

“Just Plain Murder”: Public Debate and Corporate Diplomacy in Donora’s Fight for Clean Air

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CLICK! CLICK! CLICK! Mary Hallowach heard her friend’s heels but could not see Margaret’s face as the two women converged on the same foggy sidewalk one late October morning. They greeted each other as usual, in spite of the obscuring, sulfur-smelling mist.¹ Murky days were hardly unusual in 1948 Donora, Pennsylvania, even though this fog *was* particularly dense. On the other end of town, young Alice Uhriniak wheezed uncharacteristically as she arrived for her morning shift at the telephone company. She stared, dumbfounded, at the frantically blinking lights of the usually quiet switchboard. A nightshift girl pushed earphones into her hand. “Put your set on! People are dying!”²

So began a great environmental disaster which eventually led to the passage of the Clean Air Act, but only after decades of political and financial disputes between public and commercial interests. Corporate spokesmen successfully delayed the legislation for years through diplomatic efforts that rivaled that of any foreign ambassador. Indeed, one modern definition of *corporate diplomacy* states “executives engage in the private sector version of international diplomacy... advancing their objectives through interactions with the leaders of other corporations, governments, analysts, the media and interest groups.”³ Donora’s smog brought the previously ignored issue of air pollution into the public spotlight and pitted environmentalists against industrialists, scientists against economists, and ordinary citizens against policymakers. The tragedy of Donora illustrates the medical, environmental, and economic consequences of the clash between public debate and corporate diplomacy in the fight for clean air.

Although humans have known since antiquity that tainted air was unhealthy, they have debated the actual causes of pollution-related illnesses from Vesuvius’ naturally occurring vapors⁴ to medieval London’s manmade soot.⁵ Modern industrial expansion further increased pollution, but smog was considered more annoying than dangerous. Yet there *was* a deadly precedence for the Donora incident. In 1930 a temperature inversion in Liege, Belgium concentrated a zinc smelter’s poisonous fumes and resulted in 63 deaths.⁶ The Belgian government, prominent scientists,

and industrial lawyers all debated: “Was the freak meteorological occurrence or the smoke-spewing smelter at fault?”⁷ In spite of autopsy evidence that pointed to fluoride poisoning due to zinc fumes,⁸ company diplomats successfully blamed the weather and set the stage for a deadly transatlantic encore.

The next chapter in the population/health debate opened in Western Pennsylvania, where the natural fog of Donora’s Monongahela River became thicker and fouler-smelling after the town’s zinc mill opened.⁹ Zinc workers received a full day’s wages for an arduous four-hour shift, and men worked in pairs in case anyone succumbed like the wild birds which fell, mid-flight, to the mill’s dusty floor.¹⁰ A company nurse routinely treated employees for “zinc jitters”, and laborers “retired” by age 29.¹¹ Zinc workers philosophically accepted the risks, but the unsuspecting public mistakenly considered itself safe.

Since sooty skies were a common occurrence, hardy Donorans barely noticed the haze on October 27, 1948.¹² They were more concerned with the upcoming high school football game between the Donora Dragons and rival Monessen Wildcats.¹³ Unknown to the populace, however, an unusual temperature inversion held the smog at ground level.¹⁴ By the third day hospital admissions had increased fourfold,^{15,16} and people began to die in the poisonous, stagnant air.¹⁷ Half of the town’s nearly 15,000 inhabitants were affected,¹⁸ some by mere coughs, others by searing chest pains as they struggled to breathe through pursed, blue lips. The lucky ones fled town before the dark atmosphere made travel impossible. Ambulances crept along the blackened streets, and an undertaker could not find a client’s home adjacent to the funeral parlor. Firefighter William Schempp dragged a 60-pound oxygen tank as he felt his way between houses. He’d give a few puffs of the life-saving gas to an ashen casualty and then struggle to the next home.¹⁹ By the time rain dissipated the smog on November 1, local hospitals were overwhelmed with the dead and dying,^{20,21} and the Community Center where Cub Scouts usually met became a temporary morgue.²²

Although initial theories blamed the town’s factories for the deaths,^{23,24,25} opposing viewpoints soon ignited fierce debate. Dr. William Rongaus, the only member of the Board of Health not employed by the mill, placed the guilt squarely on the zinc works, which halted operations only hours before the smog lifted.²⁶ Rongaus declared, “This is just plain murder,”²⁷ and the national press agreed.^{28,29} This widespread consensus quickly dissolved into debate when James Townsend, a public health researcher with ties to industry, stated that freak weather conditions, and not the mills, were at fault.³⁰ He ignored the fact that nearby Pittsburgh, which enjoyed newly mandated smoke controls, experienced the same foggy conditions without casualties.³¹ US Steel immediately exploited Townsend’s weather-blaming declaration and issued a full-page newspaper ad which expressed both its solidarity with the suffering townspeople as well as its innocence in the tragedy.³² Notwithstanding this diplomatic damage control, corporate heads also retained lawyers to defend against expected litigation. As had occurred in Liege, evidence of fluoride poisoning was stifled.^{33,34,35} Persistent scientific uncertainty benefited the company’s position for years.

Although it was obvious that pollution aggravated illness, scientists hotly debated the significance of smog’s role when compared to other factors. The

official death count in Donora was tallied at 20, however dozens more died over the following weeks^{36,37,38} and hundreds endured life-long ill effects. Because the initial victims were all elderly or suffered from preexisting respiratory problems,³⁹ some authorities insisted that only such persons were susceptible to air pollution, while others theorized that toxins injured even healthy subjects in subtle, debilitating ways. Since there was no *specific* disease associated with air pollution, it was difficult to implicate factory smoke as the responsible toxin. Moreover, air pollution research was a new discipline,^{40,41} and industry scrambled to gather their own friendly “experts” and to silence independent dissenters. While Ronagaus was certainly respected locally, he was not as nationally renowned as Townsend. In the 1949 Public Health Service report on the Donora smog, Townsend’s staff downplayed any *single* cause for the disaster and restated that freak weather conditions contributed more than industrial pollutants.^{42,43} Dr. Clarence Mills of the University of Cincinnati School of Medicine was highly critical of Townsend’s report and published material implicating the zinc works.⁴⁴ Industry-friendly experts and other scientists attempted to discredit Mills, but the arguments of such a respected professional were hard to dismiss.⁴⁵ While debate continued among intellectuals, broader public outrage was unsustainable, since pollution control would take time, cost money, and sacrifice jobs during the peak of Soviet expansion. Industry’s diplomatic strategy exploited Cold War anxieties—smelly air was presumed non-toxic except when “Mother Nature plays us false”⁴⁶ and was a small price to pay to ensure American technological and economic supremacy. Consequently, other concerns pushed Donora’s deadly smog out of the spotlight until an even greater disaster occurred.⁴⁷

London, like Donora, was renowned for its fog. For centuries the burgeoning metropolis spewed tons of pollution into the atmosphere, and the amber-colored air was a source of both discomfort and inspiration for many a poet.^{48,49} In December 1952, a Donora-like temperature inversion trapped Londoners in a blinding, suffocating miasma.⁵⁰ Within days, 4,000 Londoners lay dead, and the physical dangers of smog were incontestable.⁵¹ Unlike Donora, London’s woes were due to coal-burning furnaces,⁵² yet the two events were similar enough that deadly temperature inversions could no longer be considered rare.⁵³ Pollution was once again headline news and legislators in New York, where coal and refuse incinerators burned, referenced “Donora” to promote air pollution controls.⁵⁴ Without concrete proof of lasting harm, however, smog received only token Congressional consideration.⁵⁵ The Air Pollution Control Act of 1955 merely recognized air pollution as a problem and echoed industrial diplomats’ call for more research.⁵⁶ Pollution continued unabated and overworked investigators labored with minimal funding.

Scientists in the 1950s agreed that *concentrated* pollution caused acute illness yet debated the effects of small, recurrent exposures.⁵⁷ A 1960 follow-up study on morbidity and mortality in Donora produced confusing results.⁵⁸ The study showed that healthy people who suffered illness during the 1948 episode later exhibited more adverse health conditions, but there was no statistical difference between the general populations of Donora vs. nearby Butler County. Both detractors and proponents of industrial culpability for smog-related deaths claimed the study

confirmed their position. The Donora Chamber of Commerce proudly erected billboards proclaiming, “Donora...next to yours the best town in the USA.”⁵⁹ Predictably, something that was *not* debated was the need for more research. Multiple studies during the ensuing years have revealed that low-level daily exposure to air pollutants does indeed increase the risk of cancer, heart disease, and other illnesses in healthy individuals.⁶⁰

Public debate and corporate diplomacy clashed over air pollution not just in regard to health issues but also concerning the environment at large. Ecological stress in Donora was seen almost immediately after the 1915 opening of the zinc works.⁶¹ Crops withered and livestock were sickened downwind of the plant. Farmers in nearby Webster brought numerous lawsuits as their livelihood was destroyed.⁶² As usual, company lawyers delayed most of the litigation with calls for additional “study” into the causative factors, but plaintiffs had difficulty hiring their own experts.⁶³ Aerial views of Donora in the 1940s showed wide swathes of barren slopes, and erosion of Gilmore Cemetery occasionally exposed caskets. When trees in various sections of Donora withered if the wind shifted from the direction of the zinc works, homeowners complained. The company’s diplomatic response was always the same; the cause of the dying trees was “blight,” even though no natural “blight” affected all tree species.⁶⁴

Although citizens of this small Pennsylvania mill town could not prove pollution caused environmental harm, inhabitants of more affluent Los Angeles had better success. Large-scale California farms suffered crop damage and wealthy socialites bemoaned eye-stinging haze that spoiled the view.⁶⁵ Industry resisted investigation until the Donora episode stimulated air sampling which actually exonerated manufacturers. Unlike Donora, Los Angeles’ automobiles were proven the major cause of smog.⁶⁶ The problem lay in what to do about it, since cars involved not only auto manufacturers, but refineries and gasoline corporations as well.⁶⁷

For decades neurotoxic lead spewed from automobiles and contaminated the blood of every American, yet the diplomacy of the Ethyl Corporation successfully and aggressively promoted the engine-enhancing properties of leaded gasoline while minimizing its dangers.⁶⁸ Automobile manufacturers engaged in their own diplomacy and insisted that altering engines to use unleaded gasoline would bankrupt companies and make cars too expensive for consumers. Shortly after Congress mandated reduced auto emissions, however, lead-eschewing catalytic converters were inexpensively incorporated into new cars.⁶⁹ Blood lead levels fell drastically,⁷⁰ and the clean air movement that had begun in Donora continued to grow.

Further clashes between public debate and industrial diplomacy arose when many substances approved for wartime use were suddenly without markets after WWII. Untested chemicals flooded the environment⁷¹ and industry’s familiar tactic of “spill, study and stall”⁷² allowed toxic materials to be widely used for years. In 1962, Rachel Carson’s *Silent Spring* ignited the fledgling ecological awareness inspired by Donora into a sweeping grassroots movement. Carson challenged corporate diplomacy and allowed the public to enter the pollution debate alongside scientists and regulators. US citizens demanded environmental cleanup, and elected government officials took heed.⁷³

The evolution of the Clean Air Act illustrates the shifting of federal concern from corporate to public interests in the matter of pollution control.⁷⁴ The 1955 and 1967 Air Quality Acts were ineffective^{75,76} because industry successfully argued that corporations, not government, could most successfully monitor toxins.⁷⁷ Unfortunately, although companies like DuPont supported pollution controls, business leadership did not alter its pay-for-performance policy toward supervisors.⁷⁸ The natural result was that the local plant managers who could have implemented environmental change were given neither the incentives nor the resources to do so. Companies continued to foul the air, and both Congress and the public came to suspect industry's environmental sincerity. Widespread mistrust of previously accepted corporate diplomacy resulted in both the first Earth Day celebration and the sweeping reforms of the 1970 Clean Air Act.^{79,80} This law set federal air standards and the Environmental Protection Agency received the power to enforce these standards.⁸¹

The events at Donora launched not only debate over pollution's medical and environmental effects, but of monetary consequences as well. In the initial years after the killer smog, politicians invoked the name "Donora" in order to obtain regulatory power over industry and funding for cleanup.^{82,83} Eventually, however, lawmakers mentioned "Donora" as a warning to temper ecological zeal in order to avoid economic catastrophe.

For Donorans, the public debate over pollution was a matter of both physical and financial survival. Immediately after the disaster, many townspeople refused to talk to health investigators for fear of losing their jobs. Although victims of the smog filed over \$4.5 million in lawsuits, the company settled for a mere \$235,000.⁸⁴ Most Donorans were embarrassed by the whole affair and associated international notoriety.^{85,86} The citizens continued to support the company, even though property values plummeted after the smog. By 1957 Donora's zinc works closed. Within ten years the steel mill relocated, putting 5,000 people out of work and out of Donora to seek employment elsewhere.⁸⁷ One resident remarked, "People were angry when the company pulled out. After all we lived through; they left us high and dry."⁸⁸ For years corporate diplomats had blocked federal pollution standards by insisting only local governments could enforce controls, allowing industrial transfer to areas with more favorable laws. Donora's economic ruin stimulated universal standards that discouraged relocation. Industry's contention that pollution control cost too much and stifled profitability was likewise dismissed when a revolutionary study by two economists showed how air pollution actually COST the country far more than clean up would.⁸⁹ The point was moot for the poverty-stricken families of Donora. Eugene Berestecky recalls his mother's grief that "the best she could give her children for Christmas were broken toys from the Salvation Army."⁹⁰ Donora lost two-thirds of its population and practically became a ghost town.⁹¹

The catastrophe of Donora illustrates the medical, environmental and economic consequences of the conflict between public debate and corporate diplomacy over air pollution. Although much good in the form of improved air quality has come from Donora's tragedy, the earth is hardly toxin-free.⁹² Humanity still endures "ozone alert days" in the US, toxic sludge in Hungary,⁹³ and 300,000 annual smog-

related deaths in China.^{94,95} Ecological and corporate interests still clash over Marcellus shale,^{96,97} and “spill, study and stall” remains a time-honored tradition. If one visits Donora today, lush trees grow on the once barren hillsides, and the sky is blue instead of charcoal grey. And yet, in the midst of joyful signs of life there also is sadness at the death of a once-vibrant town. Boarded windows and nearly empty streets have replaced thoroughfares crowded with shoppers sporting Donora Dragons’ orange and ebony colors. The high school, services stations and cinema all closed years ago. Devoid of children playing, Donora endures its own “silent spring.”

Notes

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One of many articles in the Pittsburgh paper immediately after the disaster. This early report showed how at that time the public definitely implicated the zinc works.

Carson, Rachel. *Silent Spring*. Boston: Houghton Mifflin, 1962.

Carson writes clearly and compellingly of the dangers of modern chemicals to humans as well as the world at large. Her book became a best-seller and its influence could not be silenced by industry. Eight years after its 1962 publication the first Earth Day was celebrated in the US.

Cioccio, Antonio and Donovan Thompson. "A Follow-up of Donora 10 Years After: Methodology and Findings." *Journal of Public Health* 51, no. 2 (February 1961): 155-64.

This article looked at the difference in ten year mortality between those who were acutely ill and lived and those who were not acutely ill during the 1948 episode. The results were stratified based upon the age group examined—younger people showed a difference, older people did not, which may have been due to the fact that chronic long-term exposure already adversely affected the longevity of the older population, a possibility that was not considered. This study was used by both those who implicated pollution as a health hazard and those who vindicated it, showing clearly how the same exact science can be used to different ends when certain aspects are chosen rather than a complete view. What was interesting was that the authors did not consider the affect of long-term exposure of pollution on a day to day basis in their analysis and did not look at individuals who did not have such an exposure.

Davidson, Bill. "Airborne Disaster." *Collier's Magazine*, October 23, 1948. <http://www.gono.com/adart/colliers/collierscoverspage2.htm>.

Prophetic article detailing the incidents of a deadly smog due to temperature inversion in the Meuse Valley of Belgium in 1930. The Belgium smog sickened 6,000 and killed 63. Mr. Davidson correctly predicted that a similar occurrence was possible in the United States.

Davies, Lawrence. "Los Angeles Fog is Laid to Public: Industry-Sponsored Research Finds Population Produces Most of Impurities." *New York Times*, February 21, 1951. Accessed January 14, 2011. <https://eee.uci.edu/clients/bjbecker/SpinningWeb/week9d.html>.

Industry is blamed for 40% of the material in the atmosphere in Los Angeles. These results may have adversely affected plaintiffs' lawsuits in Donora, although the two geographical areas are not comparable. The "smog problem, which has caused growing concern along with eye irritation and poor visibility in Los Angeles County in recent years, was labeled today one for which industry and the public must share responsibility" according to the article.

H. B. DuPont, "Management Looks at Air Pollution," Proc. Second National Air Pollution Symposium, Pasadena, May 5-6, 1952, pp. 58-61.

DuPont reveals an important point about industry's view on regulation—the less, the better. Companies believed they were the best organizations to handle pollution problems. DuPont said, "It seems clear to me that our greatest promise in abating pollution lies in giving full reign to advancing technology. As Americans have found in every field, it is invention and development, not legislation or regulation, which has proved our most reliable instrument of progress."

Ellis, Paul F. "Donora Becomes a Laboratory for the Scientific Investigation of Fumes." *Herald American* (Donora), November 5, 1948.

This article notes that air sampling stations will be placed in Donora and other areas in the Mon Valley. Donora is also to be studied regarding population response to a crisis. "Meanwhile, Donora townspeople are losing their fears. At no time, however, was there panic in the town. Many became sick, but none became hysterical. The US Army sent representatives here to investigate the action of the population during the smog. The military wants to know what might happen to the population of a town should it be attacked by chemical bombs. The army's report, of course, will remain secret."

England, King. *Declaration to London*. By Charles II. London, 1666.

Charles II expressed sorrow for the destruction of much of London due to the fire in 1666. He also suggested that smoke-producing industries be rebuilt in a nonresidential section of the city to improve the health of the populace. His suggestions were ignored.

Herald American (Donora). "Death Notices." November 1, 1948.

There were 19 obituaries on this date, and 8 hospital admissions overnight. I looked at the microfilm records of the vital statistics for the months before and after the disaster. In a small town where everyone knew everybody else, a single death or hospital admission was big news. A death toll of this degree was staggering.

Herald American (Donora). "Dewey Concedes Election to President Truman." November 3, 1948.

The election pushed all the smog news from the front page except for one tiny notation, "Three smog victims to be buried today." The nation had many concerns besides the air.

Herald American (Donora). "Donora Zinc Works to Resume Operations Monday." November 5, 1948.

Dr. Duncan Holady, representing the Industrial Hygiene Division of the Public Health Service worked with Dr. Townsend. After sampling air over the previous few days (the smog had cleared by then), they state that there was no evidence to incriminate the zinc plant and it could go back to full capacity. Mr. Neale, the plant manager is quoted, "we were deeply grieved by this disaster, and we closed the plant as evidence of our desire to cooperate in every way possible with the investigation. It becomes clear now that it would serve no further purpose, since today's report..." 600 employees would return to jobs. None died and none were absent. Nine employees were treated in hospitals.

Herald American (Donora). "Hospital Admissions." October 29, 1948.

On this day, there were four admissions and one death by the AM publication of the paper. The deaths would rise later this day, but the local newspaper would not be printed again until Monday morning, and this edition was Friday AM.

Herald American (Donora). "Hospital Notes." November 4, 1948.

7 more admissions overnight and 4 new deaths were reported. I found this information by looking at the microfilm editions of the local paper which are available only at the Public Library of Donora, PA.

Herald American (Donora). "Local Hospitals." November 10, 1948.

There were 13 admissions to local hospitals on today's date, a week and a half after the smog dissipated. This reveals the continued illness associated with the acute incident that was not officially counted as due to the original event.

Herald American (Donora). "Obituaries." October 27, 1948.

There were no deaths and only one hospital admission noted on this day, the first day of the smog. This was consistent with the usual number of admissions and deaths for the weeks before the incident. In the small town of Donora, it was real news when someone either was admitted to the hospital or died.

Herald American (Donora). "Week's Visit at North Carolina Resort Offered to 50 Smog Sufferers." November 3, 1948, p. 2.

There was a delay in the trip due to questions about the legality of free airplane tickets, but eventually some smog survivors did go to the North Carolina resort. This source reveals how the nation felt solidarity with the people of this small Western PA town.

Isiminger, Roselynn. "Community Project Number 1." Editorial. *Herald American* (Donora), November 2, 1948.

The editor of the newspaper noted that Donora "over the past few days has been the object of nationwide publicity...which has placed our community in an unfavorable spotlight." She notes that the opportunity exists for Donora to take the lead in preventing such disasters not only for themselves, but for "others who live in industrial areas." She also notes that it is time to stop blaming it on an act of God. She states, "It is true that man cannot stop the rains; cannot keep clouds from forming; cannot prevent the creation of fog on the river and its banks. But again, this merely intensifies the stubbornness of our problem, we do live a river valley, we do live an industrial area, we do live in a section in which fog is prevalent—but so does the killer. We cannot be content just to pray for high winds and lowering temperatures to drive him away. We can not blame it on the Deity and call for another act of God to save us."

Isiminger, Roselynn. "Numerous Suggestions for Preventing Recurrence of Smog Disaster." *Herald American* (Donora), November 4, 1948.

The editor notes that she disagrees with suggestions to rebuild the town further up the mountain. She also criticized those who suggested that the town was at fault for being built where it was in the first place, next to the zinc works, by rightly pointing out that the town was in existence BEFORE the zinc works ever arrived.

Lanza, AJ. "Health Aspects of Air Pollution" (paper presented to Smoke Prevention Association of America, Birmingham May 24, 1949).

This source was quoted multiple times in other sources. It shows the incredible arrogance and denial of industry. Lanza notes, "The common industrial poisons do not affect the general population as a result of atmospheric pollution... On rare occasions mother nature has played us false, and we have had the chain of circumstances that contributed such episodes as Donora..." He ate those words a few years later.

Mills, Clarence A. "Comments and Communications; Dr. Mills' Rejoinder." *Science* 112 (July 21, 1950): 93-94.

Dr. Mills helps to clear up some misconceptions that his original article brought as expressed in correspondence to the editors of the prestigious journal *Science*.

Mills, Clarence A. "Comments and Communications; The Donora Episode." *Science* 111 (January 20, 1950): 67-68.

A well-respected physician from the University of Cincinnati Medical School, Dr. Mills could not be easily dismissed when he implicated the zinc works in the Donora deaths. This original publication was cited by many newspapers nationally.

New York Times. "4,000 London Fog Deaths; British Statistician Reports on Toll in December." February 13, 1953, sec. 3.

Brief report indicating the great death toll during the London fog of 1952. This source gave me information for another source in the *Lancet* of the same year.

New York Times. "Donora Smog Held Near Catastrophe: Expert Asserts Slightly Higher Concentration Would Have Depopulated the Community." December 25, 1948.

Clarence Mills, a highly respected physician from the University of Cincinnati's medical school was quite clear on the danger of the smog and that the zinc mill caused it. His views were feared and discounted by the industry executives.

New York Times. "Extension Urged of Anti-Smog Bill." November 21, 1958.

Even at the time, cancer and chronic respiratory conditions were thought to be CAUSED by pollution. Automobiles and private sources of pollution are cited as well as industry. Arthur S. Fleming, Secretary of Health, Education, and Welfare shares his recommendation that the original scheduled end of the Air Pollution enforcement for 1960 be removed and that no expiration date be set.

New York Times. "New Smoke Rules." October 26, 1953.

New York tries to cut down on its smoke problem by limiting incinerator use by apartment tenants. The cost for replacing the incinerators would be split between apartment owners and the tenants, who would also have to adjust their behavior.

New York Times. "Donora Disaster Spurs Smog Tests." November 12, 1949.

G. Edward Pendray of the New York public relations firm of Pendray & Leibert notes it is a mistake for an industry causing pollution to deny it. Rather, he says, the company should be ready to cooperate honestly with the community in a program to clean up the air and streams. If industries fail to accept their responsibility, the result would be very expensive. Mr. Pendray asserts they could look forward to being forced to do by regulation what they should have done long ago voluntarily. "No money will be saved in the end," he says, "and good public relations will have been lost. A survey of fifty leading companies showed that they had spent \$35,000,000 on pollution control since 1947 and planned to spend \$32,500,000 more in the next two years..."

New York Times. "Text of President Eisenhower's Health Message to Congress." February 1, 1955.

President Eisenhower does not mention Donora in his speech, but does promise federal funds to study air pollution. Water pollution control by this time was much more developed and advanced than air pollution.

New York Times. "Too Gentle Against Smoke." February 19, 1957.

New York has had an increase in incinerator smoke production in spite of regulations. Voluntary efforts have not worked, so legal action will now be taken against residents who fail to obey the statutes. Donora's problems spurred action elsewhere.

New York Times. "US Official Warns on Air Pollution." January 6, 1950.

Smoke, smog, and soot are health problems, and are no longer considered "mere nuisances," J.J. Bloomfield, assistant chief, Industrial Hygiene Division, United States Public Health Service, declares in this article. He also notes that New York is different than Donora—cars and buses are more of a problem. This is interesting since two years earlier he and Dr. Townsend had concluded that nature and not the mill caused the deaths in Donora.

"PENNSYLVANIA: Death at Donora." *Time*, November 8, 1948, 14. Accessed September 13, 2010. <http://www.time.com/time/magazine/article/0,9171,853334,00.html>.

This article in *Time Magazine* showed how national interest in the tragedy of the small Pennsylvania town had quickly spread. Again, the zinc works was clearly mentioned as a probably cause, although the article notes that such was not definitely proven. Dr. William Ronagaus is quoted as saying of the zinc works, "It's just plain murder."

"Personal Interview with Dr. Charles Stacey." Interview by author. August 10, 2010.

Dr. Charles Stacey was 16 and attended the Donora high school during the 1948 smog disaster. He later became the Superintendent of Schools. Dr. Stacey was wonderful to talk to—very enthusiastic, and he gave me a tour of the entire Donora Smog museum. He said that he could easily see the football players during the game that weekend in 1948, since the field was at a high elevation—it was down in the valley that the killer smog was really terrible. He described the Donora of his youth and helped me imagine the vibrant, bustling town that produced famous baseball player Stan Musial among others.

Pittsburgh Post-Gazette. "Donora Residents Calm In Spite of Fatal Smog." November 1, 1948.

This article affirms what the primary interviews already told me—that the Donora residents in 1948 were hardy and resigned to deal with adverse air conditions.

Pittsburgh Post-Gazette. "Six of Smog Victims Buried as Sun Shines." November 3, 1948.

This moving article has poignant illustrations, including a famous, often reproduced photo of a funeral procession under November sunshine to the Donora cemetery for a victim's burial.

Pittsburgh Post-Gazette. “Smog Death Toll Rises To 20 in Donora: Mist Begins to Lift Slightly.” November 1, 1948.

By November 1, the initial smog had lifted, and the “official” death toll was 20. Of course, there were more people who were sickened and who would die over the next few weeks and months directly due to the smog.

Pittsburgh Post-Gazette. “Steel Company Pays \$235,000 to Settle \$4,643,000 in Donora Smog Death Suits.” April 17, 1951.

This article notes that while American Steel and Wire company paid out of court settlements, the company did not admit responsibility, and rather laid it on the “freak weather conditions.” The article also notes that Donora property values had fallen nearly ten percent since the disaster.

Pittsburgh Press. “Donora Mill Twice Sued over Fumes.” November 1, 1948.

This interesting article notes that even at the time of the disaster the zinc works were indeed targeted for blame. In fact, they had been sued multiple times in the past by farmers and citizens of the town of Webster, across the river from the plant.

Pittsburgh Press. “Donora Smog Deaths Probed.” November 1, 1948.

This article details initial public outrage and unwillingness to accept a theory of “an act of God” as the cause of the disaster.

Pittsburgh Press. “Father Collapses, Dies in Son’s Arms: Five Orphaned By Donora Smog.” November 1, 1948.

This moving article described the death of the youngest of Donora’s immediate casualties, a 52 year old father who suffered with asthma.

Pittsburgh Press. “Fog-bound City Champ in Disguise: Smoke Control Proves Its Worth.” November 1, 1948.

This article lauds the smoke control efforts that had been put in place in Pittsburgh by mayor David Lawrence. According to this piece, if not for these measures, Pittsburgh may have suffered a similar death toll as Donora during the foggy days in 1948.

Pittsburgh Press. “Smog-Born Plague Kills 17 in Donora; Hospital Overcrowded.” October 31, 1948.

The Pittsburgh Press was published on Sunday, unlike the *Post-Gazette* and the local Donora papers, so the *Press* had the first “scoop” on the deadly smog. At the time of this article, the last three immediate victims were critically ill but still alive.

Pittsburgh Press. "Writer Foresaw Donora Disaster: Article Recalled Belgian Experience." November 1, 1948.

An interesting notation of how an eerily prophetic piece written earlier the same month of the Donora disaster predicts that such a thing could occur. The original article in *Collier's Magazine* mentions a deadly temperature inversion that occurred several years earlier in an industrial valley in Belgium.

"Pliny Writes about His Father at Vesuvius." Younger Pliny to Tacitus. lxxv. Accessed January 3, 2011. <http://ancienthistory.about.com/od/pompeii/a/PlinyPompeii.htm>.

Pliny the Younger writes of how his father originally was curious about the smoke across the bay at Mt. Vesuvius, but changed his scientific mission to a rescue mission when he received a plea for help from a relative who was trapped in Pompeii. Pliny captained the fleet and rescued many citizens, eventually staying behind in a burning homestead so that his men could go to safety. The next day he was found without bodily marks, seeming to be asleep, but clearly dead of "some toxic vapour."

Rumor of Blue Sky. Produced by Janet Whitney and Andrew Maietta. Performed by Dr. William Rongaus and 24 Others. Pittsburgh: Keystone Film Group, 2009. DVD.

This compilation of remembrances of 24 survivors of the 1948 Donora disaster is a non-narrated collage of primary source interviews. Many of the participants have died since the making of the video, and so their memories are irretrievable elsewhere. The great love these ordinary people had for their community is evident, as well as the strength of their individual spirits and their concern for their neighbors. This was my most valuable primary source along with my interview with Dr. Stacey.

Sadtler, Philip. "Industrial News: Fluorine Gases Blamed for Death and Chronic Poisoning in Donora and Webster, PA." *Chemical and Engineering News* 26, no. 50 (December 13, 1948): 3692-695. Accessed January 14, 2011. <http://pubs.acs.org/doi/pdf/10.1021/cen-v026n050.p3692>.

The abstract reads: "Circumstantial and actual proof has been found of acute fluorine poisoning by the smog in the Monongahela River Valley to persons who already had chronic fluorine intoxication... Most of the well-known symptoms of acute fluorine poisoning were found by members of the medical profession who examined victims of the smog, Philip Sadtler, consultant, discovered." Dr. Sadtler himself noted that the PHS official at the Donora site told him he was right, but to forget it. Dr. Sadtler, who had been a regular contributor to the *Chemical and Engineering News* magazine for years, was black-listed after his report was published.

Smith, Tony. "Death Smog Eyed Closely By Washington: All Public Disasters Carefully Checked." *Pittsburgh Press*, November 1, 1948.

This article by a Washington correspondent of the time illustrates the initial trust the populace had that the Federal government would thoroughly investigate the disaster and prevent recurrences.

“Smoke Control” Lois Bainbridge to Governor James T. Duff. October 31, 1948. Webster, PA.

Mrs. Bainbridge notes that the zinc works has been making the air foul for some time, even before the current disaster, and the fumes “peeled the paint off the houses.” While Mrs. Bainbridge acknowledges that the men in her family and of many other families depend upon the zinc works for their jobs, she also notes that their jobs are not worth peoples’ lives.

Townsend, James G. “Investigation of Smog Incident in Donora, Pa., Vicinity.” *American Journal of Public Health* 40 (February 1950): 183-84.

Townsend reveals more about his desire to create a new organization for public health research than the actual Donora tragedy. Townsend’s agenda was less concerned with air pollution per se but more with broader aspects of public health and obtaining federal funding for those projects.

United Kingdom. Ministry for Welsh Affairs. Home Department. *Air Pollution*. By Sir Hugh Beaver. Vol. 53. Series 333. London: Her Britannic Majesty’s Government, 1953.

The British Government wanted to look like they were doing something, so they gave out masks and set up warning systems. What they eventually did, after considerable time and expense, was to find cleaner fuels to burn and better furnaces for the people.

United States of America. Federal Security Agency. *Air Pollution in Donora, Pa., Preliminary Report*. 306th ed. Public Health Bulletin, 1949.

This report is hundreds of pages long and includes photos, autopsy reports, and air sample measurements (all taken, naturally after the disaster). It represents over \$860,000 of federal money, or the entire sum allotted to the Industrial Hygiene Program by the Federal Government for the year 1949. It was meant, as the title suggests, to be a preliminary report with follow up studies to be planned, but funding was cut. The disappointing conclusion of the report was to deny a specific cause for the disaster and to merely institute a warning system for evacuation in the future.

Secondary Sources

Aubele, Michael. “Impact Fees a Ray of Hope.” *Valley News Dispatch* (Tarentum), March 25, 2011, A3.

The author of this article reports how many organizations hope to fund pet projects, such as firefighting training, by revenue from the Marcellus shale industry fees. Looking at sources such as this, (of which there are many every day in the paper) show me how environmental issues are debated today and that economic concerns are important not just to industry, but to the public as well. This is similar to what I found when researching Donora.

Bell, Michelle and Devra Davis. "Reassessment of the Lethal London Fog of 1952: Novel Indicators of Acute and Chronic Consequences of Acute Exposure to Air Pollution." *Environmental Health Perspectives*, S3, 109 (June 2001). <http://ehp.niehs.nih.gov/members/2001/suppl-3/389-394bell/bell-full.html>.

The authors re-examine the effects of the 1952 London Fog. The data not only indicate that acute severe pollution causes long term as well as acute deaths, but that lower levels of pollution over time can cause increased deaths as well.

Bryson, Chris. "The Donora Fluoride Fog." *Earth Island Journal*, Fall 1998. Accessed January 13, 2011. http://www.donorasmog.com/newsarticles_files/articledonorafluoridefog.htm.

This article shows how over time those who did not forget about Donora re-evaluated the cause as fluoride, which is now accepted as most probable. Of note is the fact that the author of this article interviewed Dr. Sadtler, who was an investigator of Donora in 1948 and the first to hypothesize the role of fluoride. Dr. Sadtler was vilified and lost much of his scientific reputation over the incident. Mr. Bryson quotes an interview of Philip Sadtler, taped shortly before his death in 1996. "Sadtler blamed fluoride for the Donora disaster in an account published in the December 13, 1948 issue of *Chemical and Engineering News*. He reported blood fluorine levels of dead and hospitalized citizens to be 12 to 25 times above normal, with "primary symptoms of acute fluorine poisoning, paroxysmal nocturnal dyspnea found in hundreds of cases." He recommended that, "Changes should be made in suspect processes to prevent emission of fluorine-containing fumes." The industry moved quickly to silence Sadtler, who had been a contributor to *Chemical and Engineering News* for many years. "I had a call from the editor that I was not to send them any more [articles]," Sadtler said. According to Sadtler, the editor of *C&EN* told him that the head of the Alcoa and the US Steel-funded Mellon Institute, one Dr. Weidline (who also had served as a director of the American Chemical Society) "went to Washington and told [the magazine's editors] that they were not to publish any more of what I wrote."

"Clean Air Act | US EPA." US Environmental Protection Agency. September 22, 2010. Accessed January 13, 2011. <http://www.epa.gov/air/caa/>.

This site has the entire 5,672 page text of the 2008 Clean Air Act in pdf format as well as some history of the legislation over the course of the last 42 years. The site was not as useful as others which condense the material, and was difficult to navigate. In fact, this site had a lot of "back patting" of the EPA for itself, in this author's opinion.

"Clean Air Act." American Meteorological Society Home Page. Accessed January 2, 2011. <http://www.ametsoc.org/sloan/cleanair/>.

This is a much better site than the EPA's for details of all the clean air legislation in the US. Additionally, the site notes some of the historic problems associated with air pollution dating from the Middle Ages and has a lot of links. This is a great place to get started in research of air pollution. This site breaks down all of the major points of each piece of legislation into readable terms.

“Clean Air Research: Then, Now, and Future.” Epa.gov. September 20, 2010.

The EPA site mentions Donora as the impetus for the Clean Air Act. However, it does not go into detail how the events at Donora shaped public policy in the years immediately following the 1948 smog.

Davis, Devra Lee. *When Smoke Ran Like Water: Tales of Environmental Deception and the Battle Against Pollution*. New York: Basic Books, 2002.

Dr. Davis grew up in Donora after the 1948 smog and her career has been in public health effects of environmental exposures. She relates how the science of public health developed, including study design and statistics, all of which were necessary to establish causality in the study of the health effects of various forms of pollution. Dr. Davis then describes various modern menaces, from lead, to DDT, and even global warming. Her book provided a wonderful perspective for my thesis and also a great bibliography.

Davies, W. H. *Blind Man's Fog*. 1913. Poem, London.

This is a wonderful poem that describes how London's fog was awful even many years before the 1952 disaster. Indeed, in this poem, a blind man had to lead the poet to his own home due to the blinding fog.

“DEP: Timeline of Top 40 Environmental Accomplishments.” CT.gov Portal. 2010. Accessed December 26, 2010. http://www.ct.gov/dep/cwp/view.asp?a=2688&q=456018&depNav_GID=1511.

A history of not only the Clean Air Act, but also of other environmental achievements in the US during the last 5 decades.

“Donora, Pennsylvania (PA 15033) Profile: 2010” Accessed August 10, 2010. <http://www.city-data.com/city/Donora-Pennsylvania.html>.

This site gives current information about Donora, including income, population, etc. It is sad to see how this once thriving community is practically a ghost town, something that I was able to witness with my own eyes during my many visits there.

Hardy, Thomas. *A Wife in London*. 1899. A Poem of the Boer War.

This poem by Thomas Hardy describes the anguish of a recently widowed wife who receives posthumously a letter written by her soldier husband before he died. The thick London fog is an important element in the poem.

Helfand, William, Jan Lazarus, and Paul Theerman. “Donora, Pennsylvania: An Environmental Disaster of the 20th Century.” *American Journal of Public Health* 91, no. 4 (April 2001): 553.

This brief article gives Donora the credit for mobilizing public support for pollution control, although other sites as noted in this bibliography imply that things weren't so simple. The article also has a very poignant photo of the Donora mill, spewing out fumes behind a sign that says, "Donora: Next to yours, the best town in the USA."

Hess, David, David Templeton, and Jeff Gamage. "Donora Smog of 1948." Donora Fire Company. 2007. Accessed August 9, 2010. <http://www.donora.fire-dept.net/1948smog.htm>.

This website is an excellent starting place for anyone who wants to research Donora's smog disaster. It details not only the local events of 1948, but also describes some of the later, far-reaching consequences. The contributors include the Secretary of the EPA as well as reporters and historians.

"History | Clean Air Act | US EPA." US Environmental Protection Agency. Accessed November 1, 2010. http://www.epa.gov/air/caa/caa_history.html.

A brief history of the dates of US legislation for air pollution control. No mention of Donora is made.

Kahn, Joseph and Jim Yardley. "As China Roars, Pollution Reaches Deadly Extremes." *New York Times*, August 25, 2007. Accessed January 20, 2011. <http://www.nytimes.com/2007/08/26/world/asia/26china.html>.

"No country in history has emerged as a major industrial power without creating a legacy of environmental damage that can take decades and big dollops of public wealth to undo." The article notes that China has superseded every other nation not just in its rapid economic rise, but also in its terrible pollution. "But just as the speed and scale of China's rise as an economic power have no clear parallel in history, so its pollution problem has shattered all precedents." Air pollution is the cause of hundreds of thousands of deaths a year in China.

"Killer Smog." In *When Weather Changed History*. The Weather Channel. November 2008. Accessed January 14, 2011. <http://www.weather.com/tv/programs/When-Weather-Changed-History.htm>.

These two video clips from the episode on the Donora Fog gives the clearest and best illustrated explanation of a temperature inversion.

Lave, Lester B. and Eugene P. Seskin. "Air Pollution and Human Health." *Science* 169, no. 3947 (August 21, 1970): 724-33.

The authors of this article were economists, and they were the first ones to identify the terrible financial cost of air pollution. They argue that cleaning air pollution would not only be good for health, but would save the country a significant amount of money. This article created a lot of angry debate, especially among physicians and chemists who thought the authors had little business discussing a health-related field.

However, their data was correct and they also published a book-length report which could not be disputed. This source was very important to me because now everyone talks about healthcare costs, and I was surprised to find out that this was NOT always the case—in fact, these men were among the first to bring this idea into national discussions. This revolutionary article pioneered the now well-accepted practice of calculating actual money costs of illness.

“Mapping Mortality: Part I—A Special Report on Air Pollution.” Mapping Mortality: Part VI—A Special Report on Air Pollution. Accessed January 1, 2011. <http://multimedia.post-gazette.com/MappingMortality/PartI/default.asp>.

This is an exciting multimedia site which describes the continuing toll of pollution in Western Pennsylvania. This site has many links to historical photos, current videos, mortality maps and other resources. This fascinating ongoing project shows how pollution control still has a long way to go. In fact, Western PA still has some of the dirtiest air in the US.

“National Ambient Air Quality Standards (NAAQS) | Air and Radiation | US EPA.” US Environmental Protection Agency. June 3, 2010. Accessed February 1, 2011. <http://www.epa.gov/air/criteria.html>.

This site delineates the 6 categories of air pollutants subject to national regulation, namely ozone, carbon monoxide, lead, sulfur dioxide, and particulate matter of various sizes. A distinction is made between primary standards, (the level at which human harm is seen acutely) and secondary standards, (the level at which damage to crops, livestock, and property is seen). Primary standards are generally lower than secondary standards.

New York Times. “Text of President Johnson’s Message to Congress on Pollution and Resources.” January 31, 1967.

This speech to Congress was precipitated by an episode of smog in New York City, caused by many sources. The fact that air pollution caused health effects was well known by this time, but the means to correct the problem was still heavily debated. Both industry and the public were unwilling to do all that was necessary. A revision of the 1955 Air Quality Act was passed later this year, but it was still a very weak law.

Passow, Stephen and Patricia Francis. “Outline.” Proceedings of Corporate Diplomacy: Negotiation Skills for Business Executives Operating in Today’s Volatile Global Business Environment, Canterbury. Canterbury: Kent School of Business, 2009. <http://www.kent.ac.uk/politics/carc/Corporate%20Diplomacy%203.pdf>.

This outline for a recent business conference gave me the concept I used for “corporate diplomacy,” which is quoted in my paper. Although the conference is modern, all of the techniques listed were used by corporate “diplomats” in the fight for clean air in order to “advance their objectives.” This definition of corporate diplomacy is neither positive nor negative, just as the results of such diplomacy can be either beneficial or detrimental.

Ross, Benjamin and Steven Amter. *The Polluters: The Making of Our Chemically Altered Environment*. Oxford University Press, 2010.

An excellent book which provided a lot of insight on how the chemical industry has grown over the past century and the tactic of “spill, study, stall” was invented and perpetuated. This book details not only the struggle to control air pollution, but also other environmental toxins. It was my most valuable secondary source along with the Davis book.

Slalina, Sjaak. *Encyclopedia of Earth*. May 13, 2008. Accessed January 20, 2011. http://www.eoearth.org/article/Air_pollution_in_China.

This article shows how it seems every country must relearn for itself the hazards of, and solutions to, air pollution as industrialization occurs. China has a high percentage of the most polluted cities on the planet, and although other countries have demonstrated that successful and economic solutions to the problem exist, these measures are only beginning to be used in China.

Snobbs, Neal T. “Killer London Smog of 1952.” World Weather Information—The Essential Guide for Travelers. October 24, 2010. Accessed January 20, 2011. <http://www.world-weather-travellers-guide.com/london-smog.html>.

This is a great article that shows the truth of the adage that if we don't learn from history, we are condemned to repeat it. London's 1952 smog disaster killed thousands of people, and still various groups argued over the importance of air pollution as a health hazard, in spite of the additional lesson of Donora several years earlier. This article also has a very clear description of the causes of the smog, which included mostly non-industrial coal fires, as well as a temperature inversion, automobiles, and to a lesser extent, industrial causes.

Snyder, Lynne P. *The Death Dealing Fog over Donora, Pennsylvania: Industrial Air Pollution, Public Health and Federal Policy, 1915-1963*. Diss., University of Pennsylvania, 1994. Ann Arbor: UMI, 1994.

This dissertation is very complete for the history of Donora from its beginning though the early stages of the Clean Air Act. What is most useful about this source was Snyder's assertion that Donora was used for many ends by many people, and I agree with her assessment. The source also has a great bibliography that I used to find some useful primary sources.

Sullivan, Walter. “Muskie Congressional Record: CAA Debate.” Edmund S. Muskie Archives. February 15, 2006. Accessed January 14, 2011. <http://abacus.bates.edu/muskie-archives/ajcr/1963/CAA%20Debate.shtml>.

Verbatim transcript of the final senate discussion on the occasion of passage of the Clean Air Act of 1963 includes great quotes from Senator Muskie. “Air is life. We all know that we need fresh air every few seconds if we are to live.” Regarding travel, the senator notes, “Major turnpike crashes were attributed to poor visibility caused by air pollution. Air pollution, aggravated by atmospheric conditions, has increased

transportation costs for air carriers. . . To these health and economic hazards we may add the nuisances of irritated eyes, unsightly haze, soiled clothing and buildings, and unpleasant smells. Air pollution makes life difficult, costly and unpleasant.” Senator Muskie concludes, “Our population is increasing and our standard of living is going up. Our industries, homes, and office buildings and motor vehicles take the air, combine it with fuels and return the air-polluting compounds to the air. The more we prosper, the more we foul the air we breathe.”

Szabo, Sandor H. “Official: Hungary’s Toxic Sludge Reaches the Danube River—USATODAY.com.” *News, Travel, Weather, Entertainment, Sports, Technology, U.S. & World—USATODAY.com*, October 7, 2010. Accessed January 15, 2011. http://www.usatoday.com/news/world/2010-10-06-hungary-toxic-sludge_N.htm.

This source includes a video clip of the recent ecological disaster in Hungary. There has been a lot of debate about whether or not this waste was toxic, even though thousands of fish, animals, and tens of people died. The reservoir wall is cracked, and there may be future danger as well. Blame is being debated on human error vs. the aluminum company. Some things never change.

“Timeline of the Clean Air Act.” Environmental Defense Fund—Finding the Ways that Work. 2009. Accessed January 13, 2011. http://www.edf.org/documents/2695_cleanairact.htm.

A nice timeline which also includes some information on litigation in the last twenty years.

“U.S. Town Demolished over Lead Contamination.” Online Posting. April 18, 2006. Reuters.

This news release contains information about the persistence of environmental lead in the current day. From this I learned that even if people learn about the dangers of pollution, they often choose to ignore them until lives or property are lost.

Verace, Tom. “Panel Discounts Drilling Dangers; Some Residents Wary as ‘frack’ Water Recycling, Dilution Touted.” *Valley News Dispatch* (Tarentum), March 25, 2011, A3.

The author of this article reports on a recent town hall meeting of Allegheny Township, which is near my home. Citizens discuss their fears that merely diluting frack water, as the company spokesmen want to do, will merely spread environmental poisons. The arguments noted here sound very familiar to those in my sources on air pollution.