IT WAS LIKE
LIVING IN THE COKE PLANT
FOR THREE DAYS AND NIGHTS. YOU
GO TO BED AT NIGHT AND WAKE UP
IN THE MORNING BREATHING COKE OVEN
EMISSIONS IN YOUR
BEDROOM.

YOUR EYES
SMART AND
WATER, YOUR NOSE
RUNS AND BURNS, YOUR
THROAT FEELS LIKE THERE IS A
KNIFE IN IT AND THE TASTE
IS LIKE EATING
SULFUR.

# COKE, CLAIRTON AND CANCER

## A THREE-DECADE PUSH FOR REFORMS

By Paola Corso

A shift in the battery where coal, 16 tons of it, heats up to 2,000 degrees in fuming ovens just might be a coke oven worker-turned-minister's memory of hell.

"You may never have thought of shooting somebody before, but if you put a gun in the hands of a coke oven worker overcome with heat and fumes, he just might use it. That's how bad you feel," recalls the Reverend Alexander McLean.

McLean, 81, started working in the batteries at the Clairton Coke Works in 1947 and stayed for 18 years before becoming a minister. He thanks the goodness of the Lord that he made it out:

> Men much younger than me died of cancer. Just about all my friends from the coke works have passed away. With all the ovens side by side along the railroad track and so much smoke and gas leaking out, it didn't matter you were in the open air. There was a saying that you work two weeks there and you cut off 10 years of your life.

At each phase of the coke production process, workers like McLean at the plant's 816 ovens breathed in toxic fumes.

While most of the gas is recycled and reused, some emissions escape through leaks in the oven doors when coal is dropped into the oven, heated until it becomes coke, and removed.[1]

**Reverend Alexander McLean.** Photo George Thomas Mendel.

**Previous page: The caption for this 1956 U.S.S. publicity photo declared the Clairton Works as the world's largest coke and coal chemical plant, with 23 batteries and 64 ovens consuming 30,000 tons of coal daily.** HC L&A, ACCD.

McLean says he knew jobs on top of the batteries must have been the worst because everyone who worked there lost their hair. Many got cancer then. Others didn't get it until after they retired. He remembers a time when one worker got too hot working on top of the ovens:

> He told the boss to send somebody to take his place. The boss said he didn't have anyone, but the man said, 'Well you don't have nobody up here either.' He somehow got the strength to climb down and went to the hospital to cool off. You get so overcome with heat and fumes, you don't care what you say.

Though McLean began as a laborer, he eventually was promoted to operating a machine to push the coke out of the oven but was grateful to make his exit. He left in 1967 to study at the Pittsburgh Theological Seminary and Bible School before becoming minister of Gethsemane Church of God in Christ in Clairton where he continues to this day.

It wasn't until 10 years after McLean left the coke works that labor garnered a major victory: in 1977, the federal Occupational Safety and Health Administration (OSHA) established a more protective coke oven emissions standard that acknowledged high cancer rates for those who worked in the batteries. What brought about this historic victory for the rank-and-file was a triumvirate of firsts—landmark studies basing the high risk of cancer on human experience rather than laboratory experiments with animals, a strong union leadership whose mobilization of allies was unprecedented, and workers whose testimonies at public hearings were as important as those from the technical experts.[2] With the recent 30th anniversary of this more stringent standard, a look back reveals not just why and how it was implemented but to what degree worker safety has improved since McLean's pre-OSHA years at the coke works.

**Workers atop coke ovens searing heat and fumes holes burned through their boots**

It's hard to imagine more hazardous working conditions than McLean's pre-OSHA days: an environment so hazardous, a government agency was required to monitor it. But there was good money to be made at Clairton Coke Works. It still is the nation's largest producer of coke—stretching more than three miles along the Monongahela River 15 miles south of Pittsburgh. However, McLean, who started out making $250 every two weeks in 1947, came to realize how detrimental it was to his health and didn't wait for a scientific study to prove him right.

"Most health experts surmised that the heady mixture of gases released from coke ovens, full of tar, benzene, and heavy metals was unhealthy. Yet the demand that this process be shown to harm humans in statistically significant, well-designed studies was not easily met," writes The University of Pittsburgh's Center for Environmental Oncology Director Devra Davis in her new book *The Secret History of the War on Cancer.*[3]

That is, until 1962 when The National Cancer Institute funded a team of researchers from The University of Pittsburgh Graduate School of Public Health to study the relationship between coke oven emissions and

cancer rates. Dr. Antonio Ciocco, professor and chair of the Department of Biostatistics, and the late Dr. J. William Lloyd, who was at that time an epidemiologic researcher at the National Cancer Institute, planned and led the earliest phase of the study. They directed a research team that collected work histories and subsequent mortality rates for more than 59,000 steelworkers employed from 1953 to 1961 at seven plants in Allegheny County. Researchers asked questions of employees such as where they worked, for how long, what kind of jobs they held, and what chemicals and dust they were routinely exposed to.

They concluded there was a higher mortality rate from lung cancer among coke oven workers in Allegheny County at that time. The risk was two-and-a-half times higher for coke oven workers compared with other steelworkers, five times higher for those who worked at the top of the ovens, and 10 times higher for top oven workers on the job for five or more years where fumes were most concentrated for the longest time.[4]

The most striking finding was that African American coke oven workers like McLean had a much higher risk of dying from lung cancer than workers in other parts of the steel plant. Why African Americans? Davis explains:

> In the 1950s, and even as late as the 1980s, there was one major requirement for working the coke ovens. Those who ran the ovens were strong, often young, and most often black. At the time, nine out of every ten coke oven workers in southwestern Pennsylvania were black. Black men who sought work in the well-paying steel industry were offered only the dirtiest, most dangerous posts.[5]

According to Davis, African Americans couldn't be machinists, carpenters, chemists, or electricians because those jobs were given to men of British, Scottish, or other European ancestry. "They could work atop or next to the coke ovens, where searing heat and fumes regularly burned holes through their boots," Davis says.[6]

**She put on a hard hat to see what the environment was like, hot and fumes leaking out oven doors**

The same year McLean left the coke works was the year Dr. Carol K. Redmond replaced Lloyd, who had returned to his position at the National Cancer Institute. What Redmond (a recent graduate of Pitt's biostatistics program) and the research team found was that the risk for lung cancer seen in Allegheny County coke oven workers was also present in the other 10 plants studied, regardless of race or ethnicity.

"I visited companies and put on a hard hat to see what the environment was like. It was very hot, and I saw a lot of exposure from leaks around the doors," explains Redmond, currently a distinguished service professor of Public Health and Biostatistics at Pitt.

Furthermore, when Redmond and researchers studied those who worked on top of the ovens for 15 years or more, they found that 28 percent died of lung cancer—a risk 16 times greater than that of workers in other areas of the steel plants. Moreover, the risk of dying of kidney cancer was seven-and-a-half times greater in coke oven workers.[7]

Researchers found what Redmond refers to as a "dose response relationship." This meant the higher the worker's exposure to suspected carcinogens and the longer the period of time exposed, the higher the risk for cancer. They wrote a series of articles about the long-term mortality study of steelworkers published in *The Journal for Occupational Medicine*—two of which received Adolph Kammer awards from the American Occupational Medical Association.[8]

**A janitor had to go to his own doctor to find out he was dying of cancer. In two months, he was dead.**

- Eugene Puesley of Republic Steel, testimony at OSHA hearing

Even before the Pitt research findings, union officials had a good idea what was causing the cancer. "We had been pushing for better working conditions for a long time before the studies," says Michael Wright, director of health, safety, and environment for the United Steelworkers Union (USW). Wright says that black steelworkers in cities such as Chicago and Baltimore during the civil rights movement were instrumental in challenging the hiring practices of putting black workers in the dirtiest jobs. They initiated lawsuits to allow plant-wide promotions rather than seniority restricted to department.

"It was no surprise to us that people were dying in the coke batteries," Wright

**Devra Davis, author of *The Secret History of the War on Cancer.***
Photo George Thomas Mendel.

says. Some members of the USW Local 1557 (Clairton) were involved with the citizens advocacy organization Group Against Smoke and Pollution (GASP) and had been working with the Allegheny County Health Department to control coke oven emissions there.

In 1967, the American Conference of Industrial Hygienists suggested a Threshold Limit Value (TLV) for coke oven emissions of 0.2 mg/m3 benzene-soluble fraction of total particulate matter (BSFTPM) per eight-hour working day. This value was adopted by the U.S. Secretary of Labor in 1969 prior to congress passing the Occupational Safety and Health Act of 1970 to establish OSHA. OSHA kept the standard, but industry petitioned the Labor Secretary to lower it while the USW called for a more stringent measures, according to an article written by John D. Graham, who founded the Harvard Center for Risk Analysis, and David R. Holtgrave, a professor at the Johns Hopkins School of Public Health.[9] Both petitions were temporarily denied by the Labor Department while the National Institute for Occupational Safety and Health (NIOSH) conducted its own research. NIOSH later concluded that the data available was inadequate to change the standard and that the best way to control emissions was through engineering controls and good work practices. According to Graham and Holtgrave, OSHA issued numerous citations against domestic steel producers for failure to meet the standard in the early 1970s.

Union leaders renewed their campaign for a more protective standard. They organized a strategy session with union districts, locals, and headquarters to devise an action plan. They mobilized support from state agencies providing medical and technical expertise. "The mobilization of labor and its allies was unprecedented. It was able to secure resources not mobilized in other carcinogens cases," writes Wake Forest University History Professor Simone M. Caron in a paper on the OSHA standard setting process.[10]

As a result of both large-scale research findings and highly successful union efforts, the government set up a committee chaired by University of Cincinnati Professor Eula Bingham, but it failed to reach a consensus for coke oven standards. Then in 1975, OSHA held informal hearings and invited testimonies from all interested parties—workers, researchers, as well as company and government officials.

The union brought many sick coke oven workers to the hearings. All told, it recruited 55 witnesses, including 43 rank-and-file workers who provided four days of testimony about their personal experience with cancer


**A 1937 postcard offers a romantic view of the Clairton Coke Works.** HC L&A.

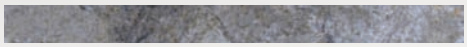
and health problems. Two of the coke plant workers who offered their testimonies had cancer of the larynx. One had a tumor in his neck, and others had lung cancer or other disabling lung conditions. Many were in and out of hospitals prior to the hearing. One worker had one-third of his right lung removed. Another received cobalt treatments while yet another worker had been through a throat operation and was told he had a 50/50 chance of surviving. In some cases, the cancer was so advanced that workers fainted on the job. Other times, it was picked up in an X-ray taken by a company physician, though employees weren't always advised of their condition.[11] Take Eugene Puesley of Republic Steel's Chicago works who said that a janitor told him it was "a damn shame" he worked 22 years before he took a company medical test. "He said he had to go to his own doctor and find out he was dying of cancer. In two months, he was dead," Puesley testified.[12]

In his testimony, Daniel Hannan, union member and cofounder of GASP, describes his physical reactions during the November 1975 air pollution emergency in Clairton:

> It was like living in the coke plant for three days and nights. You go to bed at night and wake up in the morning breathing coke oven emissions in your bedroom. Your eyes smart and water, your nose runs and burns, your throat feels like there is a knife in it and the taste is like eating sulfur.[13]

According to union attorney James English, worker testimony "put into perspective what the steel firms said about their facilities.… [F]or the first time, the workers themselves became as important as the technical experts." Simone refers to the USW's organizing of rank-and-file workers to testify as "the cornerstone" of its action plan.[14]

Dr. Eugene Sawicki, chief of the Atmospheric Chemistry and Physics Division of the Environmental Protection Agency, testified that a cigarette smoker would probably have to smoke three packs a day for perhaps 10 or 20 years to take in as much benzopyrene as a coke oven worker on a top side did in one day. Sawicki said his values might not be correct, but "they are in this ridiculous proportion of a huge amount of cigarette smoke as compared to the small amount of air breathed by a coke oven worker."[15]



**Across the river from the coke works vegetation didn't grow, then a brown hill turns green**

Redmond presented Pitt's findings as an independent investigator and was on the stand for two days. "Everybody was asking questions and requesting back-up documentation—not just OSHA but attorneys from the companies and the unions," she says.

"Given this evidence and the composition of an advisory committee sympathetic to labor, the final recommendations to OSHA reflected labor's position on every issue," writes Caron, who refers to Bingham and Lloyd in his paper. Lloyd, who conducted the early epidemiological studies, went on to join the USW staff as well as OSHA and NIOSH before he died of cancer, Wright says.

The result was a more stringent standard for coal tar emissions from 0.2 mg/m3 to 0.15mg/m3 BSFTPM17 per eight-hour workday. In addition, work practice controls were listed in the OSHA standard as well. For example, OSHA banned green pushing—or moving coal out of the oven before it was coked—in order to reduce carcinogenic smoke. Maintaining the ovens and other equipment was also key to cutting down on leakage as was finding a better way to charge the ovens so the doors would be opened for a shorter period of time. "Since topside ovens didn't meet standards, respirators were required for those workers," Wright explains. Other guidelines included posted signs to label hazardous areas, medical examinations, and educational programs.

Redmond says that the testimonies and research findings presented had great health implications. "Coke oven standards were one of the first OSHA founded. They were given priority because of our epidemiological findings based on human experience and the fact that the company acknowledged the risk was high," Redmond says.

The U.S. Department of Labor History website calls the OSHA coke emissions standards controversial but "the most important action to protect workers' health" despite five years of development and delay.[16] Wright says the union held a coke oven conference in the United States and Canada before and after the 1977 standards to build worker support and determine what could be done and how safety measures could be properly enforced.

In 1980, the union was awarded a grant from the National Cancer Institute to train workers to protect themselves from coke oven emissions. Wright says they met with workers and their families to discuss work practices and employer responsibilities. The union followed up with a survey. "We found if you educate workers about the risks and how to control them, they generally do just that," Wright says.

Redmond, too, understood the workers' perspective. Born in Uniontown where her grandfather was a coal miner, she was familiar with the Clairton Works. Her father worked there as a time taker, and her uncle was a welder. She remembers as a young woman looking at the foot of the hills across the river from the plant and noticing how vegetation didn't grow there. However, after the Pitt studies and subsequent emissions standards were established and enforced, the hill turned from brown to green. "You could smell clean air again and not what came out of the plant," Redmond says. "I was thinking I had done something important for my family and for the community."

### Worker histories from the 1890s gathered bit by bit one index card at a time

While the impact of these landmark studies presented at the OSHA hearings was monumental, the process of gathering worker data was done bit by bit one index card at a time. Redmond recalls how a clerical staff abstracted records the company made available and physically copied data such as job title, department assigned, tasks performed, starting date on the job, worker's leave of absence date and date of return, promotions or transfers, and retirement or discontinued employment.

"Four of the men began working at the plant in the late 1890s and were still working in 1953, the year used to define the steelworkers studied. Some switched jobs a lot and their records were quite lengthy," Redmond recalls.

In addition to overcoming the tediousness of gathering and organizing data, Redmond says a number of factors made these studies and the subsequent setting of standards possible. She notes an unpublished report based on workers in various industries that suggested high lung cancer rates. This research prompted company medical directors in Allegheny County to study the health of workers. Redmond writes,

> The medical directors of the major steel companies knew the findings from our initial study posed major problems, and they knew they had to determine if the problem was countywide and specifically the coke oven process given what was known about the hazards of coal tar exposures to humans.

In 1953, technicians took hundreds of thousands of chest X-rays in vans parked close to worker exits. Redmond explains that Ciocco and Lloyd selected that same year as the start date of employment history when conceptualizing the study design, because it coincided with the year in which the chest X-rays were done. The hope was that employment records could be linked to the chest X-rays.

According to Redmond, company physicians concerned about a potential for excess cancer risk enlisted the cooperation of management at the plants to assist with the Pitt study. The companies granted the research team access to old company records.

Furthermore, Pitt's Biostatistics Department was closely affiliated with the National Cancer Institute and the Allegheny County Health Department was actively involved in monitoring air quality and its impact on public health. "In the late 1940s," Redmond explains, "Pittsburgh was one of the first to pass a clean air act since so many people still used coal furnaces as well as all the mill pollution from the industry's high production level during the war."

To keep up with the demand for steel during World War II, some beehive ovens that released emissions in the air were used again, but even with existing ovens, which piped and recycled the emissions, problems arose with fumes and gas leaking from oven doors not tightly sealed. On top of that, Redmond said that workers were not given respirators until the late 1960s, after the study's initial findings became available.[17]

### A company history of compliance and violations cheers, jeers, penalties of cleaner air and more fines

Has worker safety improved since the OSHA standards for coke oven emissions took effect 30 years ago? "They have helped reduce respiratory cancer risks below earlier levels, although risks of a coke oven worker dying from cancer remain higher than expected based on the experience of other steelworkers," Redmond says. As she concludes, the standard was set at a level that was technologically possible, though it doesn't necessarily eliminate excess risk.

According to David Kusnet, who directed publicity for the American Federation of State, County, and Municipal Employees (AFSCME), OSHA reached its peak of effectiveness during the Carter administration under the leadership of Dr. Eula Bingham. Kusnet highlighted Bingham's effectiveness in a 1987 article:

> She was a toxicologist who believed that the agency should not only police workplaces but also should educate and organize workers to protect themselves. Bingham's OSHA generated a flood of informative new publications, sent staff throughout the country conducting conferences, and funded innovative projects to help labor, business, and community groups promote job safety.[18]

Kusnet goes on to say that these efforts were "virtually eliminated" by President Reagan, who declared in his 1980 presidential campaign that there was "no need for OSHA." In the same 1987 report, Kusnet refers to a 1984 AFL-CIO report that compared how similar incidents of unsafe coke ovens were handled in different ways by the Carter and Reagan administrations' OSHAs. In 1979, 52 serious violations were issued and $51,700 in penalties were assessed for violations of OSHA's coke oven standard. But, in 1983, the new policies produced only three serious violations and $2,800 in penalties assessed for 38 instances of noncompliance with coke oven standards.[19]

As one example, U. S. Steel's Clairton Coke Works has a varied history of compliance and violations since 1977 when OSHA standards went into effect. In 1989, U. S. Steel faced a record $7.3 million in penalties from OSHA. Then in 1993, a clean air deadline extension for Clairton was proposed by Congress to give it another year to comply with the Clean Air Act. Officials were glad to have an extension but activists wanted more timely enforcement of the law. Three years later, the steel manufacturer cut emissions at Clairton and GASP dropped its

lawsuit. Two years after that, the company boasted the cleanest air in 80 years. In 2001, workers were lauded for their contribution. But in 2007, the company was back to paying a pollution fine—this time $76 million.[20]

benefit not just workers but the community at large.

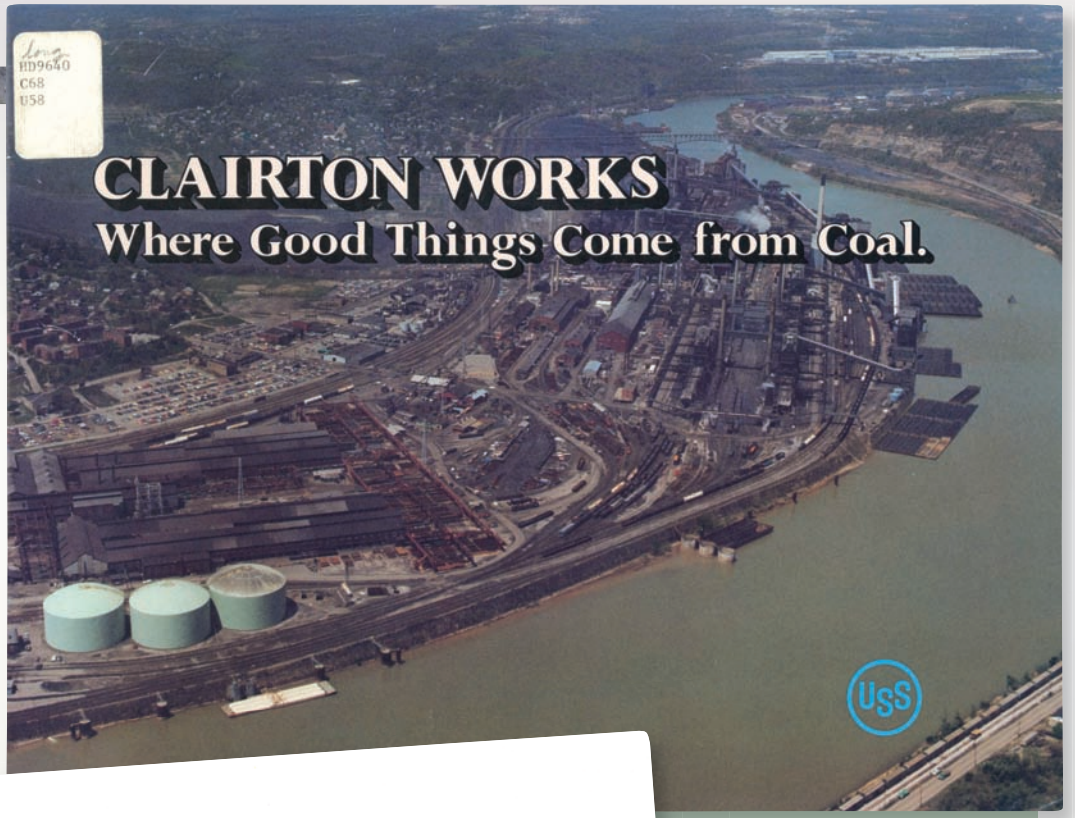
One exception here is if companies meet EPA standards by using a cokeside shed, which encloses dust left in the air once the coke is pushed out of the oven and into a quench car located on the other side of the ovens. "In a contained shed, conditions are worse as workers breathe in more dust and have poor visibility," Wright explains.

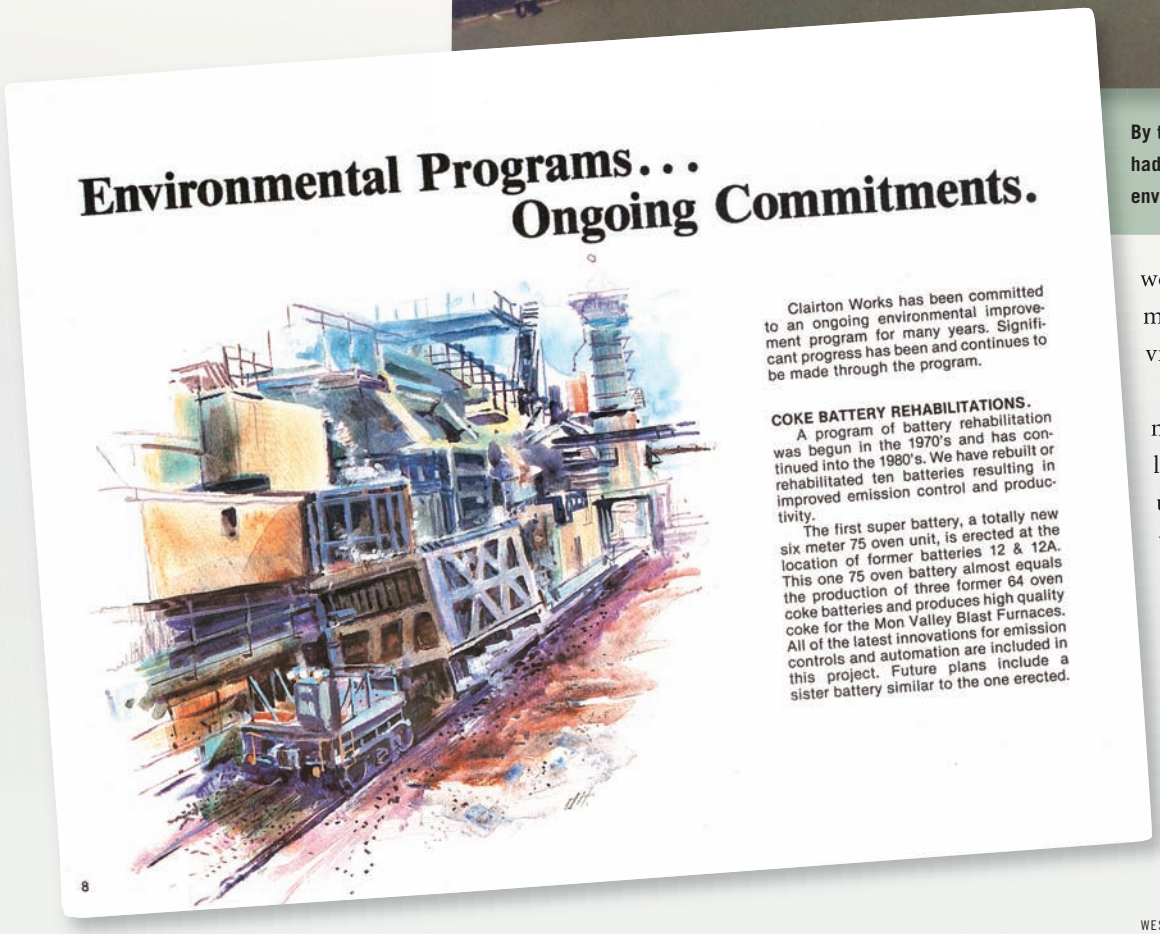
According to Wright, the most promising prospects for lowering pollution levels is to use non-recovery batteries where the carcinogenic byproducts of the coking process are burned in a controlled way that is much cleaner. The other big advantage is that there aren't leaks from the ovens as there are in the current ovens that pipe the byproducts out.

### What workers breathe what's in the ambient air hand in hand

Wright says the biggest gains for worker safety can be made by pursuing environmental regulations for ambient air as well as OSHA standards:

> They go hand in hand. Emissions from the batteries go into the immediate air and workers breathe them first before they're released into the ambient air. EPA regulations will clean the air for everyone and make conditions better for workers just as OSHA standards




**By the 1980s, USS public relations had shifted to touting the company's environmental advances.** HC L&A, HD9640.C68.U58.

"It's possible to achieve low pollution with both types of ovens but it's much easier to do so with the new technology battery that industry has been researching," Wright says. But as long as the more traditional ovens are used, there will be leaks and those leaks put workers at risk.

When asked if there was any new research being conducted given that a coke oven worker's risk of dying from cancer remains higher than expected, Redmond says it's unlikely. "It's a different time and a different environment. We'd have to be able to get access to records and have the cooperation of the plant. That would be very difficult in today's climate with companies contracting out services or being bought and sold. I don't think we could establish a long-term employment history today with plant closings and layoffs."

She also notes that with the 2001 advent of the Office of Homeland Security, fewer records are disclosed. In contrast, some of the employment records for the study were kept in an old limestone mine that served as a bomb shelter. The files were safe, and the company granted the researchers access.

Though collecting worker histories dating back to 1953 for a study like the one Pitt researchers conducted would be next to impossible today, safety concerns continue. Redmond was subpoenaed four years ago to testify about exposure to asbestos in a lawsuit against the manufacturer of coke ovens.

There is widespread interest in how effluents affect health for residents in the

**Clairton Coke Works today.** Photo Brian Butko.

community as well as in the workplace, Redmond says. According to GASP Executive Director Rachel Filippini, days after Pittsburgh was named the most livable city, it was ranked the second worst in air quality. "The abysmal ranking is driven by the fine particle monitor located in Liberty Boro, downwind of U. S. Steel's Clairton Coke Works as well as other industry," Filippini writes in a GASP newsletter. Filippini calls the ranking a "call to action that more must be done to clean up Southwestern Pennsylvania air now."[21]


She notes ways in which concerned citizens can conduct their own research by getting involved in the Allegheny County Health Department Air Quality Program and becoming a GASP Citizen Smokereader to monitor air pollution levels in their community.

But community activists and the union's 3,000 members employed at the Clairton Coke Works have reason to be optimistic. U. S. Steel recently announced a $1 billion capital investment program at its Clairton plant to construct new batteries. USW officials say the investment will result in "significant environmental performance improvements" and applaud it as a sound commitment to the long-term viability of the steelmaking tradition in the Mon Valley.[22]

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**Paola Corso** is the author of *Giovanna's 86 Circles and Other Stories,* the poetry collection *Death by Renaissance* set in her native Pittsburgh, and most recently co-editor of *The International Feminist Journal of Politics* Special Issue *Politics of Water: A Confluence of Women's Voices,* in which she wrote an introductory personal essay about Pittsburgh's water and gender politics.

[1] John D. Graham and David R. Holtgrave, "Coke Oven Emissions: A Case Study of Technology-Based Regulation," *1 Risk* 243 (1990): 244-47.

[2] Simone M. Caron, Wake Forest University Department of History paper, "Combatants on a Strategic Battlefield: An Analysis of Capital-Labor Conflicts and the OSHA Standard-Setting Process" at www.wfu.edu/~caron/ssrs/Wahl.doc/.

[3] Dr. Devra Davis, *The Secret History of the War on Cancer* (New York: Basic Books, 2007), 314.

[4] J.W. Lloyd, "Long-term mortality of steelworkers, V. Respiratory cancer in coke plant workers," *Journal of Occupational Medicine,* 13 (1971): 53-68.

[5] Davis, *Secret History,* 315.

[6] Davis, *Secret History,* 316.

[7] Carol K. Redmond, "Cancer Mortality Among Coke Oven Workers," *Environmental Health Perspectives,* October 1983, pp. 67-73 and Redmond, C.K, Ciocco, A., Lloyd, J.W. and Rush H.W, "Long Term Mortality of Steelworkers, VI. Mortality from malignant neoplasms among coke oven workers," *Journal of Occupational Medicine* 14 (1972): 621-629.

[8] The series of articles and their authors are listed in the Appendix A of a NIOSH research report titled, "Long-Term Mortality Experience of Steelworkers" (U.S. Department of Health and Human Services, June 1981).

[9] John D. Graham and David R. Holtgrave, "Coke Oven Emissions: A Case Study of Technology-Based Regulation," *1 Risk* 243 (1990): 244-47.

[10] Simone M. Caron, Wake Forest University Department of History paper, "Combatants on a Strategic Battlefield: An Analysis of Capital-Labor Conflicts and the OSHA Standard-Setting Process" at www.wfu.edu/~caron/ssrs/Wahl.doc

[11] "Post-Hearing Brief of United Steelworkers of America AFL-CIO on Standard for Coke Oven Emissions," June 16, 1976, 3-4.

[12] Ibid,147.

[13] Ibid, 21-22.

[14] Simone M. Caron, Wake Forest University Department of History paper, "Combatants on a Strategic Battlefield: An Analysis of Capital-Labor Conflicts and the OSHA Standard-Setting Process" accessed at www.wfu.edu/~caron/ssrs/Wahl.doc/.

[15] "Post-Hearing Brief," 33.

[16] "3. Dunlop/Corn Administration, 1975-1977: Reform and Professionalization," accessed at U.S. Department of Labor, www.dol.gov/oasam/programs/history/osha13corn.htm/.

[17] Phone interview with Dr. Carol K. Redmond, October 10.

[18] David Kusnet, "Death on the Job: OSHA Under the Company Thumb," in *The Case Against Corporate Crime,* May 1987, Vol. 8-5.

[19] Ibid.

[20] "USS faces record $7.3M in penalties from OSHA" (*American Metal Market,* November 3, 1989 by Peter Scolieri); "Clean air deadline extension for Clairton cheered, jeered" (*Pittsburgh Post-Gazette,* June 7, 1993 by Don Hopey); "USX to cut emissions at Clairton: GASP drops lawsuit" (*Pittsburgh Post-Gazette,* September 27, 1996 by Don Hopey); "Clairton Coke Works Air Cleanest in 80 Years" (*Pittsburgh Tribune-Review,* May 29, 1998); "Shop Talk: Workers lauded for contributions that really make a difference" (*Pittsburgh Post-Gazette,* September 9, 2001 by Jim McKay); "U.S. Steel to pay $76 million pollution fine" (*Pittsburgh Tribune-Review,* June 8, 2007).

[21] "Most livable city-least breathable?" by Rachel Filippini, *Group Against Smog and Pollution Hotline,* Summer 2007, 1, 8.

[22] USW news release, "USW Hails U.S. Steel's $1 Billion Investment in the Mon Valley," November 30, 2007.