment and management of hazardous exposures to chemical, biological, and physical agents, in both industrial and nonindustrial settings. This change acknowledges the shift in the nature of work in the United States, and the general lessening of distinctions between workplace and community environmental health issues. We have also reshaped the Environmental Health pathway in the Master of Public Health degree program to better respond to the needs of nonphysician professionals who seek additional training in Environmental Health. Both new curricula will be offered to students during the 2001–2003 biennium.

**Faculty**

Three faculty members were promoted in the biennium: Drew Brodkin to Associate Professor, Lianne Sheppard to Research Associate Professor, and Janice Camp to Senior Lecturer. Three more achieved tenure: Joel Kaufman, John Kissel, and Noah Seixas. Dr. Peter Johnson, a University of California, Berkeley-trained engineer with interests in ergonomics and repetitive motion injury, was recruited to the Industrial Hygiene and Safety faculty after a multiyear search effort. Dr. Steven Guffey, a veteran member of the industrial hygiene faculty, left in 2000 to take a senior position with West Virginia University’s Industrial and Management Systems Engineering program. Two faculty searches are currently under way, one to replace Dr. Guffey and one to add a specialist in water and water supply issues to the Environmental Health Technology faculty.

Faculty who were honored include Dr. Zhengui Xia, completing her term as Sheldon Murphy Assistant Professor, with significant research success to her credit; Curt O miecinski, succeeding Dr. Lucio Costa as Toxicology program director; Dr. John Kissel, elected to head the International Society for Exposure Analysis (ISEA); Dave Eaton, becoming president of the Society of Toxicology; and Janice Camp serving as president of the Pacific Northwest section of the American Industrial Hygiene Association. Additional faculty honors are summarized on page 40.
HEALTH

Staff
Among the 100+ classified and professional staff in the Department, many received awards and honors. Marcy Harrington received the DEH staff outreach award in 2000 and Kathy Hall received it in 2001. Collin White received the Department’s outstanding staff service award in 2000 and Adrienne Hidy received it in 2001. Further honors are summarized on page 40.

Research
We continue to be awarded multi-investigator programs and centers. The start of the biennium saw the launch of the EPA Northwest Center for Particulate Air Pollution and Health. This Center, one of five established nationally, is conducting research to better understand the relationship between air quality and public health.

In collaboration with the Fred Hutchinson Cancer Research Center, a new Toxicogenomic consortium will study how genes respond and adapt to environmental toxicants, and the ways that these genetic responses can cause environmentally-related diseases. A goal of the consortium is to develop new techniques for using and analyzing microarrays, “gene chips” that can analyze hundreds or thousands of genes simultaneously. Three other large program grants, CRESP (funded by the U.S. Department of Energy), the Pacific Northwest Agricultural Safety and Health center (PNASH), and the UW Superfund Basic Research Program (funded by NIEHS) were successfully renewed. The Department’s research on children and pesticides was widely covered by local and national media.

Facts & figures
Growth continued in departmental funding from all sources in the past biennium. Fueled by research grants, our overall budget was up
slightly more than 22% from the 1997–1999 total, one of biggest expansions in our Department’s history. As Figure 1 shows, federal sources of departmental support (primarily competitive research grant programs) account for about 60% of our total support, up from 50% in 1993–1995. From 1997–1999 to 1999–2001, state funds, including funding from the University and funds from the Washington state industrial insurance system (Medical Aid and Accident funds) declined from 26% to 25% of our total support base. Use of these funds is shown in Figure 4.

Patterns of how departmental support originates and how it is used are not much changed from the previous biennium. As Figures 2 and 3 A/B show, federal funds are dominant in research and student support activities, while state funds are major elements of academic programs, teaching, service programs, and service project efforts. Uses of state funds provided by the industrial insurance system were essentially unchanged from 1997–1999. The combination of service programs and special initiatives rose from 30% of all Medical Aid and Accident funding in 1997–1999 to 36% in 1999–2001.

Recent initiatives

Service

In the past biennium, we have emphasized the following areas: greater dialogue with external groups, particularly those linked to our worker protection mission; a more interactive process for setting funding priorities for departmental service initiatives; and greater use of distance learning technologies and on-site contract courses. We developed a certificate program to make our educational offerings more accessible to working safety and health professionals.

Through these activities, we let others know about our mission and programs, and learned more of their needs and interests. The goal of working more closely with employers, workers, regulators, consultants, and safety and health professionals was the focus of considerable activity in the past two years. Department Chair Dave Kalman and Assistant Chair for Outreach Sharon Morris have met with representatives from many labor, trade, and professional associations in the state. They and other faculty have met with several key groups that address workplace safety and health issues.

We increasingly combine our service, teaching, and research missions to the mutual benefit of clients, students, and researchers. For example, an employer requested that we assess noise exposure on his construction sites. This became a class project, giving many students experience in the field and giving the employer a comprehensive noise assessment report. He and other employers subsequently requested that we assess silica exposure at construction sites and make recommendations for controlling exposures. The experience gained during these projects and the history of access to the worksites enabled us to compete successfully for a federal grant to conduct further research in this area.

With counterparts at the Department of Labor and Industries, we organized a summit in September 1999, which brought together departmental faculty and staff with program leaders and other professionals at L&I. This review of collaborative efforts increased interaction between the two departments. One outcome is the planned creation of a certificate program in industrial hygiene, intended to allow working industrial hygiene staff to upgrade their training and credentials while staying employed.

Departmental faculty, Labor and Industries, and the Departmental Advisory Committee (members are listed on page 56) participated in an 18-month process to evaluate programs conducted with Medical Aid and Accident funds and develop priorities for new initiatives. After reviewing nine projects, it was agreed to end funding for two, to continue four as before, to expand three others, and to propose two new activities.

New technologies

Another theme is the transformation of communications wrought by the digital revolution. It is clear that this revolution will continue to change how we as educators and knowledge seekers transfer information, knowledge, and even skills. We have begun to participate in these changes. For example:
Our OSHA Training Institute Education Center is becoming a national leader in offering courses to enable employers and workers to meet federal and state safety and health standards. We have been a pioneer in offering courses using distance-learning technologies, including two-way video-conferencing and online courses.

Within hours of the 2001 Nisqually earthquake, our Web site was able to respond by offering a free online course, entitled “Surviving an Earthquake.”

We have begun to offer our departmental newsletters and many other informational products on the Web, allowing wide on-demand public access. http://depts.washington.edu/envhlt/info/publications.html

In June 2001, a Web site (http://www.firesmokehealth.org) was established to share information on the hazards of smoke from forest and agricultural fires. It provided information on smoke in community air as well as guidance during the Northwest fires in August and September. Without electronic access and transfer, such an effort would have taken months rather than weeks to accomplish.

On a smaller scale, but convenient for us, quarterly meetings between leaders in

Figure 3A. Budget sources 1999–2001

Figure 3B. Departmental student support, 1999–2001 (6% of total budget)

Figure 4. Use of state Medical Aid and Accident funds, 1999–2001
Looking ahead
During the next biennium, we look forward to making progress on several fronts. Our educational mission will continue to have high priority as we look forward to new recruitment efforts that will attract ever more capable students to our programs. We will also continue to develop electronic communications as an instructional tool.

Two academic programs will be the special focus of departmental review and possible enhancement: the undergraduate program and the graduate program in Occupational and Environmental Medicine. These programs are challenged by the changing realities of their respective missions. Undergraduates need broad and versatile skills balanced with an orientation to the practical requirements of employment as an environmental health practitioner. Occupational medicine programs across the country are struggling to address the significant unmet demand for OM-trained physicians while coping with the economic pressures created by the reshaping of the health care industry.

Outreach and communication with our external constituent groups will remain a top priority. We will continue to meet with interested groups and develop activities and opportunities for responding to emerging needs.

Departmental resources will receive careful planning and review. We are hoping to improve the quality and quantity of our space for teaching, research, and other scholarly activities in the coming biennium to keep pace with programmatic and faculty growth.

In conclusion
The Department of Environmental Health has enjoyed a high level of success in the past two years. Despite that success, we continue to recognize the need to make sure that the research we conduct, the students we educate, and the services we provide meet the needs of the changing environment in which we live. This is the exciting nature of our world, which we invite you to share.

—Dave Kalman
FACTS

AND ...

FIGURES

1999–2001
D E G R E E S  C O N F E R R E D

U N D E R G R A D U A T E

1999–2001

S U M M E R  1999
Trung Ngoc Bui
Tiffany G. Harris

A U T U M N  1999
Shaelin A. Fettes
Kennethia R. Ishman
Cynthia S. Marshall

W I N T E R  2000
Keriya Adem
Tanya L. MacFarlane

S P R I N G  2000
Nora Chen
Eugenia Colby
Leonard Di Toro

Katia F. Harb
Angela L. Harkins
Phebe A. Mason
Laurette M. Rasmussen
Melissa A. Spencer
Andrew J. Torres

S U M M E R  2000
Amanda Pearl Rehr
Chris Peter Rowe

A U T U M N  2000
Berhan Bahre Beraki

W I N T E R  2001
Vanessa J. Bussiere

S P R I N G  2001
Shireen Said Assaf
Chester L. Baldwin III
Char’ryse Juadel Birge
David Allen Braungardt
Mark Nicholas Ghezzi
Wendi Jean Kirchoff
Karen Masakane
Christopher David Miele
Kenton Anthony Wise

Char’ryse Birge receives her bachelor’s degree in June 2001
**GRADUATE**

**Degrees:** Master of Science (MS), Master of Public Health (MPH), and Doctor of Philosophy (PhD). **Graduate Programs:** Industrial Hygiene and Safety (IH&S), Environmental Health Technology (Tech), Toxicology (Tox), Occupational and Environmental Medicine (OccMed), Preventive Medicine (PrevMed). Faculty preceptor (italics)

**SUMMER 1999**

Arnold Bunyaviroch, MPH (OccMed) A systematic evaluation of methods for evaluating hearing impairment. (Bill Daniil)

Dianne Knutson, MS (IH&S) A biological monitoring survey of organophosphate pesticide exposure among children residing in two communities in the Seattle Metropolitan Area. (Richard Fenske)

Maria Aileen Mendoza, MS (Tox) Effects of methylmercury on the cell cycle of mouse fibroblasts of different p21 and p53 genotypes. (Elaine Faustman)

Stephanie Pingree, MS (Tox) Effects of 2,3-dimercaptopropanesulfonic acid (DMS) on tissue and urine mercury and porphyrin levels of methyl mercury-exposed rats. (James Woods)

Susan Swan, MS (IH&S) Systematic evaluation of hearing conservation plans—A pilot project. (Bill Daniil)

Debra Winterton, MS (Tech) Polymorphisms as biomarkers for inhaled sulfur dioxide in subjects with asthma sensitivity. (Jane Koenig)

Eva Wong, MS (Tech) Use of children’s activity patterns in dermal soil exposure assessment. (John Kissel)

**SPRING 2000**

Julie Christine Adams, MS (Tech) A physiologically based toxicokinetic model of xylene inhalation exposure in Caucasian men and a correlation study of individual kinetic and anthropometric parameters. (David Kalman)

Gerry Croteau, MS (IH&S) The effect of local exhaust ventilation control on dust exposures during masonry activities. (Nahal Srixas)

Douglas O. Johns, MS (IH&S) The effect of varying concentrations of chemical mixtures containing toluene and methyl isobutyl ketone on the accuracy of collection in passive and active samplers. (Michael Morgan)

Nancy Judd, MS (Tox) Estimates of human exposure to PCBs and associated health risks from dietary seafood consumption. (David Kalman)

Karen Marienau, MS (PrevMed) Evaluation of the feasibility of a retrospective study design to investigate the risk of spontaneous abortion and exposure to nitrates in drinking water: a pilot study. (Harvey Checkoway)

Claire A. Olsovsky, MS (IH&S) An electromagnetic field exposure assessment of airline ground crew workers: A comparison of metrics. (Steve Guffey)

Diane Yoder, MS (Tech) Agricultural injuries among adult Hispanic farm workers. (Matthew Keifer)

**SUMMER 2000**

Michelle Bell, MS (IH&S) A pilot study to evaluate the methodology of collecting and analyzing vectors and disease agents of Lyme Disease and human ehrlichioses. (Chuck Trser)

David Bonauto, MPH (OccMed) A telephone survey of work and injuries in teenage agricultural workers in an eastern Washington community. (Matthew Keifer)

Michael Box, MS (IH&S) Exposition to particulate matter among older adults with chronic obstructive pulmonary disease: Relation between personal, indoor, and outdoor concentrations. (Sally Liu)
Cynthia Curl, MS (Tech) Organophosphorus pesticide exposure in children of agricultural families in the lower Yakima Valley. (Richard Fenske)

Ed Doran, PhD (IH&S) Measuring and modeling dermal absorption of pesticide residues. (Richard Fenske)

Barbara Faville, MS (IH&S) Validation of five checklists used to assess risk factors associated with musculoskeletal disorders of the upper extremities. (Michael Morgan)

Jiho Huang, MPH (OccMed) Traffic counts and emergency department visits for childhood asthma. (Carl A. Brodkin)

Matthew McQueen, MS (Tox) The role of oxidative stress in nuclear Factor-kappaB activation in arterial endothelial and kidney epithelial cell lines. (James Woods)

Gary Palcisko, MS (Tech) Children’s exposure to lead and arsenic in orchard soils. (John Kessel)

Keone Pang, MS (IH&S) Field evaluation of a multiple beam sampling strategy for OP-FTIR spectrometer monitoring. (Michael Yost)

Emily Schneider, MS (Tox) Effects of sodium arsenite on the cell cycle of primary rat midbrain neuroepithelial cells. (Elaine Faustman)

Autumn 2000

Alma Maria Cárdenas, MS (Tox) The effects of prenatal methanol exposure on simple and choice reaction time in nonhuman primates. (Tom Burbach)

Cecile Krejsa, PhD (Tox) Activation of glutamate-cysteine ligase in lymphocytes. (Terrance Kavanagh)

Thomas Lewandowki, PhD (Tox) Toxicokinetic and toxicodynamic modeling of the effects of methyl mercury on development of the embryonic rat midbrain. (Elaine Faustman)

Amy M. Scanlon, MS (Tox) The effect of vitamin C on glutathione depletion in A549 cells after exposure to ozone. (Jane Koenig)

Shengli Shi, MS (Tox) Effects of glutamate-cysteine ligase overexpression on DNA damage and survival rates in HEPA-1 cells. (Terrance Kavanagh)

Hongbin Xiao, MS (Tech) Evaluation of passive samplers for monitoring six aldehyde compounds. (Sally Liu)

Winter 2001

Hailing Lu, PhD (Tox) The effect of inorganic lead on DNA synthesis in 1321N1 human astrocytoma cells: Roles of protein kinase C and mitogen activated protein kinases. (Lucio Costa)

Jeffery Thompson, M PH (OccMed) Occupational history taking by family practitioner physicians. (Carl A. Brodkin)

Spring 2001

Nilo Arnaiz, MPH (OccMed) Genetic factors in the development of an asthma-like condition while employed in an aluminum smelter potroom. (Joel Kaufman)

Anne Caughlan, MS (Tox) Apoptosis: A novel endpoint for chlorpyrifos-induced neurotoxicity. (Zhegui Xia)

Emily Goswami, MS (Tech) Spatial characteristics of fine particulate matter and nitrogen dioxide in Seattle: identifying representative monitoring sites. (Sally Liu)

Julia Hoefl, MS (Tox) A biologically-based dose-response model for ethanol-induced developmental neurotoxicity. (Elaine Faustman)

Kimquy Kieu, MPH (OccMed) Demographics of hoarders in Seattle/King County. (Chuck Treser)

Maria Majar, MS (IH&S) Respirable dust and silica exposure assessment in construction tasks. (Noah Seixas)

Hongxia Wang, MS (Tech) The cardiopulmonary effects of 300 ppb NO2 on healthy subjects. (Jane Koenig)

Carolyn Whitaker, MS (IH&S) Accuracy of construction worker recall of tasks for epidemiological exposure assessment to noise. (Noah Seixas)

Lori Winnemuller, MS (IH&S) The validity of supervisor assessments in identifying ergonomic risk factors. (Joel Kaufman)

Tanongsak Yingratanasuk, MS (IH&S) An assessment of lung diseases and silica exposure in a stone carving company in Chonburi Province, Thailand. (Noah Seixas)
WARDS & HONORS

STUDENTS

**Erika Abel**, PhD student, Toxicology
Achivement Rewards for College Scientists award, 1999

**Shireen Assaf**, undergraduate student
Department’s outstanding undergraduate student, 2001

**George Astrakianakis**, PhD student, IH&S
Scholarship from the Pacific NW Section of the American Industrial Hygiene Association, 2000; Stockhausen scholarship, 2001; TSI Inc./Arthur J. Abrams Endowed Scholarship from the American Industrial Hygiene Foundation, 2001

**Lynn Bekris**, M S student, Toxicology
Achivement Rewards for College Scientists award, 1999

**Michael Box**, M S student, IH&S
First-place poster at the National Environmental Health Association, 1999

**Stephanie Carter**, PhD student, IH&S
Stockhausen scholarship, 2000

**Leonard Di Toro**, undergraduate student
Department’s outstanding undergraduate student, 2000

**Ed Doran**, PhD student, IH&S
Department’s outstanding graduate student, 2000

**Katia Harb**, M S student, IH&S
Scholarship from the Pacific Northwest Section, American Industrial Hygiene Association, 2000

**Julia Hoeft**, M S student, Toxicology
Achivement Rewards for College Scientists award, 2001

**Francesca Noel Hudson**, PhD student, Toxicology
Department’s outstanding graduate student, 2001

**Doug Johns**, PhD student, IH&S
Stockhausen scholarships, 2000, 2001; Achivement Rewards for College Scientists award, 2000

**Wendy Kirchoff**, undergraduate student
Scholarship from the Association for Women in Science—Seattle Chapter, 2000; Fellowship from U S Department of Energy, 2000
Students (continued)

Robert Leo, M S student, IH & S
Stockhausen scholarship, 2000

Hailing Lu, PhD student, Toxicology
Metal Specialty Section award at Society of Toxicology annual meeting, 2001

By Pham, medical student working with Matthew Keifer
Excellence in research award, Western Medical Student Research Forum, 2000

Ming Tsai, PhD student, IH & S
Achievement Rewards for College Scientists award, 2000

Carolyn Reeb Whitaker, M S student, IH & S
Best presentation or poster by a student, Occupational Epidemiology Committee, American Industrial Hygiene Conference and Exposition, 2001; best presentation or poster by a student, Graduate Student Poster Session Review Committee, American Industrial Hygiene Conference and Exposition, 2001; Stockhausen scholarship, 2000; Scholarship from the Pacific Northwest Section of the American Industrial Hygiene Association, 1999

Kyung Ehi Zoh, M S student, IH & S
Scholarship from the Pacific Northwest Section of the American Industrial Hygiene Association, 2000

Faculty & Staff

Dianne Botta
Department’s nominee for the UW Distinguished Staff Award, 2000–2001

Janice Camp

David Eaton
President, Society of Toxicology, 2001–2002; Fellow (Elected), Academy of Toxicological Sciences, 2000; National Academy of Sciences/ National Research Council committee to review the scientific basis for EPA’s proposal to lower the drinking water standard for arsenic

Jean Garber
Department’s nominee for the UW Distinguished Staff Award, 1999–2000

Richard Gleason
Construction Safety Trainer of the Year award, Puget Sound Construction Safety Summit Association, 2000; DEH distinguished lecturer award, 1999

Kathy Hall

Marcy Harrington
DEH staff outreach award, 1999–2000

Adrienne Hidy
DEH distinguished staff service award, 2000–2001

Matthew Keifer

John Kissel
President-elect of the International Society of Exposure Analysis, 2001

Jane Koenig
Community service award, School of Public Health and Community Medicine, 1999

Sally Liu
Elected councilor of the International Society of Exposure Analysis, 2001

Michael Morgan
Distinguished Industrial Hygienist Award, Pacific Northwest Section, American Industrial Hygiene Association, 1999; Outstanding teacher award, School of Public Health and Community Medicine, 2000

Jan Oberdoerster
Best poster, Neurotoxicology Specialty Section, Society of Toxicology, 2000

Curt Omiecinski
Burroughs Wellcome Fund Toxicology Scholar Award, 1995–2000

Cathy Schwartz
International award of excellence, Society for Technical Communication, 2000

Noah Seixas
DEH faculty outreach award, 1999–2000

Charles (Chuck) Treser
President, Association of Environmental Health Academic Programs, 2000

Collin White
Department’s outstanding staff service award, 2000

Zhengui Xia
Burroughs Wellcome Fund for New Investigator Award in Toxicology, 1999–2000
Scott Barnhart, MD, MPH, is an Associate Professor (primary appointment in the School of Medicine). He directed the Occupational and Environmental Medicine program until his appointment in 1999 as medical director of Harborview Medical Center. One area of research is the natural history of asbestos-related lung disease, including possible protective effects of beta-carotene and vitamin A. A second project is control of silicosis in developing nations. A third area of investigation is use of a public health approach to reduce occupational hazards on Department of Energy sites.

Carl A. (Drew) Brodkin, MD, MPH, an Associate Professor of Internal Medicine and Environmental Health, teaches in the Occupational & Environmental Medicine program. His research involves health effects of organic solvents and asbestos, including solvent-related liver disease and occupational pulmonary epidemiology. He has served on the Board of the Association of Occupational and Environmental Clinics since 1993, and was president in 1997. He was appointed to the American Thoracic Society Committee to update the 1986 ATS statement on “the diagnosis of nonmalignant diseases related to asbestos.” He is a coeditor for the Second Edition of the Textbook of Occupational and Environmental Medicine (Saunders & Co).

Thomas M. Burbacher, PhD, is an Associate Professor in the Toxicology program and deputy director of the Department’s Center for Child Environmental Health Risks Research. His research focuses on the effects of prenatal or early postnatal exposure to environmental pollutants on central nervous system development. His current projects include studies aimed at...
examining: the cognitive and sensory effects of prenatal methylmercury exposure in aged monkeys; the effects of prenatal exposure to methanol on sensory and cognitive development; and the effects of early pesticide exposure on brain development in rodents. In 1999, he was appointed to the National Academy of Sciences review panel on the effects of methylmercury exposure on children’s health, which issued its report in 2000.

Janice Camp, MSN, MSPH, is a Senior Lecturer in the Industrial Hygiene and Safety program and director of the Field Research and Consultation Group. Her research interests include field industrial hygiene and safety, ergonomics, and program evaluation. Ms. Camp, a Certified Industrial Hygienist, is past president of the Pacific Northwest Section of the American Industrial Hygiene Association.

Harvey Checkoway, PhD, is a Professor in the Occupational and Environmental Medicine program. His research interests include occupational and environmental risk factors for cancer, dust-related lung diseases, and neurological disorders. Increasingly, his research has incorporated biomarkers of exposure, response, and genetic susceptibility. Recent projects include a study of silica, silicosis, and lung cancer among diatomite industry workers; semen quality among lead smelter workers; environmental exposures and genetic variations in Parkinson’s disease; and cancer risks among textile workers.

Lucio G. Costa, PhD, is a Professor in the Toxicology program. His area of research is neurotoxicology, particularly the study of the cellular, biochemical, and molecular mechanisms involved when toxicants affect the nervous system. His laboratory uses in vivo, in vitro, and cell culture systems, as well as biochemical, molecular, and imaging techniques. Research projects include the effects of alcohol and lead on brain cells, and studies on the toxicity of pesticides and on genetic predisposition to neurotoxicity. He has published more than 170 articles in peer-reviewed journals and contributed dozens of book chapters and other publications.

William Daniell, MD, MPH, is an Associate Professor in the Occupational and Environmental Medicine program. His research interests involve noise-induced hearing loss, carpal tunnel syndrome, and the utility of workers’ compensation data for research and intervention purposes. Past research includes neuropsychological consequences of occupational chemical exposures, particularly organic solvents, and multiple chemical sensitivity syndrome.

David L. Eaton, PhD, is a Professor in the Toxicology program and Associate Dean for Research in the UW School of Public Health and Community Medicine. He has published more than 80 research papers, contributed to 23 books, and written a dozen articles explaining toxicological principles to the general public. He directs a training program for elementary and secondary educators and is President of the Society of Toxicology. His research specialty is chemical carcinogenesis, focusing on how enzymes in the liver activate and detoxify carcinogenic chemicals. He directs the Center for Ecogenetics and Environmental Health, which brings together more than 50 UW investigators to study how small differences in human genes (polymorphisms) can influence susceptibility to toxic substances in the environment. The Center is funded by the National Institute of Environmental Health Sciences (NIEHS).

Elaine M. Faustman, PhD, is a Professor in the Toxicology program and director of the Institute for Risk Analysis and Risk Communication, and director of the Center for Child Environmental Health Risks Research. Her long-range aim is to identify biochemical and molecular mechanisms of developmental toxicity. Because 70% of human birth defects have an unknown cause, she wants to identify preventable causes, focusing on several types of pollutants including pesticides (organophosphates, benzimidazoles) and metals such as lead and methylmercury. During 1999–2001, she chaired a National Academy of Sciences panel that developed approaches for incorporating new molecular and...
developmental biological findings into risk assessment. She is an elected fellow of the American Association for the Advancement of Science. Dr. Faustman has published more than 73 papers in peer-reviewed journals and a dozen book chapters and other publications.

Richard A. Fenske, PhD, MPH, is a Professor in the Industrial Hygiene and Safety program, and director of the Pacific Northwest Agricultural Safety and Health Center, one of nine such centers supported by the National Institute for Occupational Safety and Health. He is also deputy director of the Center for Child Environmental Health Risks Research. He researches new methods for assessing workplace and community exposures and risks. This work has included development of a quantitative fluorescent tracer technique for characterizing dermal exposure during pesticide applications, evaluation of risks associated with residential pesticide use, and community-based biological monitoring of children’s exposure to pesticides. He teaches courses in exposure assessment and environmental risk analysis. He is a member of the EPA Science Review Board for pesticide science policy, an advisor to the National Cancer Institute’s Agricultural Health Study, and a member of the NIOSH Implementation Team for the National Occupational Research Agenda.

Gary M. Franklin, MD, MPH, is a Research Professor in the Occupational and Environmental Medicine program and in the Department of Neurology, and is the medical director of the Washington State Department of Labor and Industries. His research interests include the epidemiology and outcomes of treatment for occupational injury, occupational and environmental diseases of the nervous system, health services research, and health policy.

Jack Hatlen, MS, is an Associate Professor Emeritus in the Environmental Health Technology program. His research specialties include environmental sanitation practices in public health agencies, environmental health planning and management, and workforce education and development. He is the first executive director of the newly formed Association of Environmental Health Academic Programs.

Peter Johnson, PhD, is an Assistant Professor in the Industrial Hygiene program, specializing in ergonomics. He earned his doctorate in Bioengineering from the University of California-Berkeley and has worked as a researcher at the National Institutes of Occupational Health in the United States, Sweden, and Denmark. He is developing and validating an exposure assessment system for measuring multiple physical risk factors during computer work, working on a large-scale study to measure and characterize officeworkers' exposure to upper-extremity hazards, and developing tools for exposure assessment of physical risk factors. He is also developing methods to measure occupationally-related muscle fatigue using electrical stimulation of the muscle.

David A. Kalman, PhD, is Department Chair and Professor in the Environmental Health Technology program. His research focuses on chemical issues, such as hazardous properties of materials, environmental fate and transport; environmental quality assessment; hazard management; and occupational and community exposure assessment, especially using biomarkers of exposure. Active research areas include: assessment of exposures to atmospheric particulates including wood smoke; exposures and effects of arsenic in drinking water, diet, and soil; and nonoccupational pesticide exposure.

Joel Kaufman, MD, MPH, is an Associate Professor in the Department’s Occupational and Environmental Medicine program. He has a joint appointment with General Internal Medicine and an adjunct appointment in Epidemiology. His research activities fall into three areas: epidemiology of occupational and environmental asthma; surveillance and prevention of occupational illnesses and injuries, including lead poisoning and occupational skin disorders; and occupational and environmental factors in cardiovascular disease. He is past-president of the Northwest Association of Occupational and Environmental Medicine.

Terrance J. Kavanagh, PhD, is an Associate Professor in the Toxicology program. His research interests include free radical biology and oxidative stress, and the effects of chemicals on diseases of aging, including cancer, atherosclerosis, pulmonary fibrosis, Parkinson’s disease, and Alzheimer’s disease. His laboratory assesses the role of the free radical scavenger glutathione (GSH) and the antioxidant enzymes catalase, superoxide dismutase, and glutathione peroxidase in preventing free radical injury. Another research interest involves assessing the role of genetic polymorphisms in these enzymes in free-radical-mediated diseases.

Matthew C. Keifer, MD, MPH, is an Associate Professor and interim director of the Occupational and Environmental Medicine program. He joined the faculty after serving as project epidemiologist for CARE in Nicaragua, where he participated in health surveillance and development activities related to pesticide exposures and health effects. His activities pertain to studies of pesticide health effects on humans. He is codirector of the Pacific Northwest Agricul-
tural Safety and Health Center, one of nine agricultural centers in the US funded by NIOSH. He is also director of the Fogarty International Center funded International Scholars in Occupational and Environmental Health.

John Kissel, PhD, is an Associate Professor and director of the Environmental Health Technology program. His research interests include pathways of human exposure to environmental contaminants in soils. Exposure factor data collected by Dr. Kissel and his students and staff are cited in EPA guidance documents and used in cleanup decisions at Superfund sites. He also investigates community exposures to pesticides and currently serves on the EPA Science Advisory Panel for the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Dr. Kissel is an active member of the International Society of Exposure Analysis and the Society for Risk Analysis. He has authored or coauthored more than 25 papers in scientific journals.

Jane Q. Koenig, PhD, is a Professor in the Toxicology program. Her research interests are the respiratory health effects of air pollution, especially the response of susceptible individuals, such as those with asthma or other chronic respiratory diseases. She is involved in three general areas of research: controlled laboratory studies using human subjects; field or epidemiological studies evaluating respiratory health in populations exposed to fine particulate matter from wood smoke or other sources in their neighborhoods; and assessment of physical or chemical changes in cultured human epithelial cells after air pollutant exposure. She has published more than 60 peer-reviewed journal articles, and directs the EPA particulate matter research center at the UW.

L.-J. Sally Liu, ScD, is an Assistant Professor in the Environmental Health Technology program. She earned her doctorate in 1994 from Harvard University's School of Public Health and has published about a dozen papers in peer-reviewed journals and two book chapters. She is the principal investigator of several exposure assessment projects. Two studies are currently funded by the US EPA to assess particulate matter exposure and health effects among high-risk subpopulations in the US Northwest region. She is also the principal investigator of an exposure assessment technology transfer project, jointly sponsored by the US EPA and the Taiwan EPA.

Daniel L. Luchtel, PhD, is a Professor in the Toxicology program. His research projects include the effects of gaseous air pollutants (ozone, nitrogen dioxide, and sulfur dioxide) on cultured human nasal epithelial cells and primate bronchial epithelial cells; toxicology of carbon/graphite fibers used in advanced composite materials by the aerospace industry; and mucociliary clearance as a defense mechanism in the lung. He has developed new ways of preserving and fixing mucous cells with ultrarapid freezing and freeze-substitution. He is also interested in the applications and techniques of microscopy. He has published more than 50 papers in peer-reviewed publications.

Lee Monteith, MS, is a Senior Lecturer Emeritus in the Industrial Hygiene and Safety Program. Mr. Monteith, a Certified Industrial Hygienist, is a member of the Air Sampling Instruments Committee and the Gas and Vapor Detection Systems Committee, American Industrial Hygiene Association and a liaison between the two committees. He is a Diplomate member of the American Academy of Industrial Hygiene. His research interests include the adsorption process in passive dosimeter badges, methods for the measurements of glove permeation, and methods for the detection and measurement of trace compounds in the environment. In October 2000, he visited ten occupational health groups in China to exchange information as part of a delegation from the American Conference of Governmental Industrial Hygienists and People to People Ambassador Program.

Michael S. Morgan, ScD, is a Professor in the Industrial Hygiene and Safety program and director of the Department’s undergraduate program. He holds adjunct appointments in the Departments of Civil Engineering and Chemical Engineering at UW. Dr. Morgan is a Certified Industrial Hygienist. His main academic interest is in respiratory physiology and inhalation toxicology. He measures and models the pharmacokinetics of industrial solvent exposures, and studies the performance of personal protective equipment used with solvents. He also studies lead exposures in the construction industry, particularly among demolition workers. He chairs the Biological Exposure Indices Committee of the American Conference of Governmental Industrial Hygienists. In 1999, he was appointed to the National Research Council’s Committee on Air Quality in Passenger Cabins of Commercial Aircraft. He has published more than 40 papers in peer-reviewed journals.

Sharon L. Morris is a Senior Lecturer in the Occupational and Environmental Medicine program and the Department’s Assistant Chair for Community Outreach, as well as associate director of the Pacific Northwest Agricultural Safety and Health Center. Her research interests include occupational safety and health policy and program evaluation, and she directs the Department’s Policy Analysis and
Program Evaluation Initiative. She serves on the Board of Scientific Counselors of the National Institute for Occupational Safety and Health; the Innovations Task Force of the Washington Department of Labor and Industries; the Governor's Industrial Safety and Health Advisory Board; and the NIOSH NORA Economic and Social Consequences Committee.

Curtis J. Omiecinski, PhD, is a Professor and director of the Toxicology program. He is also an Adjunct Professor in the Department of Pharmacology. His research program in molecular toxicology seeks to understand genetic factors and regulatory mechanisms that underlie susceptibilities of individuals to toxic effects associated with chemical exposures. These studies are largely focused on the cytochrome P450 and epoxide hydrolases, enzymes that metabolize many environmental substances of concern. He is an editorial board member of several scientific journals, and has served as Associate Editor of both Toxicology and Applied Pharmacology and Toxicological Sciences, official journals of the Society of Toxicology. He received the Society’s Zeneca Award in 1998 and the Burroughs Wellcome Fund Toxicology Scholar Award, 1995-2000. He has published over 70 peer-reviewed articles and numerous book chapters, reviews and other technical reports. Dr. Omiecinski’s research program in toxicogenetics is supported by several NIH grants together with the Burroughs Wellcome Fund.

Mansour Samadpour, PhD, is an Assistant Professor in the Environmental Health Technology program. He is trained in microbiology and food science. Recent projects include source analysis for fecal coliforms in relation to shellfish beds and public water supply; molecular epidemiology of food-borne outbreaks; and prevalence and implications of food-borne pathogens in public food supplies. His laboratory specializes in rapid identification of sources of outbreaks of infectious diseases and the microbiology of food, water, wastewater, and air. He received a group recognition award from US Food and Drug Administration in 1997 for his team’s work in solving the E. coli identification problem in the Odwalla apple juice case.

Noah S. Seixas, PhD, is an Associate Professor in the Industrial Hygiene and Safety program and graduate program director. Dr. Seixas is a Certified Industrial Hygienist and a member of the editorial board of the American Industrial Hygiene Association Journal. He also serves on the AIHA Occupational Epidemiology Committee. His interests are in the quantification of exposure for occupational epidemiology, especially agents affecting the respiratory tract. Current research efforts include a prospective study of noise-induced hearing damage among construction workers, assessment of irritant gas exposures during aluminum smelting and their relationship to respiratory tract infection, exposure assessment for women textile workers in Shanghai, China, and methods of controlling exposure to dust during construction tasks. Dr. Seixas also works closely with the local construction community evaluating the effectiveness of educational and organizational programs.

Elizabeth (Lianne) Sheppard, PhD, is a Research Associate Professor in the Occupational and Environmental Medicine Program with a joint appointment in Biostatistics. Her applied work focuses on air pollution health effects and occupational epidemiologic studies. Her biostatistical research interests emphasize estimation of health effects from environmental and occupational exposures, and incorporating group information in epidemiologic studies.

Charles D. Treser, MPH, is a Senior Lecturer in the Environmental Health Technology program. His interests include administrative law and process applied to environmental health, and vector control and housing. Current research projects include several projects through the NW Center for Public Health Practice to develop a regional network of state and local public health agencies and academic institutions focused on current issues of public health workforce development. He is also spearheading a national effort to produce a practical manual on housing and health for environmental health practitioners. He is Chuck Treser, undergraduate advisor and commencement marshal, at June 2001 graduation ceremonies.
president of Association of Environmental Health Academic Programs; and principal investigator on a cooperative agreement between AEHAP and the CDC National Center for Environmental Health designed to improve Environmental Health practice through promoting and strengthening EH academic programs.

Gerald van Belle, PhD, a Professor in the Environmental Health Technology program (joint with Biostatistics), was department Chair from 1990 to 1998. His research specialties include design of experiments, data characterization, and analysis with particular emphasis to neurodegenerative diseases and environmental studies. He is the principal investigator for the core in Biostatistics, Epidemiology, and Statistical Genetics of the UW Alzheimer Disease Research Center. He also researches the effects of air pollution on health, particularly the link between daily fluctuations in air pollution levels and morbidity and mortality statistics. He is a member of the Research Committee of the Health Effects Institute, Boston, a board member of the Mickey Leland National Urban Air Toxics Research Center, Houston, and a member of the Food and Drug Administration’s Peripheral and Central Nervous System Drug Advisory Committee. He is the author or coauthor of more than 100 papers and coauthor with L. Fisher of the Wiley book, Biostatistics: A Methodology for the Health Sciences.

James S. Woods, PhD, MPH, is a Research Professor in the Toxicology program. His research focuses on the molecular mechanisms of toxicity of heavy metals such as mercury, arsenic, and lead, with interest in changes in metabolism of porphyrins as biomarkers of metal exposure and toxicity. He also conducts epidemiological studies of metal toxicity in human populations, including a study to determine the potential health risks to children of dental amalgam fillings containing mercury. He is past president of the American Board of Toxicology and of the Pacific Northwest Association of Toxicologists. He has served on numerous national and international advisory committees to evaluate human health risks from metal exposures. He has published more than 100 papers in peer-reviewed journals in addition to numerous book chapters and review articles.

Zhengui Xia, PhD, is Assistant Professor in the Toxicology program. She has published 20 papers, mostly on the mechanisms for regulating apoptosis, a form of programmed cell death. During development, apoptosis helps remove cells that are produced in excess, have developed improperly, or are no longer needed. In adults, apoptosis removes cells that are potentially dangerous, such as viral infected cells, genetically damaged cells, or toxin-damaged cells. Dr. Xia studies the role of chemical toxins such as sodium arsenite and pesticides on apoptosis. Abnormal apoptosis has been implicated in various diseases, such as cancer, autoimmune disorders, Huntington’s disease, Alzheimer’s disease, and stroke. Dr. Xia’s research has been supported by the Sheldon Murphy assistant professor endowment and NIH. She is also a recipient of the Burroughs Wellcome new investigator award.

Michael G. Yost, PhD, is an Associate Professor and director of the Industrial Hygiene and Safety program. His research interests include optical remote sensing of chemicals in the environment, and physical agents in the workplace such as noise, vibration, and electromagnetic radiation. Dr. Yost is a member of the Bioelectromagnetics Society (BEMS) and the American Conference of Government Industrial Hygienists (ACGIH). He is developing new tools for exposure assessment, such as Optical Remote Sensing (ORS) methods that use electromagnetic radiation (such as lasers, UV, visible, or infrared light) to rapidly identify and measure contaminants. He is developing new types of sampling methods, such as a heart rate controlled sampling pump and instruments for measuring solvent concentrations in exhaled breath samples using infrared spectroscopy.
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POSTDOCTORAL FELLOWS

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Federica Bordi
Sean Boyle
Jane Cavanaugh
Sanders Chai
Sandrea Chang
Pandora Christie
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Harriet Ammann, PhD, Associate Assistant Professor
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Washington state Department of Labor and Industries
Stanley Bigos, MD, Adjunct Professor
Spine Research Clinic, Harborview
Denis Bourcier, PhD, Associate Professor
Environmental Engineering, Boeing Defense and Space Group
Jeanine L. Bussiere, Associate Professor
Director of Pharmacology and Toxicology at Immunex
John Calcagni, MD, Clinical Instructor, Richland
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Industrial Safety and Health, Washington state Department of Labor and Industries
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SHARP, Washington state Department of Labor and Industries
Jon Counts, DrPH, Clinical Assistant Professor
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David Covert, PhD, Adjunct Research Professor
Civil Engineering, Atmospheric Sciences
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Foppe DeWalle, PhD, Associate Professor
Delft, The Netherlands
Frank Dost, DVM, ATS, Associate Professor
Veterinary Sciences, Freeland, WA
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UW Environmental Health and Safety
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Alan Fantel, PhD, Adjunct Research Professor
Department of Pediatrics
Bruce Fowler, PhD, Visiting Associate Professor
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Steven Gilbert, PhD, Associate Professor
President, SNBL-US, Director, Institute of Neurotoxicology and Neurological Disorders
Timothy Gilmore, MD, Clinical Assistant Professor
Group Health Cooperative

Gary Goodman, MD, Clinical Associate Professor
Joint with Medicine (Primary Appointment), Swedish Tumor Institute

Samuel Hammar, MD, Clinical Professor
Joint with Pathology (Primary Appointment)

John Holland, MD, MPH, Clinical Assistant Professor
Joint with Orthopaedics (Primary Appointment)

Scott Iverson, PhD, Adjunct Associate Professor
Industrial Engineering

Damir Janigro, PhD, Adjunct Research Associate Professor
Neurological Surgery

James Karr, PhD, Adjunct Professor
Department of Zoology

Ronald Kathren, PhD, Affiliate Associate Professor
U.S. Transuranium and Uranium Registries
Washington State University, Richland

Philip Landrigan, MD, Clinical Professor
Director, Division of Environmental and Occupational Medicine, Mt. Sinai Medical Center, New York

Timothy Larson, PhD, Adjunct Professor
Department of Civil Engineering

Joellen Lewtas, PhD, Affiliate Professor
U.S. EPA, Region 10

Roseanne Lorenzana, PhD, Affiliate Assistant Professor
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Donald Malins, PhD, Affiliate Professor
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Thomas Martin, MD, MPH, Adjunct Associate Director, Toxicology Services, Emergency Medicine, UW

Roscoe Moore, PhD, Affiliate Associate Professor
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Karen Morris-Fine, PhD, Affiliate Assistant Professor
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Carl Osaki, MSPH, Clinical Associate Professor
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Barbara Silverstein, PhD, MPH, Affiliate Associate Professor
SHARP Program, Washington State Department of Labor and Industries

Michael Silverstein, MD, MPH, Affiliate Associate Professor
Joint with Health Services
A assistant Director for WISHA Services, Washington State Department of Labor and Industries

Patricia Sparks, MD, Clinical Assistant Professor
Consultant, occupational and environmental medicine and clinical toxicology

Peregrin Spielholz, Affiliate Associate Professor
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Philip Watanabe, PhD, Affiliate Professor
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Stephen Whittaker, PhD, Affiliate Assistant Professor
SHARP Program, Washington State Department of Labor and Industries

Paul Williams, MD, Clinical Associate Professor
Northwest Asthma and Allergy Center, Mount Vernon

Helmut Zarbl, PhD, Affiliate Associate Professor
(Joint with Pathology)
Fred Hutchinson Cancer Research Center
This list includes books, articles, and reviews in professional journals. It does not include book chapters, letters, technical reports, or conference presentations. Departmental investigators are bold-faced.


Becker P, Flanagan ME, Aklados M. Development of an...


Dills RL, Zhu X, Kalman DA. Measurement of urinary methoxyphenols and their use for biological monitoring of...


Guffey SE, Simcox N, Booth DW, Hibbard R, Stebbins A. Hard


Li W, Costa LG, Richter RJ, Hagen T, Shi h DM, Tward A, Lusis AJ, Furlong CE. Catalytic efficiency determines the in-vivo


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Schmeling KB, Afari N, Barnhart S, Buchwald DS. Medical and psychiatric predictors of airway reactivity. Respir Care 1999;44:1452–1457.


ACKNOWLEDGMENTS

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Contributors

Kris Freeman, Jennifer Grant, Shannon Kirkpatrick, Jane Koenig,
Diane Morgan, Rory Murphy

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The soulcatcher, logo of the School of Public Health
and Community Medicine, is a northwest coast
Indian symbol of physical and mental well-being
(artist: Marvin Oliver)