What does the future hold for California if heat waves become more frequent and severe due to global warming? If recent history is our guide, we could see hospitals overloaded with patients and increased mortality, disrupting the lives of 37 million residents at an estimated cost of over $130 million per event.\textsuperscript{1}

A newly released study examines the July 2006 heat wave in California to measure the impacts to the healthcare system and to the state. July 2006 was the hottest on record with unusually high temperatures stretching from July 15 through August 1. The event resulted in 16,166 excess hospital visits, 1,182 excess hospitalizations and over 400 excess deaths.\textsuperscript{2,3}

Study physician Gina Solomon, senior scientist with the Natural Resources Defense Council and co-director of the occupational and environmental medicine residency program at the University of California, San Francisco, considered the July 2006 heat wave striking for three reasons. First, heat waves are generally localized, but this one allowed the team to compute statewide data for greater empirical analysis. Second, it was unusually long, extending 18 days. Third, there was no relief at night. According to Solomon, “heat at night can...”

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California Air Resources Board Tackles Climate Change

John R. Balmes

With the signing by Governor Schwarzenegger of Assembly Bill 32 (Núñez) in September 2006, California embarked on the most ambitious effort within the United States to control greenhouse gas emissions for the prevention of radical climate change. Schwarzenegger gave the California Air Resources Board (ARB) primary responsibility for developing regulations to monitor and control greenhouse gas emissions. AB 32 requires ARB to adopt these regulations in an “open public process to achieve the maximum technologically feasible and cost-effective greenhouse gas emission reductions.” The bill authorized ARB to adopt “market-based compliance mechanisms,” but before such a mechanism can be established the board must (1) consider the potential for direct, indirect, and cumulative emission impacts, including localized impacts in communities that are already adversely impacted by air pollution; (2) design the mechanism to prevent any increase in the emissions of toxic air contaminants or criteria air pollutants; and (3) maximize additional environmental and economic benefits for California. In addition, ARB intends its greenhouse gas emission programs to direct public and private investment toward the most disadvantaged communities in California and create opportunities for small businesses, schools, affordable housing associations, and other community institutions to participate in and benefit from these programs.

The requirements of AB 32 are tough. Tension is inherent in the development of maximally feasible technologies and the implementation of cost-effective strategies, especially during a period of economic decline. Tension is also inherent in a market-based approach that must also address environmental and social justice issues. ARB staff have been working hard for the past two years to design an overarching framework, the AB 32 “scoping plan,” that will underpin the development of specific regulations to meet the goal of reducing greenhouse gas emissions to 1990 levels by 2020. The plan has several key elements, including: (a) the strengthening of energy efficiency programs; (b) a statewide renewable energy mix of 33%; (c) a cap-and-trade program that is linked with the Western Climate Initiative to create a regional carbon market; (d) regional targets for transportation-related emissions reductions; (e) implementation of regulations that have already been approved such as the Pavley Clean Car standards, the Low-Carbon Fuel Standard, and goods movement measures; and (f) targeted fees such as a public goods charge on water use.

The cap-and-trade program stands out as the most controversial of these elements. Industry groups generally advocate for this type of market mechanism because it allows flexibility. Environmental justice groups fear a cap-and-trade program will lack sufficient incentives for heavy industrial sources to reduce greenhouse gas emissions. These groups advocate a carbon fee strategy where all emitters pay a per tonnage fee—an approach that might be simpler to implement and less easily gamed by speculators. Conversely, cap-and-trade supporters argue that by setting a cap on greenhouse gas emission allowances their approach would achieve the targeted reduction, although at the expense of price volatility. They further argue that while a carbon fee achieves price stability, it fails to guarantee a targeted reduction. A carbon fee could be adjusted upward, however, if it appeared to be too low to achieve the targeted reduction. Respected economists line up on both sides of the argument.

Given that the Governor wants to see a cap-and-trade program—California is already negotiating the establishment of a regional carbon market with multiple state and Canadian provincial partners in the Western Climate Initiative, President-elect Obama and the Democratic congressional leadership have signaled their interest in setting-up a nationwide system, and the European Union has already established a carbon market—it is fairly certain that California will try its hand at this approach. It is, therefore, incumbent on environmental and public health groups to fight for the best possible cap-and-trade program, i.e., one that maximizes co-benefits for communities. For example, a cap-and-trade program with 100% auction of emission allowances and zero offsets (e.g., getting credit for planting trees in rain forests instead of reducing emissions) would be similar to a carbon fee in terms of incentives to emitters. A revenue stream will be generated and a portion of these revenues must be used to assist disadvantaged communities. Finally, greenhouse gas reduction measures can be designed to ensure that cumulatively impacted communities receive the co-benefits of toxic pollutant reduction.

In my year as a member of ARB, I have learned a lot about the immediacy of the threat of climate change (see cover story), about the pros and cons of “market mechanisms,” and about politics. The relatively open nature of ARB’s regulatory process requires that I meet with multiple stakeholders on different sides of almost every major issue. To move forward on an issue almost always requires compromise. The trick is to know how much to compromise without betraying public health. Despite the compromises it embodies, the AB 32 scoping plan serves to push California forward in the fight against climate change.
McKone Receives Wesolowski Award and NRC Appointment

The International Society of Exposure Science (ISES) presented Tom McKone with the Jerome J. Wesolowski Award at its annual conference in Pasadena, California. Each year ISES recognizes an outstanding scientist for their exceptional contribution to the knowledge and practice of human exposure assessment.

In addition, the National Research Council (NRC) of the National Academies of Science named McKone to a prestigious national committee charged with determining the true costs and benefits of energy production and consumption.

McKone, a senior staff scientist at Lawrence Berkeley National Laboratory and adjunct professor of environmental health sciences at UC Berkeley, is one of 21 experts named to the committee. The panel’s two-year project is entitled, “Health, Environmental, and Other External Costs and Benefits of Energy Production and Consumption.”

Hammond Receives Distinguished Professor Award

Flight Attendant Medical Research Institute (FAMRI) awarded UC Berkeley Professor Katharine Hammond the “Dr. William Cahan Distinguished Professor Award” entitled “Assessment of Flight Attendants’ Exposure to Second Hand Smoke (SHS) for Epidemiologic Studies” at its annual scientific symposium in May 2008. The award, $600,000 over three years, will support Dr. Hammond’s research into the health effects experienced by flight attendants’ exposure to second hand tobacco smoke during their flying careers. It also recognizes her contributions to improving the health of populations worldwide.

Hammond’s work on two major studies of SHS exposure on commercial airlines led to the banning of smoking on domestic flights and was instrumental in the litigation resulting in the formation of FAMRI. Dr. Hammond’s continuing investigations into respiratory disease research captured the attention of FAMRI trustees during a site visit to her Environmental Health Sciences Laboratory in 2004. One of Hammond’s investigative interests has been the study of exposures to SHS. She developed one of the first methods for measuring SHS as well as the first passive SHS exposure monitor. The U.S. Environmental Protection Agency later adapted her measuring techniques for its nationwide exposure studies.

The Distinguished Professor award honors the memory of the late Dr. William Cahan, a surgeon at Memorial Sloan-Kettering Cancer Center for over 50 years. He was a pioneer in the national movement to fight the hazards of smoking and second hand tobacco smoke.

The mission of the Flight Attendant Medical Research Institute is to sponsor medical and scientific research for the early detection, prevention, treatment and cure of diseases and medical conditions caused by exposure to second hand tobacco smoke and to ensure that health care providers ask the right questions of their patients about second hand tobacco smoke exposure.

Goldberg Honored by the Royal College of Physicians of Ireland

The Occupational Medicine faculty of the Royal College of Physicians of Ireland held the 20th James Smiley Lecture on November 16, 2007, awarding Robert L. Goldberg with the James Smiley Medal and an honorary fellowship. Goldberg presented the keynote lecture on “Recent Research in Ergonomics and Upper Extremity Musculoskeletal Disorders.”

Goldberg has been a member of the Occupational and Environmental Medicine (OEM) faculty at the University of California, San Francisco, (UCSF) since 1998. He served as the director of the OEM residency program from 2002 through 2008 where he brought refinement and enhanced clinical opportunities to the curriculum. Gina Solomon and Sarah Jewell, both UCSF OEM faculty members, accepted new roles as co-directors of the program following his recent retirement. Goldberg continues in his role as clinical professor of medicine at UCSF where he directs the occupational medicine Grand Rounds and Journal Club as part of his interdisciplinary responsibilities within COEH. He is also leading a research project investigating the utility of a new surface electromyographic device in the assessment of occupational upper extremity disorders.

Among the factors investigated by the Committee are the quality, abundance and reliability of energy sources; transportation and waste disposal systems; approaches for assessing economic impacts; and estimating greenhouse gas emissions and their impacts on climate.

Katharine Hammond, chair of Environmental Health Sciences, UC Berkeley, says of McKone, “Working with Tom is one of the delights of being at Berkeley — he is full of ideas and enthusiasm and eagerly explores concepts with faculty and students. Tom has developed innovative approaches, such as the widely used CaITOX model, which incorporate both multimedia environmental late and multiple pathway exposure.” He is an author of the recently released National Research Council report, “Science and Decisions: Advancing Risk Assessment,” which, according to Hammond, “will have a major impact on how we approach risk assessment in the 21st century.”

Above: Robert Goldberg with Dr. Ken Addley, Dean of the College (left), and John Smiley (photo from Royal College of Physicians of Ireland).
be dangerous, especially for the elderly or people already ill, because there is no opportunity to recuperate or re-hydrate between hot days.”

Previously, researchers explored mortality during heat waves, but Solomon was surprised at how few studied morbidity. She reports, “Morbidity is extremely important, partly because of the strain on the health care system and partly because of the immense suffering it implies when people end up in the emergency room and in the hospital. It is a major problem for those who are ill, their families, their work places and the economy of the state.”

Solomon says heat related illness runs a spectrum. It begins with relatively mild phenomena like abdominal or leg cramps that can resolve with rest and re-hydration. Heat stress is more serious and involves nausea, vomiting, profuse sweating and exhaustion. Then there is heat stroke—a true emergency. Patients require immediate medical attention to cool their body down. Heat stress may rapidly become life-threatening.

Heat waves pose the greatest risk to children and the elderly. In July 2006, residents over age 65 comprised 52 per cent of the excess hospitalizations. Solomon says there are plenty of young, healthy people also at high risk—for example, farmworkers who toil in the sun without enough water or shade, or indoor laborers without air-conditioning.

The pattern of heat-related illness showed statistically significant variations across regions, with the greatest risks in the central coast and Bay area. “We were stunned,” said Solomon. “We did not predict the areas that were not the hottest would have the most dramatic impacts on hospitalizations, and especially on emergency room visits.”

The area from Marin County to San Francisco and south to Santa Cruz and Monterey showed the highest relative risk for heat related illness. “We think two things are at work—one is lack of air conditioning and the other is physiological adaptation.” The study suggests a typically moderate summer temperature may leave residents less acclimatized to heat.

Solomon recommends measures to reduce the risks of heat-related illness. “We need to move forward quickly with solutions to reduce greenhouse gas emissions statewide, nationally and internationally.” Next, she calls for state and local heat response plans that include cooling centers, employer education and outreach. Last, Solomon suggests we should look at our communities. Illness prevention measures such as “buddy systems” for elderly neighbors, and transporting at-risk individuals to cooling centers can save lives.

This study was conducted in collaboration with the California Department of Public Health Tracking Program; Miriam Rotkin-Ellman, a recent graduate of the EHS program, was a co-author on this paper.

1 Cost of excess hospitalizations and emergency department visits for the 2006 heat wave, analysis by Thara Srinivasan
3 English, Paul (California Department of Public Health, Personal Communication, December, 2008).

(Note: Please see related article on a COEH community intervention program on heat-related illness in farmworkers, Bridges, August 2008.)

David Michaels presented a seminar on his new book, **Doubt Is Their Product, How Industry’s Assault on Science Threatens Your Health**, for COEH members and students in August 2008 at UC Berkeley.

Michaels’ book details how scientists that specialize in “product defense” manipulate scientific literature, manufacture uncertainty, and influence policy decisions to the advantage of private rather than public interests.

In his seminar, Michaels underscored how industry favors “proof over precaution.” He described how “raising scientific doubt for a couple more years” enables companies to make money on products long after scientific evidence proves them unsafe. For example, second-hand smoke, asbestos, leaded gasoline and other toxins remained unregulated while hired scientists and lobbyists disputed the adverse effects of human exposure. His book offers suggestions for taking the politics out of science so public health and safety principles guide regulatory policy.

The Split Keyboard: An Ergonomics Success Story

A fter a long day at your computer, do you find your muscles stiff or your joints aching? If you answered “yes,” you are not alone. Musculoskeletal symptoms and disorders of the hand, arm, neck and shoulder affect up to 15 per cent of those who use a computer more than 20 hours per week. Research suggests changing from a conventional to a split keyboard might ease your discomfort, or better yet, prevent the pain and musculoskeletal disorders before they start.

David Rempel, professor of medicine at the University of California, San Francisco and associate professor of bioengineering at the University of California, Berkeley, highlighted the ergonomic success story of the split keyboard in a special Golden Anniversary issue of the journal, Human Factors.

Research into the split keyboard began in the 1920s after typists complained of muscle strain. In the 1960s, the German scientist Karl Kroemer conducted studies evaluating the effects of a split keyboard on user preference and pain that brought new knowledge to the field of ergonomics. It was not until the late 1990s, however, that Rempel and others clearly established the health benefits of the split keyboard with the first randomized controlled trials evaluating the effects of keyboard design in patients with hand or arm disorders. This research led to changes in the marketplace, and by 2006, a split keyboard became the number one sold retail keyboard of all keyboards in the U.S.

Rempel suggests research into the split keyboard offers valuable lessons for ergonomics students. As his article details, early short-term research effectively demonstrated that ergonomic adjustments improved posture related risks and decreased muscle load, yet study participants continued to favor conventional designs. Scientists later proved why—it takes months, not days, to experience significant health benefits after changing to a split keyboard—in insights that require long-term studies and controlled trials.

Rempel says no one has yet identified the ideal keyboard design. The trend in the computer community is the switch to laptop computers—these come with new hand and neck posture problems—so opportunities exist for COEH researchers to develop the ergonomic keyboards of tomorrow.


Endoscopists at Risk of Occupational Injury

Endoscopists commonly suffer overuse injuries of the hand, wrist, elbow, and shoulder associated with conducting many colonoscopies per week. Recent surveys indicate that almost 60% of endoscopists report some form of musculoskeletal problem. Fortunately, ergonomic experts are stepping in to help.

A pilot study now in press in the journal, Gastrointestinal Endoscopy, by Amandeep Shergill, assistant clinical professor of medicine and David Rempel, professor of medicine, both of the University of California, San Francisco, is the first to estimate hand forces and muscle loads among endoscopists during colonoscopy.

The study included physicians from the San Francisco Veterans Affairs Medical Center who performed colonoscopies. Researchers recorded hand force measurements using an electronic pad attached to the right thumb. They also recorded activity in muscles of both forearms using surface electromyography.

Shergill and Rempel found peak pinch forces of the right thumb exceeded 10 Newtons, a level associated with increased risk of musculoskeletal injury of the hand and thumbs, and muscle activity of the forearm exceeded threshold limits set by the American Conference of Industrial Hygienists, posing a risk for overuse injuries of the elbow and wrist. Shergill recently received funding to expand the study to evaluate a large number of gastroenterologists in the San Francisco Bay Area. Given the increased demand for colonoscopies in the United States, ergonomists may play an instrumental role in reducing a serious occupational risk.


UC Berkeley employee Michael Murphy uses an adjustable split keyboard.
COEH Symposium Focuses on Immigrant Workers

COEH’s 2008 interdisciplinary symposium, “Immigrant Workers: A Population at High Risk for Occupational Injury and Illness,” was a catalyst for attention to the occupational and environmental issues central to immigrant workers and their families. The symposium, held in April 2008 in Oakland, California, highlighted leading-edge research and community initiatives by a diverse group of academics and government leaders, with students sharing their work in a poster session. Co-directors Marc Schenker, professor in the Department of Epidemiology and Preventive Medicine at Davis, and Robin Baker, director of the Labor Occupational Health Program at Berkeley, are planning a follow-up event for Spring 2009.

Presenters at the symposium gave participants a historical overview of immigrant labor, a description of today’s most challenging issues, and a look ahead to new ideas that will shape the future of one of the most vulnerable sectors of society. Don Villarejo and Steve McCurdy addressed special concerns of migrant farmworkers while other COEH researchers provided findings about workers in high-risk jobs in restaurants (Meredith Minkler), the garment industry (David Rempel and Jackie Chan), and hotels (Niklas Krause).

Agriculture is California’s largest industry with an output of $32 billion a year.¹ There are more than 700,000 farmworkers hired annually in California to meet the demands of this labor-intensive industry. Agriculture has been a traditional first occupation for immigrants in California², yet other critical sectors of California’s economy depend on their labor—hospitality, garment and construction, to name a few. Increasingly, immigrants fill the most hazardous jobs.

Schenker explained California’s dependence on immigrant labor is part of a global phenomena. In California, over 25% of the population is foreign born. Schenker said, “Demographics will make increased immigration inevitable. By 2016, there will be 87 entrants in the workforce for every 100 retirees in developed countries. There is no other way to close the employment gap than migration.” Reports Schenker, most migrants are economic migrants. With $300 billion dollars sent home by migrants annually, they play a vital role in the world’s economy.³

Future directions in the area of research, health access, public policy, and community linkages were discussed by Sylvia Guendelman, Robert Harrison, Glenn Shor and Rajiv Bhatia. Symposium participants then joined COEH faculty in facilitated group discussion sessions, as well, to explore these topics in-depth and provide direction to COEH. Xochitl Castañeda provided closing remarks on culture providing poignant examples of disparities in health and safety among worker groups, as well as barriers in provision of and access to basic health care for immigrants.

John Balmes, director of COEH, concluded that health care reform has to include immigrants. Balmes said, even as a physician, he sometimes finds navigating the health care system a challenge. How difficult would it be, he questioned, for an undocumented, non-English speaking immigrant? Balmes identified four priorities for improving the safety of immigrants: health care and immigration reform, an increase in resources for enforcement of occupational and environmental health violations, and more funding for research.

According to Balmes, it will take a broad, multi-disciplinary effort to bring researchers together with advocates, policy makers, and communicators to effect change for immigrant workers. Said Schenker, “We need to educate more young, future investigators and policy makers to ensure that more people work on the issue.” Papers from the Symposium will be published in a special edition of the American Journal of Industrial Medicine. To view all COEH Symposium presentations, please visit http://coeh.berkeley.edu/symposium.

¹²³ COEH Symposium presenter Marc Schenker, April 2008.

Cover: Xochitl Castañeda presenting
Traffic-Related Air Pollution Contributes to Asthma Onset in Children

Scientists have understood for some time that air pollution can worsen asthma symptoms. Yet evidence on whether air pollution contributes to new-onset asthma remained inconclusive. Now a new study based on children living in Southern California suggests traffic-related air pollution is significantly associated with asthma onset.

Over the past 25 years, rates of asthma have increased in nearly every country where data are available. An estimated 300 million people suffer from asthma worldwide. It is the most common chronic disease among children and the leading cause of school absenteeism among children in the United States.

The study published in the October 2008 issue of Environmental Health Perspectives by lead author Michael Jerrett, associate professor of environmental health sciences at the University of California, Berkeley, randomly selected a sample of 217 participants aged 10 to 18 years in 11 communities of the Southern California Children’s Health Study (CHS). The CHS began in 1992 and followed 5,500 children for up to 8 years to learn the effects of air pollution on the health of their lungs. John Peters, professor and director of the division of environmental health in the Department of Preventive Medicine at the University of Southern California, was the principal investigator.

Researchers assessed asthma status annually for eight years by questionnaire to track new-onset cases. In their statistical analysis, they excluded participants who started the study with a history of asthma. They also excluded children who reported early-childhood chest illness or wheeze to eliminate those with potentially undiagnosed asthma.

The team placed air pollution monitors outside the home of each child for two weeks in both the summer and winter to measure nitrogen dioxide ($\text{NO}_2$), a marker for traffic-related air pollution.

These measurements of $\text{NO}_2$ correlated well with annual averages of air pollution.

When Jerrett and colleagues compared children living in higher air pollution exposure areas to those in lower exposure areas of a city, they found a 29% increase in asthma. Among all 11 cities, areas of unusually high air pollution exposure demonstrated a tripling of new-onset asthma.

Jerrett says, “This is the first study in North America to find an association between traffic-related air pollution and new-onset asthma. There is only one other study from the Netherlands to report similar results. If researchers replicate the findings in larger studies, it could have major implications for public health.”

A particular strength of the study was the team’s ability to analyze individually measured air pollution exposures. Jerrett suggests this might have improved human exposure assessment by uncovering effects previously undetected by monitors placed in central locations within a city or region.

While environmental regulations have had some success in reducing air pollution from industrial sources, in many places, traffic-related air pollution has increased. The Jerrett study suggests this may lead to higher asthma rates in the future.

A new study suggests liver cancer mortality increases for children exposed to arsenic in drinking water. Children rarely develop liver cancer—in the United States only 1.1% of cases occur before age 20. Yet for a Chilean population exposed to arsenic, researchers found the rates of liver cancer mortality for children, aged 10 to 19, were ten times greater than for unexposed children. Such a marked increase in mortality from a childhood cancer has hardly ever been seen before.

The study by lead author Jane Liaw and Allan H. Smith, professor of epidemiology and director of the Arsenic Health Effects Research Program (AHERP) at UC Berkeley, analyzed mortality records from two regions of Chile from the years 1950 to 2000. The first region contained the cities of Antofagasta, the second largest city in Chile, and neighboring Mejillones. Children began drinking contaminated water in 1958 when these cities changed their water sources to two rivers containing arsenic.

Before 1958, Antofagasta averaged arsenic concentrations of 90 micrograms per liter. Concentrations shot to an average of 870 micrograms per liter following contamination. The problem continued until 1971 when a filtration plant was installed. In comparison, the control region contained the city of Valparaiso where, during the same period, arsenic concentrations were below the detection limit of 20 micrograms per liter.

The study by AHERP is the first analysis of a population highly exposed to arsenic that finds clear evidence suggesting an increased risk of mortality from a cancer occurring in childhood. According to Smith, the results were unexpected. Initially researchers found little evidence of any increase in risk for all childhood cancers combined. Adds Smith, “Fortunately, we dug a little deeper. That is when the liver cancer finding popped out.”

He explains, “If you look at age distribution, there is a clear group of cancers that occur in children up to age 20. Then there is a distinct occurrence of adult cancers. Both have their own latency and their own patterns, and I think their own causes.” Although previous research showed evidence of adult liver cancer resulting from arsenic in water, Smith says there is no rationale to assume the same cancer risk for children.

Large numbers of people in the world remain exposed to arsenic concentrations higher than the WHO guideline of 10 micrograms per liter, including in the U.S., and many drink water containing more than 50 ug/L. “These people are our number one concern,” says Smith. “Every finding—and especially the finding that there are effects from childhood exposure—adds to the urgency to reduce high arsenic exposure worldwide.”

1 National Cancer Institute Surveillance Epidemiology and End Results, www.cancer.gov
Studies in Pakistan show dangerously high levels of indoor air pollution in kitchens burning wood fuel. Pregnant women with high exposure to these levels of wood smoke are more likely to deliver low birth weight (LBW) infants compared to mothers cooking with natural gas. LBW infants are often pre-term and at higher risk for illness and mortality.

The World Health Organization (WHO) reports the rate of LBW in Pakistan at 19% compared to slightly over 8% in the U.S. An article in *Environmental Health Perspectives* by Drs. Anna Siddiqui and Ellen Gold, both from the Department of Public Health Sciences, University of California, Davis (UCD), examined LBW in Rehri Goth, Pakistan, a coastal fishing village of approximately 35,000 residents. The research team worked with 366 pregnant women who cooked with wood and 260 who cooked with natural gas. Team members measured over 90% of infants within 48 hours of birth and recorded as LBW those weighing less than 2,500 grams, or 5.5 pounds. The rate of LBW was almost 23% among wood users compared to 15% among natural gas users.

In this study population, more than 95% of births occur at home using a traditional birth attendant. Many births go unmeasured. Consequently, documenting the percentage of LBW in this community was a critical step in an environment where half rely on wood fuel for cooking and heating. Further, Siddiqui described the setting as “below poverty line, where literacy is minimal.” More than 60% of men and 90% of women lack formal education.

Siddiqui confirmed that her team’s study is the first in Pakistan to establish the link between wood fuel cooking and LBW, adding global evidence to similar exposure studies conducted in Guatemala by COEH member Kirk Smith, UC Berkeley, and former COEH graduate students Eric Boy and Lisa Thompson.

In a random, sub-sample of the same cohort, Siddiqui and Gold, along with Drs. Deborah Bennett and Kiyoung Lee, characterized indoor air concentrations of carbon monoxide (CO) and particulate matter (PM2.5) in kitchens using wood and natural gas for cooking fuel. Researchers captured CO and PM2.5 measurements for 8 hours daily in the cooking areas of each house from December 2005 to April 2006.

Sixty one per cent of the wood users had CO concentrations above the WHO’s 8-hour guideline of 25 parts per million. All homes using natural gas fell within WHO guidelines. PM2.5 levels were estimated to be far higher than the 24-hour EPA National Ambient Air Quality Standard of 35 micrograms per cubic meter. Siddiqui and Gold’s research underscores the serious health effects of indoor air pollution, a potentially modifiable exposure, facing women and children in developing countries.

More than a hundred friends and colleagues celebrated the careers of Bob Spear and Suzanne Llewellyn at their “unofficial” retirement gathering on September 17, 2008, at UC Berkeley Alumni House. Guests ranged from preschoolers to retired scholars—all eager for the opportunity to thank Spear and Llewellyn for their profound impact on their personal and professional lives.

Spear retired as professor of environmental health sciences (EHS). Llewellyn retired from her role as administrative officer for COEH. True to their style, Spear and Llewellyn added to the celebration by honoring three colleagues granted prestigious awards for their leadership in the field of public health—Professors Katharine Hammond, Kirk Smith and Tom McKone.

John Balmes, current director of COEH, spoke aptly when he called the event “bittersweet” as guests found it difficult to imagine campus life without Spear and Llewellyn. Barbara Resnik, the first Occupational and Environmental Health Nursing program director at UC San Francisco, kept the crowd in stitches while she recounted the early years of COEH. She said it best: “Everybody should understand they wouldn’t be in this room without Bob Spear.”

From the ground up, Spear built his vision of COEH as a multi-campus consortium, dedicated to interdisciplinary research addressing the challenges of environmental and occupational health at home and abroad. Resnik recalled when Spear first dropped into her office with the memorable line: “I want to introduce you to an idea.” That idea expanded into a Center that changed the world for countless people across the globe. Smith described it as “one of the most successful collaborations on any campus in any state.” Spear became the founding director in 1979.

Robin Baker, director of the Labor Occupational Health Program, UC Berkeley, explained, “Bob had the vision, Suzanne had the implementation.” Spear also recognized Llewellyn’s work on Bridges, calling it “the singular, most important political instrument for the Center because it allows us to be quite well known in places around the world. And that is thanks to Suzanne.”

In his tribute to Llewellyn, Spear praised her support of UC San Francisco’s nursing program and her advocacy and constant quest for NIOSH student funding. Spear also recounted how Llewellyn won the Chancellor’s Outstanding Staff Award in 2004 for her leadership at Berkeley.

Michael Wilson, research scientist in the School of Public Health (SPH), highlighted Llewellyn’s contribution to the Green Chemistry program, in particular, her skill at managing relationships during complex funding negotiations.

Karis Miyake, one of the winners of the COEH student project award, thanked Llewellyn for helping her team secure funding for the Shuar indigenous people’s project in Ecuador. Marion Gillen, COEH deputy director, envisioned renaming this award as the Llewellyn Student Award in acknowledgment of her creation of the award and in appreciation of her career.

Soon the spotlight turned to honor three stars in the field of public health. Balmes...
praised Katharine Hammond, chair of EHS, for her exposure studies of diesel exhaust and second hand smoke that established her as “one of the leading industrial hygienists in the world.” Hammond received two career awards in 2008: The “Henry F. Smyth, Jr., Award” from the Academy of Industrial Hygiene and the “Distinguished Professor Award” from the Flight Attendant Medical Research Institute.

COEH intern Sophia Song thanked Hammond for “teaching her research methods through practice.” Sa Liu, a doctoral student, said she never feared posing a question to Hammond, although she quickly learned her responses always led to difficult thinking and more work.

Nina Holland, EHS adjunct professor of genetics and toxicology announced that UC Berkeley granted EHS Professor Kirk Smith the Chancellor’s Award for Public Service in 2008. Smith also became a Nobel Laureate in 2007 when Al Gore and the United Nation’s Intergovernmental Panel on Climate Change (IPCC) shared their award with Smith and about 2000 IPCC report authors worldwide.

Lisa Thompson, assistant professor, UC San Francisco, School of Nursing, recalled the seven years she spent with Smith as her academic advisor. She expressed the words his students used to describe him: caring, generous, unique, invested, blunt, authentic, witty and pioneering.

Spear paid tribute to adjunct professor Tom McKone for his appointment to a new National Research Council committee. In addition, the International Society of Exposure Science granted McKone the Wesolowski Award in 2008 for his outstanding contributions to the field.

Spear recalled first noticing McKone’s graduate student researchers, called him a great mentor. The evening closed with moving tributes to Spear. Kirk Smith remarked, “I am proud to be listed on his resume as his first doctoral student.” Spear was also the first person Smith called when he learned of his invitation to the National Academy of Sciences in 1997. “It was his willingness to take a risk with me initially and his mentorship throughout my career that made it possible.”

Smith recounted Spear’s earliest research on pesticides that, to this day, remains state-of-the-art. He called his methods “far advanced” for the era, and noted researchers have yet to improve them in any substantial way.

Smith noted, “Bob’s collaboration with Steve Rappaport and Steve Selvin in the 1980s revolutionized the field of occupational hygiene. This collaboration exemplifies Bob’s strengths: engage junior faculty and students in structured discussions; create opportunities for them to excel; step aside and allow them to reap the benefits.”

Researcher Edmund Seto, another of Spear’s former graduate students who has known him for 15 years acknowledged, “My career is built on the shoulders of Bob.”

Seto and Smith spoke of Spear’s global impact as a scholar—China has granted Spear some of the highest awards conferred to a foreigner including the Sichuan Jinding Award and the Friendship Award of the State Council.

Trina Mackie, an EHS doctoral student, admired that Spear “somehow manages to move through his many responsibilities without ever looking overburdened and without an air of tension and stress.” She recalled, “He always had an appropriate level of optimism, and though he never told me exactly what to do or how to do it, he let me know that I could do it.”

Smith said, “Bob represents the best of the Berkeley tradition—international caliber research, dedicated and productive teaching and mentorship, and a devotion to and competence in university and public service.”

Fortunately, Spear will continue as professor emeritus. Llewellyn also plans to continue working on UC Berkeley’s Green Chemistry initiative and other special projects. In lieu of retirement presents, Spear and Llewellyn request donations, made payable to “UC Regents,” for the new Sichuan Earthquake Relief Project and the Llewellyn Student Award.
The Northern California Center for Occupational and Environmental Health (COEH), a multidisciplinary program of the University of California at Berkeley, Davis, and San Francisco, promotes health and safety in workplaces and communities by:

- Educating health professionals in epidemiology, ergonomics, industrial hygiene, medicine, nursing, toxicology, and related fields to be leaders in occupational and environmental health.
- Developing new knowledge through an interdisciplinary research agenda focused on preventing illness and injury.
- Responding to the needs of people affected by hazards in their workplaces or communities, with special attention to vulnerable populations.

Through these activities COEH supports federal, state, and local agencies, health and safety professionals, industry, labor, and community-based organizations in their efforts to prevent occupational and environmental disease and injury.

COEH is an Education and Research Center (ERC) of the National Institute for Occupational Safety and Health (NIOSH).