defining
A NEW TOMORROW
2013–2015 BIENNIAL REPORT
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from the chair
DEFINING A NEW TOMORROW

The Department of Environmental and Occupational Health Sciences aims to create healthy, safe, and sustainable communities and workplaces. We have a great stake in the long-term health and vitality of the Pacific Northwest—its environment, its public, and its workforce. For this reason, we must plan and act sustainably, with the future of our region in mind.

Sustainable business operations and company practices aim to manage their environmental, economic, and social impacts to meet the needs of future generations. In the fields of environmental and occupational health, we are concerned with maintaining healthy populations. Our work is expanding the definitions of environmental, economic, and social impacts.

This biennial report will introduce you to our department and will give examples of our activities.

The graduates of our educational programs are among our greatest achievements. They contribute to a skilled workforce attuned to and capable of managing health and safety issues, and they are equipped to conduct research on emerging hazards. They provide the foundation for a sustainable future, and for that reason, we depict them on the cover of this report.

You will also read in this report how we improve workers’ health and safety through our service activities, such as job-site monitoring and evaluation, laboratory testing, health and safety training, continuing and professional education, and clinical care. You will get a glimpse of projects focused on greener, more sustainable lab practices and how we are helping campus-wide and industry-led efforts to reduce hazards and decrease waste and energy costs. You will learn about occupational and environmental health issues that can influence the sustainability of our food production and drinking water supply. Finally, you will find out about new tools developed by our researchers that increase our knowledge of how traffic air pollution impacts public health.

Please visit us online at deohs.washington.edu for more information.

Michael Yost, Chair
Department of Environmental and Occupational Health Sciences
The Department of Environmental and Occupational Health Sciences aims to create healthy, safe, and sustainable communities and workplaces by:

- Providing outstanding education to students and professionals.
- Discovering how the environment affects people’s health and well-being.
- Conducting research to prevent occupational injury and illness.
- Serving the citizens, workers, and employers across Washington state and the Northwest.
- Promoting healthy communities and workplaces locally, nationally, and globally.

### Education

Our multidisciplinary faculty teach and train students. We offer undergraduate and graduate degrees, a medical residency, and postdoctoral research fellowships. We also offer continuing and professional education.

### Research

The department’s research focuses on environmental factors that influence human health and well-being, with the goal of clean air, clean water, safe food, safe workplaces, and sustainable communities.

### Service

The department’s service activities support occupational health and safety for Washington state workers and employers. We provide:

- Health and safety training.
- Workplace monitoring and evaluation.
- Laboratory analysis.
- Clinical care.

### People

<table>
<thead>
<tr>
<th>People</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>STUDENTS = 140</td>
<td></td>
</tr>
<tr>
<td>Postdoctoral fellows</td>
<td>22</td>
</tr>
<tr>
<td>Graduate students</td>
<td>75</td>
</tr>
<tr>
<td>Undergraduates</td>
<td>43</td>
</tr>
<tr>
<td>FACULTY = 136</td>
<td></td>
</tr>
<tr>
<td>Core</td>
<td>38</td>
</tr>
<tr>
<td>Clinical</td>
<td>15</td>
</tr>
<tr>
<td>Emeritus</td>
<td>16</td>
</tr>
<tr>
<td>Adjunct</td>
<td>13</td>
</tr>
<tr>
<td>Affiliate</td>
<td>54</td>
</tr>
<tr>
<td>STAFF = 100</td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>60</td>
</tr>
<tr>
<td>Service</td>
<td>18</td>
</tr>
<tr>
<td>Operations</td>
<td>6</td>
</tr>
<tr>
<td>Communications</td>
<td>4</td>
</tr>
<tr>
<td>Computing</td>
<td>4</td>
</tr>
<tr>
<td>Student Support/Instruction</td>
<td>8</td>
</tr>
</tbody>
</table>

Photo: Sarah Fish
The department’s activities are funded by federal, state, and private sources. The graph below depicts department revenue across biennia. The federal sources of revenue are grants and contracts. From the state, the department receives grants and an appropriation from the Medical Aid and Accident funds. The department’s activities are also supported by self-sustaining units, tuition revenue, and private funds, such as charitable gifts. The difference between revenue and expenditures is due to the timing of grant and contract award disbursements and the timing of spending these award dollars during the grant or project period.
service /sur-ˈvis/ n. Four service units in the Department of Environmental and Occupational Health Sciences work together to help meet the occupational health and safety needs of Washington state. The units focus on: 1) workplace monitoring and evaluation; 2) laboratory testing; 3) clinical care; and 4) professional development and continuing education. These units help: 1) reduce work-related injuries, illnesses, and deaths; 2) lower employer costs for workplace injuries and illnesses; and 3) maintain a productive and competitive workforce.
from 33 counties participated in courses offered by the Continuing Education Programs.

from 18 counties were provided on-site monitoring and evaluations by the Field Research and Consultation Group.

from 18 counties submitted samples that were analyzed by the Environmental Health Laboratory.

who live in 22 counties were seen by physicians in the Occupational and Environmental Medicine Clinic.
The Field Research and Consultation Group (Field Group) is a small team of dedicated industrial hygienists who provide occupational health and safety consultation to Washington state workplaces. Directed by Senior Lecturer Martin Cohen, the Field Group prioritizes requests from companies with limited financial and health and safety resources.

A field investigation includes a site visit to observe work activities and collect samples or data on exposures. These samples are analyzed in the Environmental Health Laboratory. The Field Group’s report summarizes findings and gives recommendations. The Field Group also works with companies to design control strategies and evaluate their effectiveness. In addition, Field Group staff help provide hands-on learning opportunities for our graduate and undergraduate students.

WORKPLACE SECTORS SERVED

<table>
<thead>
<tr>
<th>Workplace Sector</th>
<th>Total Sites Visited</th>
<th>Total Workers Impacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANUFACTURING</td>
<td>64 site visits = 47% (867 workers)</td>
<td>1,204</td>
</tr>
<tr>
<td>Primary Metal Products</td>
<td>8 site visits</td>
<td></td>
</tr>
<tr>
<td>Wood Products</td>
<td>15 site visits</td>
<td></td>
</tr>
<tr>
<td>Fabricated Metal Products</td>
<td>10 site visits</td>
<td></td>
</tr>
<tr>
<td>All Other Manufacturing</td>
<td>31 site visits</td>
<td></td>
</tr>
<tr>
<td>CONSTRUCTION</td>
<td>25 site visits = 18% (41 workers)</td>
<td>29% (278 workers)</td>
</tr>
<tr>
<td>WHOLESALE TRADE</td>
<td>8 site visits = 6% (18 workers)</td>
<td>6% (18 workers)</td>
</tr>
<tr>
<td>ALL OTHER</td>
<td>40 site visits = 29% (278 workers)</td>
<td>29% (278 workers)</td>
</tr>
</tbody>
</table>

Spray Painters and Exposures

For the last several years, the Field Group has worked with Pioneer Industries, which manufactures aerospace and commercial products and employs about 200 workers. Spray painters at the facility use a durable paint primer that contains hexavalent chromium, a chemical known to be a carcinogen. Research Industrial Hygienist Allison Crollard provides quarterly air monitoring for the company. She investigates work practices and other factors that may influence workers’ exposure to this chemical. Students from our department have visited the worksite and taken part in research and monitoring activities, applying skills they have learned in class to a real workplace.

Photo: Martin Cohen
Environmental Health Laboratory

depts.washington.edu/ehlab

The Environmental Health Laboratory (EH Lab) is accredited by the American Industrial Hygiene Association's Laboratory Accreditation Program, LLC, which audits and reviews laboratories involved in analyzing workplace exposure samples to maintain high quality standards.

Directed by Russell Dills, PhD, the EH Lab provides chemical and analytical services and works closely with the Field Research and Consultation Group to serve Washington’s employers, labor groups, and government organizations. The EH Lab has unique capabilities: a diverse suite of analytical instrumentation and scientists on staff with advanced degrees and decades of experience. Clients can depend on the lab to determine a sampling protocol and identify exposures for new and unusual workplace situations.

Test Developed to Detect Chemotherapy Drug Contamination

Physicians in our Occupational and Environmental Medicine Clinic wanted to know if a rash that a nurse developed might have been related to the anti-neoplastic or chemotherapy drugs administered in the facility where she worked. Contact with miniscule amounts of these pharmaceuticals is toxic. To find out if the rash was due to exposure, Nancy Beaudet—an industrial hygienist with the clinic—took samples at the facility. A lab method sensitive enough to test samples for the chemotherapeutic agents didn’t exist, so the EH Lab scientists developed one. It included a surface-wipe sampling package and an analytical method that used a special mass spectrometer. The result? Exposure to anti-cancer drugs was not the cause of the nurse’s rash. The nurse did not handle any chemotherapeutic agents, nor was there contamination detected in her work area. The rash was likely due to benign workplace irritants. Beaudet shared her results with the facility and recommended employees follow best practices for cleaning to prevent surface contamination and inadvertent exposures.

ENVIROMENTAL HEALTH LAB SERVICE ACTIVITIES

<table>
<thead>
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<th>ANALYSIS FOR THE FIELD GROUP</th>
<th>DIRECT CLIENT SERVICE</th>
<th>QUALITY CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clients</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Submissions</td>
<td>200</td>
<td>368</td>
</tr>
<tr>
<td>Samples</td>
<td>1,803</td>
<td>2,712</td>
</tr>
</tbody>
</table>

Clients 68
Submissions 200
Samples 1,803

Clients 124
Submissions 566
Samples 2,712

Samples 368
Occupational & Environmental Medicine Clinic

www.uwmedicine.org/locations/occupational-and-environmental-harborview

Board-certified occupational medicine physicians in the Occupational and Environmental Medicine (OEM) Clinic at Harborview Medical Center care for patients with work-related environmental exposure, illness, and injury. The clinic offers comprehensive services in prevention, diagnosis, and treatment. The clinic also offers screening and surveillance exams to people whose jobs bring them into contact with hazardous materials, such as asbestos and silica. Physicians are faculty in our department and in the UW's Division of General Internal Medicine. They conduct research and train OEM physician residents in the MPH degree program. Residents see patients in the clinic. Debra Milek, clinic director, also heads the Harborview Center of Occupational Health and Education, a program that seeks to minimize work-related disabilities by offering education and training in best occupational health practices to physicians who treat workers with work-related injuries.

PATIENTS SEEN IN THE CLINIC

TOTAL VISITS
1,999

DISTINCT PATIENTS
610

TOP FOUR DIAGNOSES
• Musculoskeletal
• Dermatological
• Respiratory
• Neurological

Rx for the Workplace

Clinic staff work with employers and employees and others to help prevent work-related illnesses and injuries by raising awareness about job hazards and safety. A patient seen in the clinic signals that other employees at the same worksite or those in similar industries could be at risk for the same injury or illness. When an auto detailing employee came to the clinic with burns, the attending physician worked with Nancy Beaudet, the clinic’s certified industrial hygienist who collaborates with the Field Research and Consultation Group, to track down the hazard. Hydrofluoric acid is contained in cleaning products that auto detailers use. While effective as a cleaner, it can cause severe tissue burns and eye injury and can affect cardiac rhythm. Beaudet surveyed the industry and found many were unaware of the risk and that proper protective equipment was needed to prevent exposure. As a result, she shared information with employers on how to better protect workers.
Continuing Education Programs

The department’s Continuing Education Programs (CE), directed by Nancy Simcox, promote safe, sustainable workplaces by delivering OSHA-standards training and professional and continuing education classes. These help meet the ongoing and evolving educational needs of Washington state workers, practitioners, and employers.

People Served by CE

- Workers, managers, and health and safety professionals (Pacific Northwest OSHA Education Center, the only authorized OSHA training facility in the Pacific Northwest)
- Practitioners in occupational medicine, occupational health nursing, industrial hygiene, safety, and hazardous materials management (Northwest Center for Occupational Health & Safety)
- Underrepresented minorities who are Superfund site workers, emergency response personnel, and hazardous waste transporters and workers (Minority Worker Training Program, Hazardous Waste Worker Training, HAZMAT Disaster Preparedness Training)

Safer Chemicals & Labs

The Continuing Education Programs offered a series of courses on safer chemicals and sustainable lab practices. The courses were in response to widespread government, industry, and other institutional interest. A laboratory-oriented course shared information on sustainable practices to prevent chemical exposures, reduce lab waste, and communicate safe chemical use.

A second course covered how to protect workers, consumers, and the environment from chemical hazards by establishing a chemical management system to reduce or eliminate chemical hazards at the source.

Another CE course featured recognized leaders in chemistry and toxicology and helped guide participants in the use of tools for chemical design and predictive toxicology to make safer, healthier choices.

PROFESSIONALS WHO TAKE CE COURSES

<table>
<thead>
<tr>
<th>Category</th>
<th># COURSES</th>
<th># STUDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private sector</td>
<td>42%</td>
<td>6,880</td>
</tr>
<tr>
<td>Governmental agencies</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>Nongovernmental organizations and academia</td>
<td>21%</td>
<td></td>
</tr>
</tbody>
</table>

Photo: Kelsey Hughes

osha.washington.edu
In the early 1980s, Joseph Coble joined our department's air quality researchers who were investigating indoor air pollutants—especially formaldehyde and other gases from plywood and other wood products. He chose UW for his master's degree because of the availability of training grants through the Education and Research Center funded by the National Institute for Occupational Safety and Health (NIOSH) and the appeal of living in the Pacific Northwest.

His thesis research on formaldehyde sampling led to a full-time job as an industrial hygienist at the Weyerhaeuser Technical Center. He became a certified industrial hygienist in 1989. Two years later, he moved to James River Corporation, a large paper company.

He left industry for academia in 1996, but he didn't forget his roots. His doctoral dissertation at Johns Hopkins University Bloomberg School of Public Health was part of a large epidemiology study of pulp and paper workers.

After he earned his doctorate, Coble joined the National Cancer Institute (NCI), where he worked on large epidemiology studies of pesticide applicators and miners. While at NCI, he authored or co-authored more than 30 peer-reviewed publications.

Coble moved to the regulatory side of the field in 2010, taking a position in OSHA's Directorate of Standards and Guidance. He later became the director of its Office of Technological Feasibility. He worked on OSHA's new silica standard, which came out in 2016. NIOSH and OSHA worked for decades to replace the prior limit for respirable silica, which was grounded in 1960s era research.

Coble says his advice for current students is to challenge the status quo, to not accept someone's judgment that reducing exposures and improving working conditions are not feasible. OSHA's four-decade silica process reflects the need to be persistent and not give up.
The department is a leader in greening labs. We conduct research on and offer courses in making lab practices safer for human health and the environment. 1) Laboratories can reduce energy and waste through recycling and composting programs. 2) Labs can eliminate potentially harmful chemicals by substituting alternatives. 3) Green chemistry practices can reduce and may eliminate hazards associated with the manufacture, design, and use of chemicals.
Green Practices for Labs
A team of department researchers led by Research Scientist Jennifer Krenz facilitated our laboratories’ participation in the Green Laboratory Certification Program, which encourages laboratories and workplaces to be more sustainable. The project was supported with a Green Seed Fund grant from the University of Washington Sustainability Office and the Sustainable Technology, Alternate Chemistry-Training and Education Center (STAC-TEC), which is funded by the National Institute of Environmental Health Sciences. The project identified the best green practices for labs and where implementation will have the greatest impact. The project also investigated barriers to certification.

Some recommended practices ...
- Turn off lights
- Turn off equipment
- Clean freezers
- Throw away samples no longer being used
- Adjust freezer temperatures from -80°C to -70°C

Teaching Green Chemistry
Unanticipated consequences of some chemicals have caused environmental degradation and human suffering. In addition, more sustainable methods of manufacturing chemicals and products are needed. As part of multiple new activities emphasizing sustainability and safety by design, the UW’s first green chemistry course for undergraduates was developed and taught by Professor David Kalman. The course introduces students to principles and practices that aim to prevent or minimize adverse effects of chemical use on human health and the environment.

Illustrations: pialhovik/Stock/Thinkstock, Green Laboratory Certification Program, Cathy Reese/Stock/Thinkstock, greenwatermelon/Stock/Thinkstock, Cathy Schwartz
Source: UW Sustainability, Green Labs Project in the Department of Environmental and Occupational Health Sciences
Designing Safer Chemicals

How can we get all the function and performance of chemicals but not cause harm to human health or the environment? A collaboration among four universities called the Molecular Design Research Network is a green chemistry and green engineering initiative focused on the design of chemicals and materials in order to reduce their toxicity. The multidisciplinary effort partners researchers in our department with those at Yale University, Baylor University, and The George Washington University. The researchers are developing tools to more quickly and accurately predict chemical toxicity using computer modeling. This approach will help manufacturers design less hazardous alternatives.

Developing Curricula & Training

Expanding education and workforce training in green chemistry was a core component of a May 2013 report by the Washington State Department of Ecology and Washington State Department of Commerce. The Sustainable Technology, Alternate Chemistry–Training and Education Center (STAC-TEC), led by Chair and Professor Michael Yost, is meeting this need by developing curricula and training materials on sustainable technologies that can reduce hazards and waste and lower energy costs. Aimed at occupational and environmental health and safety professionals as well as graduate and undergraduate students, these new course enhancements increase awareness and know-how to apply sustainable technologies and alternative chemistries in research, product design, and the workplace. Funding for the project comes from the National Institute of Environmental Health Sciences.
BARBARA MORRISSEY
MS, 1991

Barbara Fitzgerald Morrissey's first job after graduate school took her to Olympia to investigate pesticide-related illnesses for the Washington State Department of Health (DOH).

Two decades later, she is still at DOH, helping translate science into policy.

She began her career investigating pesticide-related illness and conducting occupational safety training for pesticide workers. Over the years, she has worked on state policies to reduce recurring health issues from pesticide exposure. For example, she used Washington surveillance data to advocate for better labels on household bug bombs, safety restrictions on agricultural fumigants, and safer approaches to controlling pests at schools.

In 2009, she moved into a new position focused on children’s health risks associated with emerging chemicals. She was the lead toxicologist on a five-year biomonitoring project to collect data on environmental chemicals in Washington residents. She also helped DOH and the Washington State Department of Ecology (ECY) prioritize harmful chemicals in children’s products for a 2008 state law that requires manufacturers to disclose these chemicals in their products.

Morrissey’s current focus is on chemicals in consumer products that are winding up in people’s bodies. She and her team are identifying flame retardants of concern to children’s health and supporting policy solutions to mitigate risks. She is also collaborating with ECY to develop a statewide action plan on perfluorinated alkyl chemicals, which are common in waterproof clothing, stain-proof carpets, and grease-proof food packaging. She continues to work on children’s environmental health policies at the federal level and chairs the US Environmental Protection Agency’s Children’s Health Protection Advisory Committee.

To become effective voices for future public health efforts, she encourages students to develop strong analytical and communication skills and learn to handle big data and translate health research for decision makers.
Sustaining a safe food supply and a safe drinking water infrastructure is critical to our state. Our researchers investigate issues in the food and agricultural industries and the water supply chain. Our goals are to improve the health and safety of workers, the public who depends on these resources, and the animals who are used for livestock production, and to safeguard the environment.

Food Production and Water Supply

sustainable & safe /seˈstɑːnəbəl/ /sæfl/ adj. Sustaining a safe food supply and a safe drinking water infrastructure is critical to our state. Our researchers investigate issues in the food and agricultural industries and the water supply chain. Our goals are to improve the health and safety of workers, the public who depends on these resources, and the animals who are used for livestock production, and to safeguard the environment.
Food production is a significant economic driver in Washington state. The food and agricultural industries employ thousands of people, the linchpin of a complicated system that supplies countless numbers of families with quality food and milk.

The drinking water infrastructure that brings clean water to households is breaking, literally. Nationwide, the US Environmental Protection Agency estimates there are 240,000 water main breaks each year. An aging infrastructure means increased risks to public health; illness-causing pathogens can seep into compromised water pipes. Yet, replacing all the pipes would be a mammoth task. The American Water Works Association calculates the price tag could reach $1 trillion within 25 years.

One Health in Dairy Operations

The dairy industry faces an ongoing challenge. In expanding operations to produce nutritious dairy products to meet the needs of a growing global population, dairy farms are also considering the effects on the health and well-being of cows, dairy workers, and the environment. A One Health initiative led by Associate Professor Peter Rabinowitz in partnership with Washington dairies brings stakeholders together to discuss how best to assess the health and sustainability of dairy farming systems. One Health is a transdisciplinary strategy that explores the health linkages among humans, animals, and their shared environment. Within this new initiative, department researchers are studying how microbes on farms can move between people, cows, and the environment. Microbes may cause infections in people and animals, yet they also may help strengthen the immune systems of people living and working on dairy farms. Preliminary results from this study will be used to draft a set of best practices for infection control in dairy farming.

AGRICULTURAL FOOD PRODUCTION IN WASHINGTON

- 389 dairy farms
- $10 billion estimated market value of all crops and livestock
- #1 apples
- #2 milk
top commodities
- 160,000 people employed in the food and agricultural industries

Illustrations: keko-ka/iStock/Thinkstock, ALEKSA/iStock/Thinkstock, oleg7799/iStock/Thinkstock, greyj/iStock/Thinkstock, Dynamic Graphics/Liquidlibrary, StudioBarcelona/iStock/Thinkstock
Source: Washington State Department of Agriculture
Similar to other places in the country, Seattle has many pipes that are more than a century old. The older the pipes, the more likely they could fail. If a break occurs, water pressure in the distribution network drops and slurry around the pipe that can contain illness-causing Cryptosporidium, Giardia, and Norovirus may be pulled into the water flow. A computer model that Nicole Van Abel (PhD, 2014) built with Professor Scott Meschke may help municipalities manage water systems. The model estimates the public health risk in a compromised water distribution system by calculating water pressure, contamination levels and locations, and frequency of water usage in the home. The model uses an index of microorganisms in the environment and their potential to cause illness. The computation builds “what-if” scenarios to determine areas in the distribution system that may need priority attention. Municipalities could use the information to determine how to best allocate funds.

Sexual Harassment Video

A first-of-its kind awareness and prevention video on sexual harassment is being developed by a team led by Victoria Breckwich Vásquez, director of community engagement and education in the Pacific Northwest Agricultural Safety and Health Center (PNASH). The video stems from a Medical Aid and Accident funds-supported study of sexual harassment among Washington state farmworker women and a resulting 2014 awareness campaign. The vast majority of the women affected are non-English speaking immigrants and undocumented. They don’t report the abuse for fear of being deported or losing their sole source of income. “It’s a workers’ rights and safety issue,” said Breckwich Vásquez. “This vital workforce provides our households with food.” Partners in developing the video include some of the farmworker women who participated in the study, PNASH, KDNA-FM, the Washington Grower’s League, legal advocates, government entities, and the Equitable Food Initiative, an agency that includes worker safety standards in certifying food.
For decades, Chensheng (Alex) Lu has been studying the effects of pesticides on humans. He has recently expanded his research to honeybees.

Working with beekeepers and other experts, he has been investigating the effect of neonicotinoids, a group of widely used insecticides, on the worldwide phenomenon of honeybee disappearance. His findings have informed policy changes in the European Union, the Canadian province of Ontario, and several jurisdictions in the United States.

Lu's pesticide work began in our Pacific Northwest Agricultural Safety and Health Center. He initially came to UW to study occupational exposures in our department's PhD program. The department was one of the best in the country, he said, because of its diverse academic curricula, its federally funded Education and Research Center, and its state-funded Field Research and Consultation Group. The department had the added advantage of being housed in the highly regarded UW School of Public Health.

He stayed at the UW as a postdoctoral fellow and then a senior research scientist. He left when he was recruited by UW School of Public Health Dean Howard Frumkin, who was then chair of the Department of Environment Health at Emory University in Atlanta. Four years later, Lu was recruited by Dean Barry Bloom to join Harvard University’s T. H. Chan School of Public Health as an assistant professor of environmental exposure biology. Most of his research focuses on developing biomarkers to assess human exposure to pesticides.

Lu encourages current students to set their career goals as early as possible, especially if they want to go into research. Competition for federal grants has become increasingly fierce, he said, and students will need a strong academic background and innovative research ideas to be competitive.
mobile health /ˈmɒ-bəl helθ/ n. We are people on the move. We walk, bike, and drive from home to school to work and places in between or farther apart. There is a great deal of variability in our exposures. 1) Department researchers investigate air pollution and its health effects. 2) Their innovative mindset has led to new technologies that can be as mobile as we are, technologies that can track exposures and lower costs of research. 3) Findings can help policymakers with important decisions that impact large populations of people everyday.
Commuters and Traffic Pollution

Millions of people in the United States commute. Studies show that emissions from cars, trucks, and other vehicles negatively affect heart health. Most at risk are the elderly and those with preexisting medical conditions. Less clear are the biological mechanisms influenced by traffic pollution that lead to high blood pressure and plaque buildup and then to heart attack and stroke. A group of researchers led by Professor Joel Kaufman in the Center for Clean Air Research, directed by Professor Sverre Vedal, are trying to uncover these mechanisms. To accurately measure commuter exposures in real time, the group developed a mobile monitoring system, a vehicle outfitted with instruments that measure key ingredients in traffic exhaust, such as carbon monoxide, particulate matter, and total oxides of nitrogen. The research team is pairing the on-road data with evidence of early biological processes, such as changes to blood vessels, that can help explain acute cardiovascular effects seen in the healthy study participants. These effects are limited in duration and reversible but shed light on how the body responds when exposed to traffic pollution in a typical urban commute.

**UNITED STATES COMMUTE TRAFFIC**

- 122,644,000 commuters drive alone or carpool
- 25 minutes average commute time
- 0–500 meters from highway—area most affected by traffic emissions
- 30–40% of people in major cities live within 300–500 meters of highway

Illustrations: Kittisak_Taramas/iStock/Thinkstock, Cathy Schwartz, tacktact/iStock/Thinkstock, zygotehasnobrain/iStock/Thinkstock
Sources: American Community Survey Reports, U.S. Census Bureau; The Health Effects Institute Panel on the Health Effects of Traffic-Related Air Pollution
“Smart” Devices Measure Behavior and Exposure in Study of Chronic Disease

Low-cost, off-the-shelf smart devices not much bigger than a mobile phone are being designed and built by Associate Professor Edmund Seto and his team. The devices more precisely measure lifestyle behaviors and personal exposures across time and space. One of these devices is the Personal University of Washington Particle Monitor (PuWPM). It is being used in a study of adults in Washington state who are part of the UW Twin Registry that is directed by Glen Duncan (Epidemiology) and is one of the largest twin registries in the United States. The study has more than 8,800 twin pairs enrolled and approximately 100 new pairs added each month. Using twins with similar genetics and upbringing, researchers hope to discover what factors influence differences in health. They will measure participants’ environmental exposures to air pollution and noise, lifestyle behaviors such as physical activity and diet, and psychosocial stress. The investigators will study associations between these factors and health outcomes, such as chronic disease.
Our degree programs are designed to give students the knowledge and skills they need to be successful in their careers. Because our faculty and staff are involved in environmental and occupational health research and service activities, they are able to bring experience and understanding of current issues to the classroom and take students out into the field, providing them with hands-on training opportunities.

### Degrees Offered

**Doctor of Philosophy (PhD)**
- Environmental and Occupational Hygiene (EOHy)
- Environmental Toxicology (ET)

**Master of Public Health (MPH)**
- Environmental and Occupational Health (EOH)
- Occupational and Environmental Medicine (OEM)

**Master of Science (MS)**
- Applied Toxicology (AT)
- Environmental Health (EH)
- Environmental Toxicology (ET)
- Occupational and Environmental Exposure Science (ES)

**Bachelor of Science (BS)**
- Environmental Health

A minor in Environmental Health is also available.

Our department also has concurrent degrees with other units on campus:

**MS or MPH/Master of Public Administration** from the Daniel J. Evans School of Public Policy and Governance.

**MPH/Master of Urban Planning** from the College of Built Environments’ Department of Urban Design and Planning.

### Degrees Awarded

- 11 Doctor of Philosophy
- 12 Master of Public Health
- 28 Master of Science
- 43 Bachelor of Science
Graduating Students

Graduate program faculty preceptors are identified in parentheses.

PhD

Tania Busch Isaksen (EOHy), Extreme heat events and associated health outcomes in King County, WA: A study of historical outcomes, model validation, and heat risk-mapping (Michael Yost)
Travis Cook (ET), Pathogenesis of mortalin in manganese-induced parkinsonism (David Eaton)
Cynthia Curl (EOHy), Characterizing dietary exposure to organophosphate pesticides, incorporating information on organic food consumption, for use in epidemiological research (Joel Kaufman)
Vanessa Galaviz (EOHy), Evaluation of exposures to diesel particulate matter utilizing ambient air monitoring and urinary biomarkers among pedestrian commuters who cross the U.S.-Mexico border at San Ysidro, CA (Michael Yost)
Sean Harris (ET), Incorporating kinetic and dynamic factors in an in vitro model of male reproductive toxicity (Elaine Faustman)
Clarita Lefthand (EOHy), Using a value-based approach for informing environmental decision making on water security for two Tribal nations (Elaine Faustman)
Eyob Mazengia (EOHy), Public health impacts of Salmonella from raw poultry: Prevalence in retail markets, exposure risk factors during handling and epidemiological links to clinical isolates (Scott Meschke)
Daniella Pizzurro (ET), Effects of diazinon and diazoxon on astrocyte-neuronal interactions: Inhibition of neurite outgrowth by mechanisms of oxidative stress (Lucio Costa)
Pamela Roqué (ET), Modulation of the astrocytic influence on synapse structure and function by ethanol and cholinergic stimulation (Lucio Costa)
Nicole Van Abel (EOHy), QMRA: Exposure model sensitivity to input parameters, critical review of dose-response models, and application in assessing risk of aging drinking water distribution systems (Scott Meschke)
Susanna Wegner (ET), Dynamic in vitro models for reproductive and developmental toxicology (Elaine Faustman)

Jane Pouzou
PhD, 2016

Due to concerns for worker safety and environmental health, the US Environmental Protection Agency required pesticides with azinphos-methyl—used to control codling moth in apple production—to be phased out by 2012. This policy contributed to an increase in use of pesticide alternatives.

Jane Pouzou studies comparative risk assessment methods, with a focus on how decisions are made in selecting pesticides. She is developing a model that assigns numerical values to the factors that influence pesticide selection and to estimates for different health risks. The model could help the industry better understand tradeoffs in choosing among various pesticides when worker health and safety is taken into consideration.

“I’m hoping we’ll find a win-win scenario, where the pesticides that are the most effective and preferred by the growers are also safer,” she said. The model could also help researchers identify emerging pesticides that should be investigated.

Pouzou graduates in 2016 and hopes to work in a regulatory agency and to develop alternative analyses for risk assessment.
Jonathan Childers

MPH, 2014

Jonathan Childers was the first student to pursue an MPH from our department while in a PhD program in the College of Built Environments.

For the MPH, he worked with Associate Professor William Daniell on a Health Impact Assessment (HIA) of the Duwamish River Cleanup. He researched impacts from the revitalization and potential gentrification of primarily low-income and minority communities that would occur as a consequence of the river cleanup. His findings resulted in recommendations that were included in the HIA given to the US Environmental Protection Agency, the City of Seattle, local businesses, and other public agencies. In response, the city created a Duwamish Opportunity Fund to kick-start equitable community revitalization efforts.

Childers received the Gilbert S. Omenn Award for Academic Excellence (master’s student category) from the School of Public Health in 2014.

“His award and recognition make me feel honored and optimistic about the future of work in the built environment and public health,” he says. “Seattle has the reputation of being a healthy city, but there are still enormous health disparities, the results of decades of incremental decisions.”

MPH

Kristina Blank (EOH), Relationship between payment schemes and heat-related illness in Washington agricultural workers (June Spector)

Jonathan Childers (EOH), Engaging environmental democracy—tracing the impact of the Duwamish HIA: Evaluation via interpretative phenomenological analysis (William Daniell)

Stephen Cho (OEM), Correlation analysis of sleep study variables in obese v. non-obese military personnel diagnosed with obstructive sleep apnea (Debra Cherry)

Stella Daniels (EOH), Noise reduction in an intensive care unit: Assessing the effects of a behavior modification noise reduction program (Butch de Castro)

Katherine Gregersen (EOH), Cost-effectiveness of driver seat alternatives for King County Metro buses (Peter Johnson)

Stanley Kimball (OEM), Occupation and computed tomography measurements of chronic obstructive pulmonary disease (Sverre Vedal)

Meenakshi Kushwaha (EOH), Evaluation of an intervention to reduce childhood lead exposure in a Vietnamese battery recycling village (William Daniell)

Amber Lenhart (EOH), A community-based assessment of urban subsistence fishing in Seattle, Washington (William Daniell)

Herakles Weixuan Li (EOH), Molecular viability testing for improved diagnosis of healthcare associated infections (Gerard Cangelosi)

Scott Robinson (OEM), Is there a golden hour in combat casualty evacuation? (June Spector)

Reema Sikka (OEM), Vanadium in fine particulate matter and its association with blood pressure in the Multi-Ethnic Study of Atherosclerosis cohort (Sverre Vedal)

Hee Yon Sohng (OEM), Evaluation of health impact assessments related to labor and employment (Andrew Dannenberg)

Learn more about student research: deohs.washington.edu/student-research
Laura Rascón Padilla  
MS, 2015

Water is a big concern in the northern Mexican states where Laura Rascón Padilla lived until she was 14. This, along with a bachelor’s degree in chemistry, influenced her research and an internship she took with the Washington State Department of Health (DOH).

She helped DOH set up and conduct a study to investigate mercury concentrations in fish being sold in markets around Puget Sound. Among the varieties Rascón Padilla sampled, the biggest fish—mahi mahi, ahi tuna, and sea bass—had levels consistent with current DOH recommendations to limit consumption.

For her master’s thesis, Rascón Padilla worked with Acting Assistant Professor Gretchen Onstad to develop an analytical method to detect disinfection byproducts, chemicals formed from the reaction of disinfectants with organic and inorganic materials in the water. The method—which also reduces the need to use harsh chemicals—will be used in the US Environmental Protection Agency’s Integrated Disinfection Byproducts Mixtures Research Project, which is developing chemical and toxicological assessments of the byproducts mixtures formed during different water treatment methods.
Peter He
BS, 2016

Peter He never forgot what he learned growing up in south Seattle: “Make sure you give back to your community. Don’t forget where you come from.” His experience working with Professor Joel Kaufman’s air pollution research team and majoring in Environmental Health helped fuel his aspirations and gave him the skills to pursue them.

He helped set up and test air samplers used in the lab’s research. In 2014, he taught study participants in Los Angeles and in Baltimore how to use equipment that measured their air pollution exposures.

In south central Los Angeles, he worked with other researchers on a study that investigated pollution exposures from planes landing at the Los Angeles International Airport, which has a flight path above a low-income area. “That hit home for me,” said He, who hears airplanes flying above his parent’s house near the Duwamish River.

“My hope is to raise awareness and, overall, [that the research] increases quality of life for those that come from lower income areas.”

MS continued

Julie Park (ET), Toxicokinetics of domoic acid (DA) in pregnant and non-pregnant mice after repeated oral administrations (Elaine Faustman)

Trevor Peckham (EH), Dermal absorption of benzo[a]pyrene from soil: Assessment of flux and application to risk assessment of contaminated sites (John Kissel)

Christopher Pyke (ES), 1-nitropyrene and diesel particulate matter exposures among workers in a metal mine (Christopher Simpson)

Joemy Ramsay (ES), Measurement of urinary 1-nitropyrene metabolites as biomarkers of exposure to diesel exhaust in underground miners (Christopher Simpson)

Nazila Shakibaei (ES), Reducing workers’ exposures to chemicals and dust in nail salons using local exhaust ventilation systems (Martin Cohen)

Abigail Sutphen (ES), PPE effectiveness in agricultural settings (Michael Yost)

Rebecca Ticknor (ET), Effects of in utero diesel exhaust exposure on development of atherosclerosis in hyperlipidemic mice (Michael Rosenfeld)

Melvin Torres (ES), Characterizing lead exposure at a US Coast Guard indoor firing range (Martin Cohen)

Vivian Tran (EH), Validation of a sponge processing method for characterizing microbes in the Bullitt Center (Scott Meschke)

Christopher Warner (ES), Lung bioaccessibility of manganese in arc welding fume (Noah Seixas)

Julia Weicheld (EH), Impact of environmental factors on mosquito population abundance and distribution in King County, Washington (Charles Treser)

Rachel Wood (EH), Oral swab PCR as an alternative to sputum-based methods for diagnosis of pulmonary tuberculosis (Gerard Cangelosi)
Our faculty serve as mentors to our students in many ways. They advise graduate and undergraduate students on their research or practicum projects and steer them toward opportunities to advance their professional goals. During the 2013–2015 biennium, four of our faculty were recognized as outstanding mentors.

**Outstanding Faculty Mentor, School of Public Health**

2015: Joel Kaufman, Professor

**Outstanding Faculty Mentor, Department of Environmental and Occupational Health Sciences**

Awarded annually by the Graduate Student Advisory Committee

2014: Martin Cohen, Senior Lecturer

2015: Elaine Faustman, Professor

John Kissel, Professor
2013–2015 New Faculty

Assistant Professor Julia Yue Cui has a PhD from the University of Kansas. Her research focuses on the effects of developmental exposure to environmental chemicals and how the gut microbiome modulates the development of genes involved in drug metabolism and obesity.

Professor Kristie Ebi has appointments in DEOHS and the Department of Global Health. She has an MPH and PhD from the University of Michigan. Her work focuses on understanding sources of vulnerability and designing adaptation policies and measures to reduce risks of climate change in a multi-stressor environment.

Senior Lecturer Richard Gleason joins the department full-time. He has an MSPH from the department and is certified as an industrial hygienist and as a safety professional. His interests are in occupational health and safety, hazardous waste site cleanup, and reducing the rate of workers’ compensation claims.

Associate Professor Peter Rabinowitz has appointments in DEOHS and the departments of Global Health and Family Medicine. His research explores linkages among human, animal, and environmental health in a One Health paradigm. He received an MD from the UW and an MPH from Yale University.

Associate Professor Edmund Seto came from the University of California, Berkeley, where he was on faculty and also received a PhD in Environmental Health Sciences. He uses information technology and models to assess exposures to air pollution, noise, and infectious agents.

Autumn 2015 New Faculty

Lecturer Tania Busch Isaksen’s research investigates health impacts associated with climate change, climate-related mitigation and adaptation planning, and the intersection between sustainability and consumerism. She has an MPH from the UW Department of Health Services and a PhD from DEOHS.

Associate Professor Jeremy Hess has appointments in DEOHS and the Division of Emergency Medicine in the Department of Medicine. He has an MD and an MPH from Emory University. His research focuses on health care disaster risk management, health effects of climate change, and the epidemiology of extreme heat and early-warning systems.
Michael Yost: New Department Chair

Dean Howard Frumkin named Professor Michael Yost the chair of the Department of Environmental and Occupational Health Sciences (DEOHS), effective August 18, 2014. Professor Yost succeeded Professor David Kalman. As chair, Yost is responsible for the department’s vision and the direction of its educational, administrative, and financial affairs.

“This is an exciting time in environmental health research,” said Yost. “We have moved beyond addressing individual hazards to take a more systems-level approach. This approach provides a more integrated view of how environmental agents impact human health and gives us a greater array of solutions. It allows us to combine fundamental research, exposure science, and translational science to prevent adverse health consequences from environmental exposures. I believe DEOHS—with its multidisciplinary faculty—is well positioned to develop effective educational and policy tools to address some of the bigger challenges, such as environmental change, workplace illnesses and injuries, global workplace health disparities, the aging workforce, obesity and nutrition, and improving our built environment.”

A member of the DEOHS faculty since 1993, Yost progressed from assistant professor to associate professor and, in 2003, to professor. He led our master’s degree program in Exposure Science for 15 years and served as the department’s associate chair from 2012–2014. DEOHS students named him Outstanding Faculty Mentor in 2010 and 2013.

Yost earned a PhD in Environmental Health Sciences from the University of California, Berkeley. His research focuses on developing novel tools for environmental and occupational exposure assessment. He holds eight patents on products and processes.

His Optical Remote Sensing Laboratory invents sampling techniques to identify and measure environmental pollution. Using electromagnetic radiation such as ultraviolet, visible, and infrared light, or lasers, the technology has been applied to monitor pollution from car, train, and marine traffic, to measure pesticide exposures, and to detect hazardous materials. His interests extend beyond exposure assessment. He has made important contributions in such areas as impacts of climate change and nanotechnology on human health.

WEB plus* Read more about our faculty at deohs.washington.edu/faculty
Long-Time Supporter

Soon after Bruce Kelman founded Veritox, a Redmond-based international toxicology consulting company, he looked for an opportunity to support our department. He has worked closely with our faculty and has hired a number of graduates from our department who are trained in toxicology and exposure science. Since 2003, he has financially supported quarterly functions that bring our faculty and students together. In addition, he provides a scholarship for students studying Environmental Toxicology to attend a conference or meeting. Kelman, who has a PhD from the University of Illinois and has been certified by the American Board of Toxicology for 35 years, regularly attends the quarterly gatherings at the UW. He considers it mutually beneficial to our department and to him. He has a chance to see and talk with toxicologist colleagues on our faculty and meet new students. He adds, “Frankly, I want to meet [and potentially hire] the best and brightest students who are interested in consulting.”

Our Donors

We sincerely appreciate your gifts to the department. Your contributions support the innovative science being done in our department to better protect our communities from environmental and occupational health hazards. Thank you also to those who have contributed to student scholarships.

The individuals, corporations, foundations, and family foundation donors listed below contributed to the Department of Environmental and Occupational Health Sciences between July 1, 2013 and June 30, 2015.

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* Department of Environmental and Occupational Health Sciences alumnus
We regret any misspellings, inadvertent omission, or incorrect placement in giving categories of an individual or organization that gave to the Department of Environmental and Occupational Health Sciences in the biennium 2013–2015. Please advise us if you have found any errors by contacting the editor at esharpe@uw.edu. We appreciate the opportunity to correct our records.

Sheldon D. Murphy Endowed Chair

Julia Yue Cui, who joined our department as an assistant professor in 2014, is the Sheldon D. Murphy Endowed Chair in Toxicology and Environment Health. The endowment was established in 1990 and supported through generous donations of individuals, foundations, and corporations that honor the memory of Sheldon Murphy. He was a professor and chair of the department and played a key role in developing toxicology as a discipline in our department. In a similar vein, Cui adds a new direction to the toxicological research portfolio in our department and the training opportunities for our students. She investigates the role that the gut microbiome plays in how the liver handles drugs, particularly when the liver is developing, and how changes to the microbiome from environmental chemicals and probiotics affect drug metabolism and obesity. “I’m very grateful for receiving this prestigious award,” Cui says. The endowment funds Cui to set up her laboratory and supports her career development.
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