



DEADLY ENVIRONMENTS

On a crisp October afternoon in 1948, daylight barely trickled into the storefronts of Donora, Pennsylvania. Stagnant weather had trapped a noxious black cloud of emissions from nearby steel and zinc plants above the town, nestled in a valley just southeast of Pittsburgh. When the cloud finally lifted five days later, 21 townspeople were dead and countless others hospitalized.

It was one of the worst air pollution disasters in U.S. history, and Harvard School of Public Health took notice. In the wake of Donora, a fresh wave of faculty research would lead both to a new understanding of air pollution's impact on health, and to sweeping federal reforms restricting those emissions.

Since the beginning, HSPH has built a legacy on its response to environmental disasters like these. Through years of influential research and public health activism, the school has transformed both science and policy, leading steadily to healthier environmental conditions in our cities, towns, and workplaces—environments that, in the decades before Donora, could sometimes be deadly.





THE HAZARDS AROUND US

DANGEROUS TRADES

When HSPH was founded in 1913, U.S. labor regulations were almost nonexistent. Coal dust choked the lungs of miners. Mercury poisoned the brains of felt hat makers. And lead, used in everything from freight car seals to pottery decoration, caused horrible convulsions in exposed workers.

“While European journals were full of articles on industrial poisoning, the number published in American medical journals up to 1910 could be counted on one’s fingers,” recalled occupational health pioneer Alice Hamilton in her 1943 autobiography, *Exploring the Dangerous Trades*.

Before joining Harvard’s faculty in the late 1910s, Hamilton had built her career studying the plight of American workers—first, by running a survey of lead poisoning in Chicago, then later by examining workers sickened by picric acid, a byproduct of making explosives. In the course of her studies, she exposed dangerous workplace practices and pushed tenaciously for industrial reform.

In 1923, workers at a New Jersey clock and watch plant—mostly women—developed painful abscesses that disfigured their jaws and faces. Their teeth started falling

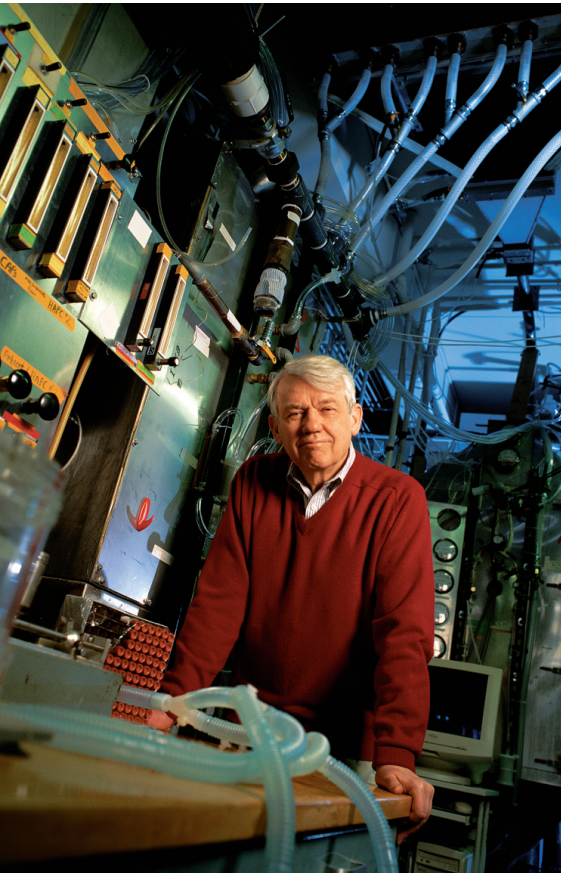
out, and within months, the women became so sick, they could barely move.

Future HSPH Dean Cecil Kent Drinker soon discovered the culprit: a new type of glow-in-the-dark paint made with radium, a radioactive element. When the workers painstakingly dabbed the paint onto clock and watch dials, the researchers found, they licked their brushes to “point up” for better detail, ingesting tiny bits of the radioactive substance. It slowly collected in their gums and jawbones, dooming the women to a painful death by radiation poisoning or cancer.

Drinker’s survey of the workers provided one of the world’s first academic studies on the effects of radiation, helping open the world’s eyes to the terrible dangers it posed.

By the end of the Second World War, Drinker and Hamilton’s legacy of research and activism left U.S. factories safer than ever before. New regulations for both chemical and radioactive exposure protected workers’

continued on page 56



“YOUR SCIENCE SCARES ME.”

In the tradition of Alice Hamilton and *Exploring the Dangerous Trades* (see page 57), HSPH’s Joseph Brain headed to a North Carolina cotton mill in the 1960s to take environmental readings and talk to workers exposed to toxic cotton dust.

“I discovered that they weren’t really glad to see us. The textile industries had already abandoned New England and had moved to Georgia and North and South Carolina, and the handwriting was on the wall: The industry was slowly moving abroad. A couple of women took me aside and said, ‘Your science scares me. I know these exposures are bad for me, but I need the work. I have children. I have to feed my kids. And I’d rather breathe this dust and have lung disease 20 years from now than lose my job.’

“It made me realize that when you implement change, you need to think of the whole ecosystem. You need to think of all the impacts. Measures that sound good may have a downside to someone. The School has always understood that to do our science, we need deep, persistent connections with workers, with industries, with countries.”

Joseph Brain,
Cecil K. and Philip Drinker Professor of Environmental Physiology

HARVARD'S FIRST LADY

By the time Alice Hamilton joined Harvard's faculty in 1919, she was already one of the nation's pre-eminent researchers in the field of occupational health. Her tenacious methods were legendary—in her study of workers suffering from diseases like lead poisoning, she sifted tirelessly through hospital records, climbed treacherous catwalks, and slipped covertly into factories around the country.

"It was pioneering, exploration of an unknown field," she recalled in her 1943 memoir, *Exploring the Dangerous Trades*. "No young doctor nowadays can hope for work as exciting and rewarding."

Hamilton's steely determination in her fieldwork served her well at Harvard. As the University's first female faculty member, she was forbidden to sit with her male colleagues at commencement, barred from entering the all-male faculty club, and even denied such perks as complimentary tickets to Harvard football games. In the face of these demeaning conditions, however, Hamilton continued her pioneering work at the University.

In the early 1920s, she was involved in one of the world's first systematic studies of industrial radiation poisoning, examined mercury poisoning in felt hat makers, and became an outspoken opponent of leaded gasoline. Later that decade, Hamilton served as the only female member on the health committee of the League of Nations, the precursor to the United Nations, and published her influential textbook, *Industrial Toxicology*, in 1934.

On her retirement in 1935, Harvard made her a professor *emerita* ("a great honor [that] pleasantly ignores my sex," she later chided), and she remained active in the field for years after as a consultant for the U.S. Department of Labor Standards.

In 1970, Hamilton died at 101, but her legacy would live on. That same year, the U.S. government established the Occupational Safety and Health Administration and the Institute of Occupational Safety and Health—entities that remain devoted to the health of workers.



Workers making felt and velour hats in Luton, Bedfordshire, England, circa 1920

Protecting Workers' Health

Throughout the School's history, researchers have sought to keep workers safe and workplaces healthy. From pioneering efforts exposing the adverse effects of early-20th-century factory life to current studies on the heart health of firefighters, HSPH researchers have uncovered scientific evidence that has led to new safety regulations and standards, and promoted a cultural standard that values the health of workers at all levels.

THESE ARE JUST A FEW OF THE NOTABLE ACCOMPLISHMENTS BY HSPH FACULTY IN OCCUPATIONAL HEALTH AND SAFETY:

- Uncovered more than 70 processes in which thousands of workers were exposed to lead poisoning, ranging from painting and pottery making to installing lead trim in caskets and polishing cut glass. The findings led to the adoption of legislation safeguarding workers' rights in the early 20th century.
- Diagnosed the cause of the felt hat industry's "mad hatter disease"—mental confusion and uncontrollable jerking of the arms and legs—as mercury poisoning.
- Described the chronic effects of carbon monoxide poisoning in garages, printing establishments, tunnels, and mining.
- Documented psychosis-producing carbon disulfide poisoning among workers in rayon fabric factories.
- Conducted the first thorough investigation into radium poisoning (detailed at right). It was suspected to be the cause of horrific degenerative ailments, particularly of the jaw, suffered by female workers who painted dials on clocks and watches with radium-based luminescent paint.
- Illuminated the effects of altitude change and oxygen deprivation on pilots and passengers in airplanes.
- Researched fatigue and work efficiency among sharecroppers, and energy and heat dissipation in muscle tissue in steel mill workers, producing a body of knowledge that evolved into the modern field of ergonomics.
- Worked collaboratively with labor and management to improve worker safety in the rubber tire, meatpacking, and automobile industries. In three separate investigations, researchers from the School provided evidence linking worker health complaints such as respiratory problems and increased cancer risk to harmful workplace exposures. These toxic exposures included emissions generated by the hot-wire technique used for cutting polyvinyl chloride meat wrappers, and the metalworking fluid used by the autoworkers.
- Linked lung disease in Chinese textile workers to cotton dust exposure. These findings persuaded the Chinese government in 1986 to adopt U.S. standards and reduce cotton dust levels by 90 percent.



Deadly Occupation, Forged Report

In the early 1920s, workers at U.S. Radium Corporation's luminous watch dial factory were mysteriously falling ill and dying. Eager to halt a mounting scandal, company President Arthur Roeder contacted industrial hygiene expert Cecil Drinker to investigate. Drinker, along with fellow Harvard School of Public Health faculty members Katherine Drinker, his wife, and William Castle, agreed to visit the Orange, New

Jersey, factory to observe the watch dial painters at work and to speak with their doctors. What they found was appalling.

At a time when many believed radium had healing properties and it was served up in tonics and spa treatments, the women thought nothing of painting their hair, nails, and teeth as a party trick. Cecil Drinker observed that every inch of the painters glowed, "even the corsets."

Drinker was convinced that exposure to continuous doses of radium was causing the women's health problems, which included excruciatingly painful necrosis of the jaw. He issued a report to the company emphatically recommending safety precautions. Roeder, however, was not convinced. He insisted that a contagious infection contracted outside the factory must be to blame and referred to an internal report that refuted Cecil Drinker's findings—a report he refused to show Drinker. When he learned of Drinker's plans to publish the HSPH team's report, Roeder threatened to sue.

While Drinker reluctantly agreed not to publish the report, his HSPH colleague Alice Hamilton refused to back down. Through a contact in the National Consumers League, she learned that U.S. Radium had submitted Cecil Drinker's report to the New Jersey Department of Labor—with the findings altered to present the company in a more positive light. Hamilton alerted both Drinkers. "[The New Jersey Department of Labor] has a copy of your report and it shows that 'every girl is in perfect condition.' Do you suppose Roeder could do such a thing as to issue a forged report in your name?" she wrote in a 1925 letter to Katherine Drinker. Confronted with the evidence that Roeder had acted in bad faith, the Drinkers ignored the continued threat of a lawsuit and published the report.

Upon receipt of the original research report, New Jersey's labor commissioner ruled that all of Drinker's safety recommendations be implemented, a move that led to the closure of the factory. Following an eventual lawsuit by former dial painters, the industry made further changes to improve worker safety. Radium-based paint was banned in the 1960s.



"Radium Girls" at work

Jersey, factory to observe the watch dial painters at work and to speak with their doctors. What they found was appalling.

The factory was saturated with radium-contaminated dust—and no steps had been taken to protect the workers from radioactive material. Dial painters were encouraged to lick their paintbrushes to keep the points sharp, each time ingesting small amounts of the radium-based paint. Supervisors assured the all-female workforce—some as young as 15—that the paint was safe, and perhaps even beautifying.

health to a large extent, and job-related illnesses fell to an all-time low. Ironically, though, outside factory walls, regulations stayed lax, and dangerous chemicals were released into the air in communities around the country. As they were, HSPH would again find itself on the front lines.

THE AIR WE BREATHE

In the years after the war, HSPH studies found direct connections between airborne pollutants and health problems like asthma, lung cancer, and chronic respiratory disease—findings that would later be the scientific bedrock for regulations mandated in the 1970 Clean Air Act.

While the new act reined in some of the country's worst air pollution, Benjamin Ferris, HSPH professor of environmental health and safety, felt more research was needed. Yes, caustic smog could kill, he noted—but how, exactly?

In 1974, Ferris and a team of HSPH colleagues began to find out. In a study of epic proportions, the group spent more than a decade traveling to six cities around the Midwest and New England—in areas of low, medium, and high pollution—to record the respiratory health of more than 8,000 adults and 14,000 children. At the same time, Ferris and his team measured nearby levels of suspended particles (soot), sulfur dioxide, nitrogen oxide, and ozone.

The study's findings, published in 1993, were striking. Death rates in the most polluted of the six cities (Steubenville, Ohio) were 26 percent higher than in the cleanest city (Portage, Wisconsin), showing a strong link between community air pollution and shortened life expectancy.

"The effects of air pollution were about two years' reduction in life expectancy," said Douglas Dockery, chair of the Department

Hope for Tiny Lives



Mary Ellen Avery

In 1963, First Lady Jacqueline Kennedy gave birth to a baby boy, premature by five weeks. Almost immediately, doctors realized something was horribly wrong—his underdeveloped lungs were failing him. Two days later, he died gasping for breath.

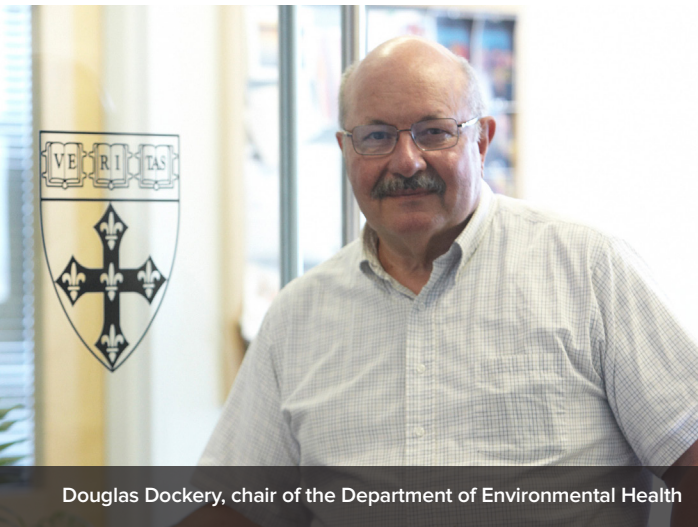
While the Kennedys' tragedy was visible on a national level, Mary Ellen Avery saw the same thing unfold in more private settings countless times. As a research fellow at Harvard School of Public Health in the 1950s, she had worked with premature infants in an attempt to discover exactly why some babies—like the Kennedys' child—struggled to breathe after birth.

At the time, most researchers believed the problem was due to a thin, glassy film over the inside surface of the lungs that stopped respiration. But by 1957, Avery had discovered the true cause of the disorder. Instead of the presence of a film, Avery found that respiratory distress syndrome (as the disorder is called today) was caused by a lack of surfactant, a foamy coating of proteins and phospholipids that help the lungs expand.

Avery's work soon led to the development of artificial surfactants that saved the lives of countless premature babies. Today, fewer than 1,000 U.S. infants die of the disorder each year, down from nearly 15,000 in the 1950s.

"She believed that the best basic science would produce the best outcomes for children—usually in ways that could not be anticipated," said Joseph Brain, former chair of the Department of Environmental Health, in 2011.

In addition to her groundbreaking work in pediatric medicine, Avery, who died in 2012, was a pioneering leader in her field, becoming the first woman to serve as physician-in-chief of Boston Children's Hospital, the first woman to chair a clinical department at Harvard Medical School, and the first woman president of the Society for Pediatric Research.



Douglas Dockery, chair of the Department of Environmental Health

of Environmental Health, who collaborated closely with Ferris, in a 2012 interview with *Harvard Public Health*. “It was much, much higher than we had expected.”

Indoor air quality was also an important factor in participants’ health. Pollutants could be trapped inside homes and offices, where residents would inhale a concentrated dose of particulates, tiny solids and liquid droplets that emerge during combustion and stay suspended in midair. The particles’ microscopic size—in some cases, more than 100 times narrower than an average human hair—let them slip deep into the lungs, transporting dangerous chemicals into the body and causing harmful inflammation.

In part based on the School’s study, the U.S. Environmental Protection Agency (EPA) passed new particulate regulations in 1997, a controversial move

that sparked immediate political backlash. Meeting the new requirements wouldn’t be cheap, after all—retrofitting power plants, steel mills, and other heavy industrial sites would cost millions.

As pressure rose from industry lobbyists and members of Congress, the Harvard team agreed to an independent reanalysis of its data by the Health Effects Institute (HEI), a research organization in Cambridge, Massachusetts. HEI—which was funded by both the EPA and the automotive industry—took three years to sort through the small mountain of data. But when the results were released in 2000, it had confirmed the Harvard team’s findings, quieting the storm of criticism that followed the study’s publication. Since then, follow-up studies by HSPH faculty have revealed even stronger links between particulate exposure and cardiovascular disease, and today, researchers are pushing for more stringent regulations.

While Ferris and his team traveled the country to study air pollution and smog, however, a second group of HSPH faculty set out to tackle another urgent environmental issue—water pollution. By 1982, one of the nation’s most infamous cases reared up in Harvard’s own backyard.

WATER, WATER, EVERYWHERE

When the Boston suburb of Woburn, Massachusetts, installed new municipal wells in the mid-1960s, residents immediately complained. The water smelled and tasted bad, and it corroded pipes and faucets. Something about it just seemed wrong.

continued

A MASK FOR HIGH FLYERS

Cecil Kent Drinker, Dean of the Harvard School of Public Health from 1935 to 1942, was one of the first physicians to investigate how the respiratory tract absorbs toxic dust and fumes. During World War II, Drinker conducted physiological research for the United States Armed Forces’ National Defense Research Committee. His work contributed to the development of high-altitude oxygen masks and goggles for Allied aviators.

Despite assurances of safety from city hall, more than a dozen Woburn children were diagnosed with leukemia after the wells went online, and residents' suspicion of the water supply grew. In 1979, the town's fears seemed confirmed: A construction crew uncovered barrels of toxic waste near the wells, and tests found high levels of industrial solvents in the water.

But did those chemicals cause the rise in cancer rates? The riddle intrigued Marvin Zelen, a biostatistician at HSPH. He and colleague Stephen Lagakos soon dove into a statistical study of more than 7,000 Woburn residents, collecting family medical histories through phone surveys and door-to-door volunteers. Indeed, the study introduced the idea of citizen epidemiology—recruiting local residents to gather data.

The study's results showed that the townspeople were right all along. The more water a household received from the tainted wells, the higher its chances of childhood leukemia or birth defects.

Zelen and Lagakos had used the survey data to draw a connection between water contamination and cancer, a finding that would help prompt the EPA to make Woburn's watershed one of its first Superfund sites in 1982. "Opponents claimed no one had been shown to be seriously 'hurt,'" Zelen said in a 2013 interview. "Then our paper came along."

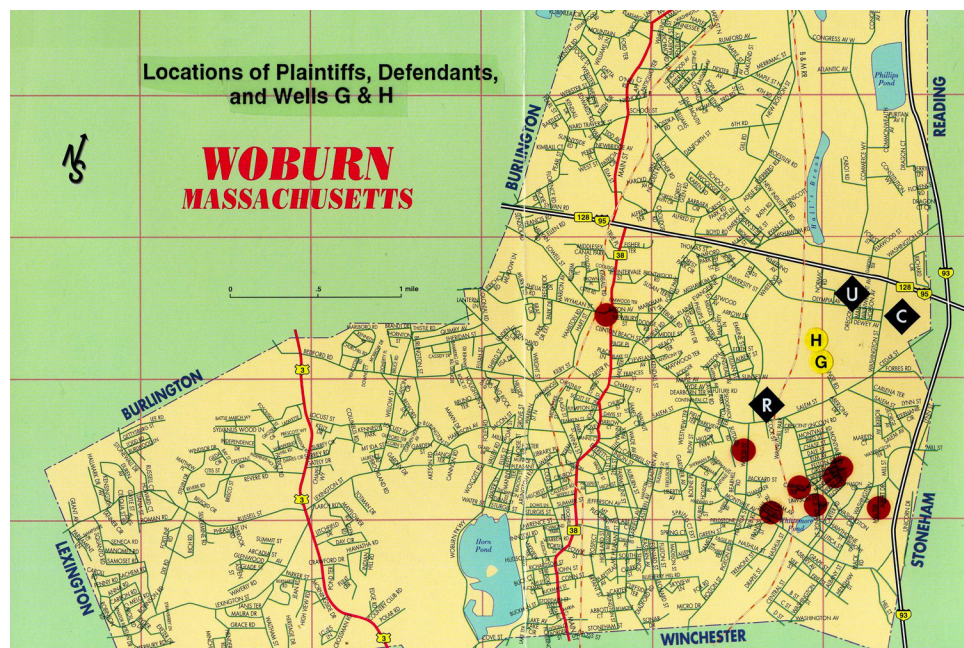
At first, Zelen's results were not universally accepted, even by some HSPH colleagues. Brian MacMahon, then-chair of the Department of Epidemiology, argued that since Zelen and Lagakos' volunteers were themselves Woburn residents, the study might be unduly biased.

Other academics, however, rallied behind the pair's work. "We commend Lagakos et al. for undertaking a difficult study with limited resources in a highly charged political environment," wrote epidemiologists Shanna Swain and James Robins, Mitchell L. and Robin LaFoley Dong Professor of Epidemiology, in a series of comments published with the study in the *Journal of the American Statistical Association* in 1986. "To the extent that this study has sparked debate and brought the attention of the scientific community to the problem of documenting the adverse health effects of low-level environmental contamination, the authors have done a service."

While a subsequent trial and the EPA's newly instituted oversight offered some recourse to Woburn residents, it may not have seemed like much to those who had lost loved ones to leukemia. Still, as frustrating as it may have been, the town seemed to have far more options than cities halfway across the globe. Similar sorts of industrial and environmental illnesses were commonplace in developing nations during the 1980s, and little help existed—except, that is, for the work of HSPH researchers.

continued on page 60

A map shows in red dots the locations of plaintiffs' houses in Woburn, Massachusetts where well water tainted with industrial chemicals was linked to cases of childhood leukemia. HSPH researchers Marvin Zelen and Stephen Lagakos enlisted more than 7,000 Woburn residents to collect family medical histories through phone surveys and door-to-door conversations—introducing the concept of citizen epidemiology. A trial about the Woburn case was later made into the book and movie *A Civil Action*.



A MOTHER'S CRUSADE FOR CLEAN WATER

In 1972, Anne Anderson's life changed forever. Her 3-year-old son Jimmy, the youngest of her three children, was diagnosed with leukemia—and other children who lived nearby were suffering from leukemia, too. “Everywhere I went—to the library, to the church, to the grocery store—I met somebody who had a child with leukemia,” Anderson said. “That’s not normal.”

She was convinced the spate of disease had something to do with Woburn's reddish, foul-smelling water, which people had complained about for years. “It was chlorinated so much, it smelled like the Y,” she said. “It rotted our pipes and faucets.”

Anderson started voicing her apprehensions—to the city, to the state, to the media. “It was hard, because I’m a very private person. Interviews and interviews and interviews, meetings and symposiums. Speaking in front of people was never my thing. But I was possessed.”

Her efforts set in motion a long and tortuous chain of events: city, state, and federal investigations; an HSPH study; and a court case made famous by Jonathan Harr's book, *A Civil Action*, and the movie of the same name.

At first, the only people who put stock in Anderson's fears were her mother and her best friend. Town leaders were reportedly insulting and insensitive; Massachusetts Department of Public Health officials were said to be unhelpful; neighbors didn't want her to publicize her complaints about the water, because they were afraid their property values would sink.

Finally, in 1979, the state shut down two of Woburn's municipal wells after discovering they were contaminated with industrial solvents. Jimmy Anderson died in January 1981—nine agonizing years after he first became sick.

Shortly after her son's death, Anderson learned that two HSPH biostatisticians—Marvin Zelen, then-chair of the Biostatistics Department, and Stephen Lagakos—wanted to investigate whether there was a link between the contaminated water and the children with leukemia, and they wanted her help. At first she was reluctant. “I was so very raw,” she said. “But my minister, Reverend Bruce Young, told me, ‘If you don't do it, who will?’”

Along with half a dozen Woburn volunteers, Anderson worked with Zelen and Lagakos in planning the study and making phone calls to gather data. “We had a very comfortable relationship of respect and friendship,” she said. “I admired the two of them so much.”

Using data from telephone interviews of 3,257 households, the researchers compared the percentage of water each household received from the contaminated wells over a 16-year period with a variety of adverse health effects, including leukemia. They found that the 15 Woburn children who had leukemia from 1969 to 1983 were exposed to an average of twice as much water from the contaminated wells as the average Woburn household. When the HSPH study revealed the correlation, said Anderson, “It was like a big weight was lifted off my shoulders.”

The School's study findings also marked a turning point for the community. “That's when the people of Woburn admitted that something was wrong,” said Anderson. “You know, you don't mess with Harvard.” Today, she believes that people in general are much more aware of the threat of environmental contamination because of what happened in Woburn.

Anderson was devastated when she learned of Lagakos' death in a car accident in 2009. She has nothing but praise for the two professors. “They were interested in little people with a big problem,” she said. “They listened to us. That meant so much.”





Joel Schwartz, professor of environmental epidemiology

GETTING THE LEAD OUT

“Every time you fill up your car with gasoline, you can think of Joel Schwartz,” William Reilly, former administrator of the EPA, remarked several years ago.

That’s because Schwartz, professor of environmental epidemiology, is the man behind a singular accomplishment: identifying an environmental exposure that threatened millions—lead in gasoline—and supplying enough evidence to ban it.

Schwartz and his EPA researcher wife, Ronnie Levin—now a visiting scientist at HSPH—showed in the 1980s that banning the addition of lead to gasoline would, on net, save billions of dollars annually, by averting long-term economic losses from lead-induced IQ declines. Such visionary calculations propelled Schwartz—at the time himself an EPA employee—to become in 1991 the first federal worker to receive the MacArthur Award, a no-strings-attached “genius grant” of \$275,000.

This wasn’t the first time School faculty had taken a stand on lead. Industrial toxicologist Alice Hamilton (see page 53), who became Harvard University’s first female faculty member in 1919, strongly opposed the decision to allow leaded gasoline on the market in 1926. “You are nothing but a murderer,” she was overheard saying to General Motors director of research Charles Kettering in a hallway confrontation during a 1925 Public Health Service conference. The meeting was attended by more than 100 industry and public health representatives to consider the issue of tetraethyl lead, a gasoline additive sometimes referred to as “ethyl” or “loony gas,” after horrifying outbreaks of paranoid and delusional behavior among lead-poisoned workers.

TOXINS GO GLOBAL

By the late 1980s, the rapid growth of industry in developing nations had triggered a new wave of environmental health concerns. Countries such as China began to face scenarios eerily similar to the industrial revolution in the United States: smog obscured skylines, chemicals tainted water supplies, and lax labor regulations endangered thousands of factory hands.

In Shanghai’s massive cotton mills, said HSPH researcher David Christiani, Elkan Blout Professor of Environmental Genetics, respiratory disease was commonplace: workers came down with chronic cough, bronchitis, and an asthmalike condition called byssinosis, caused by bacterial toxins thrown into the air during cotton processing.

In 1986, Christiani set out to examine those illnesses. After recruiting more than 1,000 employees from two Shanghai textile mills, he and a small team of researchers began the first study of respiratory health ever among Chinese textile workers.

Christiani followed up with the cohort regularly for the next 30 years, providing valuable data on the relationship between bacterial compounds called “endotoxins” and lung disease. As his team soon discovered, repeated exposure to the toxins, which normally have only a short-term effect on



David Christiani, Elkan Blout Professor of Environmental Genetics

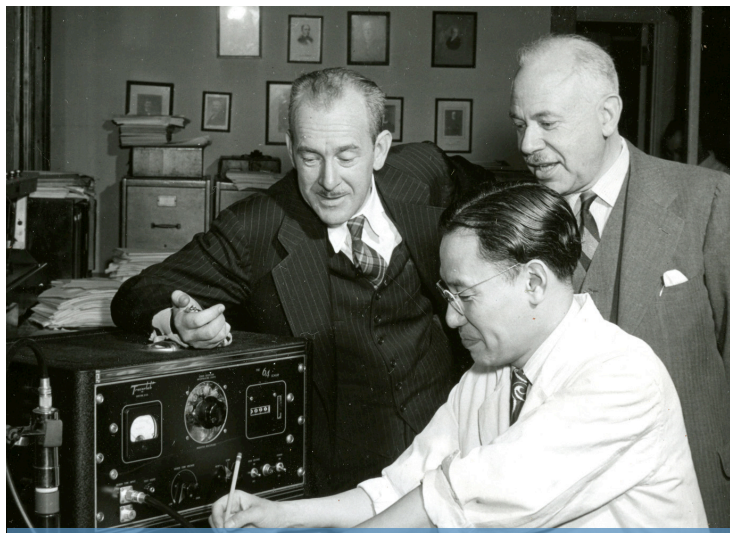
Engineering Clean Water

When sanitary engineer Gordon Fair joined the faculty of Harvard School of Public Health in 1919, one fact seemed certain: Water could sustain life, but in many cases, it could also take it away. In the late 19th century, contaminated drinking water caused outbreaks of dysentery, cholera, and typhoid fever in major cities worldwide, and the design of effective water and sewer systems—Fair’s expertise—had become a keystone of public health efforts.

After arriving at Harvard, however, Fair quickly became frustrated by what he saw as the “unscientific” nature of the field, which had been based mainly on the wisdom and advice of elder engineers. During his 46-year tenure at the school, Fair helped codify sanitary engineering, transforming it from a field steeped in empirical experience to one based on data and quantitative analysis. As his son, Lansing, recalled in a 1997 interview, when Fair started at HSPH, most textbooks contained only two formulas. “Now, they have 1,600, and they all mean something,” he noted.

In addition to refining the methods of sanitary engineering, Fair also helped revamp the role of the field within public health. Rather than focus only on hydraulics and intake velocities, he felt his peers should be concerned with larger water quality issues. By the mid-1950s, more than two decades before the birth of the environmental movement, Fair played a key role in bringing attention to water pollution in Lake Michigan, and later became a leading figure of the Harvard Water Program, an interdisciplinary group that helped manage water resources in everything from hydroelectric dams to public swimming pools.

Although environmental engineering (as the field is called today) focuses as much on microbes and biochemistry as it does on structural design, Fair’s legacy lives on. Even now, his work influences the water management strategies of the Army Corps of Engineers, guiding them as they work to control floodwaters in rivers across the U.S.



Gordon Fair, far right, with colleagues

the lungs, could cause permanent damage. “We were the first to show that chronic lung-function loss was related more strongly to prolonged endotoxin exposure than to cumulative dust,” Christiani recalled in a 2007 interview.

The study’s findings have implications that reach far beyond the textile industry, however—workers in other fields, from grain processing to plywood manufacturing, are also susceptible to byssinosis, Christiani noted, meaning that his work may help improve the health of thousands both in China and here in the United States. “We started with a very narrow objective, focused on one industry, but our findings now have bearing on the general public,” he said. “[It’s] truly rewarding.”

Today, Harvard School of Public Health continues breaking new ground in environmental research. Here

at home, it continues its tradition of studying toxins in our surroundings—from the effects of mining waste in Tar Creek, Oklahoma, to careful analysis of BPA, a compound found in some food-grade plastics that can cause hormonal changes in humans. HSPH also has international partnerships to study air pollution in Mexico City and water contamination in Bangladesh, as well as close collaborations with the National Health and Family Planning Commission of China (formerly the Ministry of Health) and Tsinghua University that began in 2005. That collaborative effort, part of the HSPH China Initiative, immediately kicked off a wide-reaching series of policy dialogues and studies to address environmental health in a nation facing rapid urbanization. ❖