The History of Air Pollution Control in Cincinnati, Ohio

The Early Years (1880s – 1920s)

By the late 1880s, Cincinnati was the largest city in Ohio with almost 300,000 people. Its unique distinction was being the most densely populated city in the U.S., with an average of 37,100 people per square mile. Cincinnati was a major center for industrial production of iron products, meat packing, cloth production, leather goods and farm implements for consumers throughout the Ohio River Valley. The city was also a transportation hub with more than 15 railroads connecting Cincinnati to other parts of the U.S. The city was also served by a fleet of riverboats plying the Ohio River between Pittsburgh, Pennsylvania and Cairo, Illinois.

As early as the 1880s, smoke from manufacturing and transportation sources was an irritant to community residents. The bituminous coal burned in most factories, locomotive boilers, and household furnaces created a thick, black, oily smoke that deposited sulfur, nitrogen, and carbon compounds on everything it touched. Like other Ohio and Mississippi River towns, Cincinnati was built in a valley surrounded by hills. As a result, coal smoke tended to lie in the basins and valleys and sometimes took days to dissipate.[1]

Smoke prevention in the late nineteenth century and early twentieth century was often a collaborative effort among representatives of a progressive political community, women's and civic clubs, and professional engineers. These groups united in lobbying municipal governments to pass tough smoke-control ordinances -- mostly to combat the effects of burning coal for use in homes, industry and transportation. Cincinnati was no exception.

Cincinnati passed its first smoke ordinance in 1881 -- one of the first cities in the nation to regulate the production of smoke.[2] The ordinance required that furnaces operated in the city be equipped with "....*efficient smoke preventatives as to produce the most perfect combustion of fuel or material from which smoke results*."[3] The smoke-preventing devices reduced the level of smoke produced by the boilers but did not eliminate it. What these smoke-preventing devices were was never mentioned. The Report of the Fire Escape and Smoke Inspector City of Cincinnati for the Year Ending December 31, 1886 reported that 257 abatement notices were issued for smoke nuisances that year. Only 32 companies actually installed smoke-preventing devices on their boilers as a result of the abatement notice.

As conditions deteriorated in the 1890s and at the turn of the twentieth century, civic reformers began to put pressure on municipal government to enforce the ordinance already on the books. In 1903, a new smoke ordinance was passed "*...to regulate the emission of smoke and prevent injury and annoyance there from.*" But more significantly, the new ordinance provided for the hiring of a supervising engineer to enforce the ordinance.

By 1900, municipal reformers and medical researchers began to suspect that coal smoke was hazardous to human health. A doctor testifying for the Women's Health Protective Association of Allegany County, Pennsylvania noted in 1895 that any atmosphere "*...in which trees will not grow is not a good atmosphere for man.*"[4] In 1911, Pittsburgh banker Andrew Mellon funded the first major comprehensive investigation of smoke, its sources and its toll on society. The project took more than a decade to complete but brought the evils of smoke to the attention of a wider public.[5]

The Cincinnati Women's Club in 1904 began a coordinated campaign pressuring the city to enforce the smoke control ordinance. Teams of club members fanned out across the Queen City, documenting

Cincinnati's most egregious smoke offenders.[6] In 1906, the Cincinnati Women's Club spearheaded the establishment of the Smoke Abatement League, which rapidly became one of the most influential civic organizations in the city. Members included attorneys, doctors, and the owners of most of Cincinnati's media, retail and manufacturing businesses. President William Howard Taft was a dues-paying supporter of the League.[7]

Partially due to the influence of the Smoke Abatement League, City Council adopted a third Smoke Ordinance in 1907 which created the Office of the Smoke Inspector with four employees. This ordinance provided for the measurement of smoke using an instrument called the umbrascope and established penalties for excessive smoke violations. Mr. George Sealey was appointed the first Chief Smoke Inspector of the newly created Office after serving as the first Superintendant of the Smoke Abatement League.[8] Mr. Sealey and his two deputies focused their inspections on smoke stacks and not the boiler operations. They used the umbrascope as the basis for determining compliance with the ordinance.

The umbrascope consisted of four grey lenses which could swing in and out of view, allowing the inspector to look at the smoke through varying shades of grey. When emissions could be seen through all four lenses of the umbrascope, then the smoke was dark enough to be in violation of the ordinance. If violations persisted, the proprietor could be fined $25 to $100.

The Smoke Abatement League remained the driving force behind the enforcement of the 1907 anti-smoke ordinance. The League, led by Mr. Matthew Nelson the Superintendant, routinely made more "citizen arrests" of smoke offenders than the Chief Smoke Inspector issued citations. In 1910, the most active year, the League's citizen inspectors made 12,137 separate observations of chimneys, sent out 477 notices to proprietors with smoking chimneys and arrested forty-four offenders, seven of whom ultimately received fines from city judges. And, more importantly, public opinion was distinctly in favor of the League. In 1910, Mr. Nelson left the League to become the new Chief Smoke Inspector where he continued his aggressive campaign against smoke violators.

In 1908, the Smoke Abatement League joined with a number of other Cincinnati civic organizations to form the United Smoke Committees of Cincinnati. Members of this powerful new committee included the Chamber of Commerce, the Business Men's Club, the City Club, the Federated Improvement Institute, the local academy of medicine, and a local engineers' club.[9] The United Smoke Committees' greatest achievement came when the City Council passed a smoke prevention law in 1913 with the power to deter smoke production.[10] One year later, the city began levying fines on violators.

By that time, the Cincinnati Terminal Association, which represented all of the city's railroads, had appointed Mr. G.H. Funk as the association's chief railroad smoke inspector.[11] Cincinnati railroads would monitor their own smoke production for the next half-century.

It wasn't until the flood of 1913 that the residents of Cincinnati realized how much smoke had affected their lives. The Ohio River rose to almost Third Street flooding railroad yards, manufacturing facilities and businesses along both sides of the river and the complete shutdown of riverboat traffic. It took days to remove the deposited silt before full operations could resume. The effect on the atmosphere was

dramatic. Mr. Louis T. More, vice president of the Smoke Abatement League wrote a letter to the editor of the Cincinnati *Times-Star*. In it he wrote,

> *"For the past few days locomotives and steamboats have not been running because of the flood, and it must have impressed everyone that the atmosphere has never been so clear or the sunshine so bright in this City."* He further stated, *"It is startling to look at the Kentucky hills and see their outlines clear and distinct without any haze of smoke."*[12]

There was a rapid succession of Chief Smoke Inspectors in the early years of the Office of the Smoke Inspector: Mr. George Sealey (1907 – 1909), Mr. Daniel Everson (1909 – 1910), and Mr. Matthew Nelson (1910 – 1911). The Smoke Ordinance of 1911 required that the Chief Smoke Inspector be an engineer mostly to get rid of Mr. Nelson who was an insurance salesman. Mr. Nelson made many enemies with his zealous execution of the law. But, more probably, his enemies were engineers who were offended by having an insurance salesman telling them how to operate their boiler rooms. Mr. Arthur Hall placed the highest on the civil service test and was appointed as the next Chief Smoke Inspector in 1911. Mr. Hall changed the emphasis of the Office from an activist enforcement philosophy to a more scientific approach to solving smoking boiler problems. The inspectors now took measurements during boiler operations to determine reasons for excessive smoke. The Office was also given the oversight to review all the plans for new boiler installations. Mr. Hall left the Smoke Office in 1914 and Mr. Charles Heath, his first assistant, was appointed the Chief Smoke Inspector. Mr. Heath held the position until 1917 when he was succeeded by Mr. Gordon D. Rowe who remained in the position until his retirement in 1938.

In 1915, the ninth meeting of the International Association for the Prevention of Smoke was held in Cincinnati, Ohio. During this meeting, delegates voted to change the name of the Association to the more manageable Smoke Prevention Association. In the early 1950s the name was changed to the Air Pollution Control Association which eventually became the Air & Waste Management Association as it is known today.

America's entry into World War I in April 1917 required a massive effort to manufacture equipment and munitions needed by the Expeditionary Force in France. This effort required millions of tons of coal to keep production moving. Enforcement of smoke ordinances took a back seat to war production. All air quality improvements gained between 1906 and 1916 were lost during the war years. More importantly, citizens accepted the loss of clean air during the war effort and the lethargy continued into the 1920s.

But interest in smoke prevention did not wane among the professionals. At the Smoke Prevention Association's 1917 convention in Columbus, Ohio, it was noted that the heavy volume of smoke escaping from factory smokestacks was an indication of profligate waste -- an opinion heartily endorsed by most of the delegates. As far back as the 1907 Milwaukee convention, delegates acknowledged that the chief culprit in smoke generation was overfeeding boilers with coal. Smoke stacks belching black smoke was no longer considered a sign of prosperity but as a waste of energy.

At the 1921 convention in St. Louis, Missouri, Professor E.L. Opie (Washington University School of Medicine) presented a paper entitled "Effect of Smoke on Health."[13] Dr. Opie's talk, linking soot and smoke to respiratory ailments, was widely circulated in the Midwest. This landmark speech resulted in even more municipalities adopting smoke ordinances similar to Cincinnati's during the 1920s. Interest in clean air was returning.

Cincinnati's reputation as a progressive leader in smoke abatement work was highlighted in its 1925 Report of the Smoke Division. It was reported that the Division received requests for advice from 51 other cities across the U.S. as well as from Prague, Czechoslovakia. The staff proudly acknowledged this

attention at the end of the report: "*In each instance the information required has been cheerfully furnished. It is a pleasure to know that Cincinnati is the acknowledged leader in smoke prevention work*".

On July 1, 1926, the Bureau of Mechanical Equipment and Smoke Emissions (as the Office was called at the time) officially became the Smoke Division of the Department of Buildings. That same year the Smoke Abatement Ordinance was further modified to:

* Provide for the hiring of additional personnel
* Provide regulations for governing the installation of equipment
* Require permits to install for fuel-burning equipment.

The 1930s

The steady passage of progressively more stringent smoke abatement ordinances began paying off in the 1920s. The 1930 Annual Report of the Smoke Division made the following observation:

> "*The number of complaints during 1930 more than doubled in comparison with the preceding year, and far exceeds the number received in any one year since the institution of the Smoke Division. It is a peculiar fact that as the number of smoke violations decreases, the number of complaints increase, probably because dense smoke is now the exception rather than the rule, is quickly noted and a complaint made*."

The increased surveillance of stationary stacks and locomotive engines was paying off with a decrease in the number of smoke violations and an improvement in atmospheric conditions. The air was noticably cleaner and the Smoke Division wanted to quantify the improvements. So they decided to re-establish soot fall collections to "*furnish more definite data as to the progress in atmospheric purification."*

With the Great Depression, the Smoke Division had additional factors to consider in enforcing the smoke ordinances. The 1931 Annual Report noted,

> "*As a result of the depression, the initial cost of coal is considered paramount in a great many instances, and as a consequence, there has been a marked increase in the amount of smoke from domestic heating plants, as in consideration of present conditions we have been more lenient in the enforcement of the smoke ordinances against such sources*".

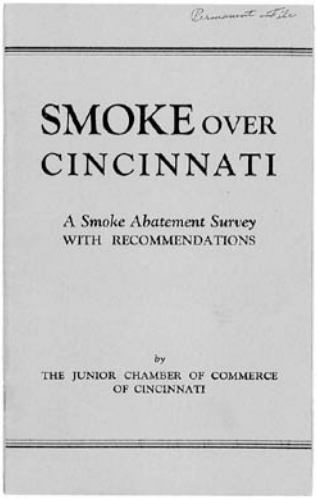
Smoke abatement continued in Cincinnati during the 1930s in light of the economic conditions. Large boilers were installed with automatic stokers which controlled feed rates more reliably than hand feeding which frequently resulted in overfeeding and the production of excess smoke. During the 1930s, several large boilers were installed with gas scrubbers which, "*...will effectively prevent the emission of flyash and smoke..."*

The General Hospital power plant in Clifton was reported to be the "*worst offender"* for nuisance smoke and soot. The 1935 Report noted "*... a water spray designed and recommended by the Chief Smoke Inspector was installed in the hospital stack; ...effectively preventing the nuisance".* Other nuisance offenders at that time included The Hudepohl Brewery in Queensgate and The Jergens Soap Co. on Spring Grove Avenue.

The work load of the smoke inspectors was overwhelming at this time. There were constant requests by the Chief Smoke Inspector to increase the number of inspectors from three to six throughout the 1930s. It never happened.

The Cincinnati City Manager formed a committee, in 1937, to recommend a more effective air pollution ordinance:

> "*The dense fogs which prevailed at the opening of the heating season have tended to increase the interest of the general public...and caused the Chamber of Commerce and other civic organizations to appoint smoke committees...to further smoke abatement".*



Because of the continued pressure by citizens groups demanding more stringent controls on smoke emissions, the Smoke Division increased their emphasis on public education in the late 1930s. Two publications were produced and distributed in an effort to increase the Division's educational campaign: Seventy thousand copies of the pamphlet, "Which End" were distributed which described the best method of firing a heating unit. In 1938, the Junior Chamber of Commerce released a booklet, "Smoke Over Cincinnati". The opening sentence set the tone for what followed in the booklet – "*Smoke is and has been for many years an obnoxious evil to the citizens of Cincinnati"*. The Federated Garden Clubs also sponsored weekly 15- minute radio broadcasts devoted to smoke abatement.

Mr. Charles W. Gruber became the Chief Smoke Inspector in 1938 following Mr. Gordon D. Rowe's retirement. Mr. Gruber was instrumental in furthering Cincinnati's national leadership role in air pollution abatement. In 1939, he expanded the network of soot fall jars that measured the amount of soot and flyash settling from the atmosphere. The jars were collected monthly and quantified as tons of soot per square mile. This provided a means to measure if smoke abatement programs were making a difference in air quality.

The 1930s ended with some progress towards the reduction of smoke and flyash but it was obvious that the task ahead was still daunting. The Smoke Division was staffed with the Chief Smoke Inspector, one Assistant Combustion Engineer, four Smoke Inspectors and one Stenographer. These staff completed 7,385 plan examinations; investigated 417 complaints; conducted 3,812 general inspections; made 65,292 smoke observations; and issued 5,362 permits.

The Division was also very progressive and wanted to use technology to assist their efforts in thwarting polluting sources. The observation deck of the Crew Tower was a favorite location for inspectors to monitor sources in downtown Cincinnati. The inspectors felt that prompt notification to violators would quickly resolve a smoking condition and correct any problem quickly. The Division even requested funding for the installation of a telephone line at the top of the Crew Tower. It was never reported if the installation actually occurred.

The 1940s

As the 1940s began, the seven person staff of the Smoke Division continued to be overworked and understaffed. The chronic request for additional staff went ignored. The staffing situation worsened when one of the smoke inspectors was called to active duty in 1941. Then, in 1942, Mr. Charles Gruber the Chief Smoke Inspector was also called to active duty.

The war effort thwarted many of the efforts to control smoke emissions in Cincinnati. Complaints kept coming in concerning excess smoke emissions. Most were related to using cheap coal in residential buildings and industrial facilities. The 1942 Annual Report noted,

"*...the war effort has made clean coal unavailable. Industrial plants are unable to secure the customary grade of fuel previously available. Consequently, a liberal exercise of tolerant good judgment must be continued where national defense industrial power plants are involved*".

Cincinnati Council passed two ordinances in the early 1940s in an attempt to remedy the excessive smoking conditions continuing to be wide-spread throughout the city. The first ordinance, enacted in 1942, was recommended by the committee convened by the Mayor in 1937. It established the Citizen's Advisory and Appeals Board to hear appeals of citations issued by the Smoke Division. A second part of this ordinance provided strict specifications on the installation of fuel-burning equipment and chimneys. Larger fuel-burning equipment was now being installed with new photoelectric smoke detectors in the stacks. These new innovative devices were attached to the over-fire air fans to control smoking conditions in the firebox.

The second ordinance renamed the Smoke Division of the Department of Buildings to the Bureau of Smoke Inspection under the Department of Safety.

There was increased emphasis on sootfall data as a measure of air pollution and the success of smoke abatement activities in the City of Cincinnati. By the early 1940s, the Bureau was servicing 19 sootfall locations throughout the city. In 1943, the first Atmospheric Pollution Survey was completed and reported sootfall measurements for various locations in the city between the years 1939 and 1943. The 1944 Survey noted that the yearly deposition of soot in the Downtown area seemed to have leveled off while the sootfall values in the industrial areas had doubled in the last five years. The increases were attributed to the poor quality of coal being burned at the time.

The late 1940s saw many changes at the Bureau. After the war ended, the Bureau was finally allowed to hire four additional inspectors to handle the workload. They also instituted 24-hour coverage to catch after-hours smoke violators. The 1947 Annual Report mentioned a new problem limiting the smoke inspectors from completing their daily workload -- it was the 40-hour work week!

The Bureau began seeing a slow but steady conversion from coal to oil and gas heating units. Also, new diesel-electric locomotives began replacing older coal-steam locomotives.

Then, on Halloween weekend in 1948, seventeen people in the steel towns of Donora and Webster, Pennsylvania, died from asphyxiation in a 12-hour span. What the newspapers called the "death-dealing smog" sent nearly one thousand residents to the hospitals with respiratory ailments and killed another three people before rain washed away the inversion early the following week.[14] The Donora episode introduced the scientific community to the wider realization that air pollution from gases, fumes and microscopic particles, and not just smoke, threatened the nation's health. The devastating and lethal effect of air pollution was echoed just four years later when a persistent fog laden with coal smoke, during the last week of December 1952, caused an estimated four-thousand deaths in London and southeast England.[15]

Improvements continued to be made in 1948. CG&E installed three new steam generating units at the West End Station. Each unit included new electrostatic precipitators "*...the most modern development in flyash collection"*. Each unit cost $176,350.

The Bureau of Smoke Inspection closed out 1949 with a staff of 22 and a budget of $85,647. The following accomplishments were noted:

- investigated 520 complaints,
- conducted 12,475 railroad locomotive smoke observations,
- issued 7,605 heating and fuel-burning permits,
- conducted 11,459 inspections of permit holders and,
- maintained a network of 20 sootfall (now called dustfall) stations in the city.

It was noted that no appreciable gains were made in air quality during the 1940s. In fact, the dustfall deposition calculated for the city was higher in 1949 (350 tons/sq. mile) than in 1939 (259 tons/sq. mile).

The first Cleaner Air Week was held in Cincinnati the week of October 23 – 29, 1949. The event was conceived by Charles N. Howison, a Smoke Inspector at the Bureau, to call attention to the ongoing efforts to reduce air pollution in Cincinnati. Many activities were noted including downtown banners, window displays, special radio and television programs, and 319 column inches of newspaper coverage. The focus was to develop a public consciousness of the air pollution programs taking place in Cincinnati. The event was soon adopted by other cities and, as popularity grew, the Air Pollution Control Association offered to sponsor a national program starting in 1955 and called it National Smoke Abatement Week.

Acknowledgments

This report is a compilation of facts and excerpts from the following sources:

- Bill Beck, ***1907-2007 Environmental Stewardship in a Century of Change, A History of the Air & Waste Management Association's First 100 Years***, AWMA;
- David Stradling, ***To Breathe Pure Air: Cincinnati's Smoke Abatement Crusade, 1904 - 1916,*** Queen City Heritage;
- David Stradling, ***Smokestacks and Progressives***, The John Hopkins University Press;
- and 83 years of Annual Reports of the Hamilton County Department of Environmental Services and its predecessor agencies.

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[1] William F. Ray, Address of Welcome on Behalf of the United Smoke Committees of Cincinnati and the Smoke Elimination Committee of the Chamber of Commerce, Proceedings, Tenth Annual Convention, Smoke Prevention Association, Cincinnati, Ohio, September 8-10, 1915, p. 10

[2] Edward F. Jerome, Address of Welcome and Behalf of Cincinnati Smoke Abatement League, Proceedings, Tenth Annual Convention, Smoke Prevention Association, Cincinnati, Ohio, September 8-10, 1915, p.11

[3] David Stradling, *Smokestacks and Progressives*, The John Hopkins University Press, p. 63

[4] Quoted in David Stradling, Smoke of Great Cities: British and American Efforts to Control Air Pollution, *Environmental History*, January 1999

[5] Angela Gugliotta, How, Where, and for Whom Was Smoke a Problem in Pittsburgh, p. 118

[6] David Stradling, *Smokestacks and Progressives*, The John Hopkins University Press, p. 52

[7] Ibid., p. 54

[8] David Stradling, *To Breathe Pure Air: Cincinnati's Smoke Abatement Crusade, 1904 - 1916*, Queen City Heritage, Spring 1997

[9] William F. Ray Address of Welcome on Behalf of the United Smoke Committees of Cincinnati and the Smoke Elimination Committee of the Chamber of Commerce, Proceedings, Tenth Annual Convention, Smoke Prevention Association, Cincinnati, Ohio, September 8-10, 1915, p. 10

[10] T.J. Wells, How the Superintendents' Committee of Greater Cincinnati Reduces Some Violations, *Air Repair*, v. 1, no. 4, May 1952, p. 23

[11] G.H. Funk, What the Railroads Have Done to Abate Smoke in Cincinnati Proceedings, Tenth Annual Convention, Smoke Prevention Association, Cincinnati, Ohio, September 8-10, 1915, p.112

[12] David Stradling, *Smokestacks and Progressives*, The John Hopkins University Press, p. 83

[13] E.L. Opie, The Effect of Smoke on Health, Proceedings, Fifteenth Annual Convention, Smoke Prevention Association, Saint Louis, Missouri, May 31-June 3, 1921, pp. 16-10

[14] Lynne Page Snyder, Revisiting Donora, Pennsylvania's 1948 Air Pollution Disaster, p. 129

[15] A special Correspondent, Polluted Air Over the Towns, *Times of London*, April 20, 1953, Reprinted in *APCA News*, v. 2, no. 6, September 1954, pp. 1-2

The History of Air Pollution Control in Cincinnati, Ohio

The 1950s

The 1950s saw a dramatic increase in activity at the Bureau of Smoke Inspection. The installation of thousands of gas-fired heaters at apartment buildings, residences and commercial buildings greatly decreased smoke emissions violations in Cincinnati, but greatly increased the workload of the Bureau. Each gas-fired heater required a permit to install and subsequent annual inspections. Then an unintended consequence of the gas-fired heaters affected the Bureau – citizen deaths from carbon monoxide poisoning from improperly vented gas-fired heaters. Because the Bureau was responsible for permitting and inspecting these units, they also had to investigate the cause of each fatality or near-death situation.

City Council took steps to halt the alarming number of accidents and deaths associated with carbon monoxide poisoning. They amended the existing ordinance to (1) require gas-fired heating equipment to be properly vented, and (2) make it unlawful to use cooking stoves for space heating. Throughout the 1950s, the Bureau investigated approximately 30 incidents of carbon monoxide poisoning each year. The number of deaths decreased each year from 15 in 1951 to 8 in 1959. As a result, winter months were almost exclusively devoted to gas heater inspections with limited smoke abatement work performed.

However, there was also a positive aspect to all those gas-fired heaters - visible smoke violations were decreasing significantly. Besides the installation of thousands of gas-fired heaters, the railroads were converting from coal-steam locomotives to diesel-electric locomotives. Nearly 40% of locomotives were diesel-powered in 1950. By the close of the decade, 100% of locomotives were diesel-powered so smoke observations were discontinued at rail yards.

The coal furnaces/boilers remaining were heavily regulated thanks to the Ordinance adopted in 1947. This ordinance regulated the use and sale of clean burning coal and, more importantly, established an annual inspection program of all coal-burning units. The Smoke Inspectors were able to check operational and maintenance procedures which reduced the number of excess smoke violations. Smoke violations dropped 90% in the ten years after the 1947 Ordinance was passed.

To assist with the enforcement of excess smoke violations, the Bureau began to equip their cars with two-way radios. Inspectors would choose locations above the City, such as Oregon St. in Mt. Adams, to observe excessive smoke violations. The radios allowed quick communication with offending smoke stack owners to correct smoking conditions.

The reduction of visible smoke violations also resulted in a decrease of smoke-related complaints. Now, the majority of complaints were for odors and fumes. It was noted in the 1952 Annual Report that, *"Such complaints are more difficult to*

handle, to find the source, and determine the corrective measures." Because of the increase in odor complaints, a special project was initiated in 1953 between the Bureau of Smoke Inspectors and the U.S. Weather Bureau. The Weather Bureau agreed to provide the smoke inspectors with a 24-hour advanced weather forecast that showed conditions conducive to a buildup of air pollution. If weather conditions for the next day were appropriate, a smoke inspector would follow a prescribed "odor route" of past odor complaints. No conclusive results were obtained following a three-month trial.

Mr. Charles Gruber, the Chief Smoke Inspector, was elected President of the newly named Air Pollution and Smoke Prevention Association of America for the 1950-1951 term. The Association's name was too long and difficult to type, so in 1952 delegates to the Cleveland Convention shortened the name to the Air Pollution Control Association (APCA).

Notably in 1951, Hilton Davis Chemical Company installed four catalytic fume burners on their varnish cooking kettles to control the varnish fumes. This was reported to be the first application of this type of pollution control equipment in the Country.

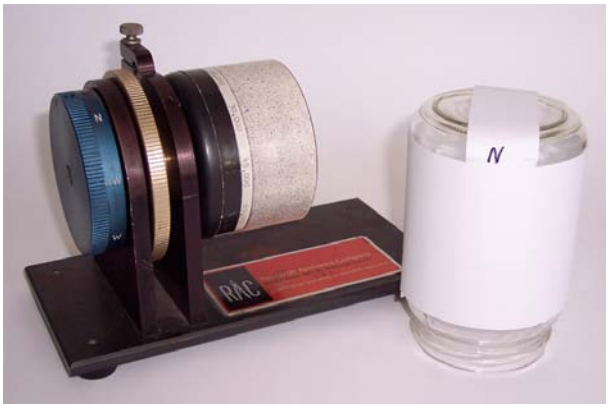
It was recognized in the 1950s that air pollution does not follow boundaries and Cincinnati ordinances did nothing to control pollution blown in from neighboring communities. Discussions began in the mid-50s that culminated in an agreement between seven local communities and the City of Cincinnati to provide air pollution "services" in those communities. The agreement, signed in 1957, created the Metropolitan Air Pollution Control Program and assigned an air pollution control officer from the Bureau to those communities. The original communities were Saint Bernard, Elmwood Place, Amberley Village, Reading, Lockland, Wyoming, and Glendale.

The 1950s also saw many new changes to the organization of the Bureau of Smoke Inspection. The Bureau continued to produce the Atmospheric Pollution Survey each year which was a graphical compilation of settleable particulate (dustfall) concentrations since 1939. However, in 1950, Charles Gruber, the Chief Smoke Inspector wrote, *" ...it's most important ... to develop a means of scientifically studying general air pollution from a quantitative as well as a qualitative standpoint ... to develop test procedures and apparatus for determining emissions of air pollution substances ... ."* During the 1950s, Mr. Gruber would be true to his word. Mr. Edwin L. Alpaugh, a chemical engineer, was hired in 1951 to head the newly created Research, Technical Tests and Special Assignments Section of the Bureau. That same year, meteorological equipment was obtained from the U.S. Weather Bureau and placed on the Bureau of Smoke Inspection's roof at 417 Lincoln Park Drive (now Ezzard Charles Drive). In 1952, a continuous air sampler was also placed in operation at the Bureau's office. The sampler measured suspended particulates by drawing air through a one-inch round area of filter paper for a six-hour period. The "dirt shade", as it was called at the time, was measured by light reflectance off the dirty area. The first research study conducted by Mr. Alpaugh was a comparison of "dirt shade" concentrations versus time of day, wind speed, and wind direction.

The Bureau agreed to be part of a national air pollution study conducted by the U.S. Public Health Service, Taft Engineering Center, located in Cincinnati. The U.S. Public Health Service placed a high volume air sampler (hivol) on the Bureau's roof in 1953. The hivol was designed to collect inhalable particulate matter up to 100 microns in diameter which is the size of particles normally breathed by human

beings. The sample was collected over a 24-hour period.

The number of research projects grew in 1955 to include the evaluation of "sticky paper" jars to measure the directional component of wind-blown settleable particulate matter. Also, the ambient concentration of sulfur dioxide was evaluated at three locations using instrumentation supplied by the University of Cincinnati, College of Medicine, Kettering Laboratories. Hourly sulfur dioxide concentrations were measured and it was observed that higher concentrations were found in winter months (more coal burning) than in summer months (less coal burning). On a daily basis, higher sulfur dioxide values were observed during the morning hours due to industrial equipment start-up and early morning temperature inversions.



Mr. Edwin Alpaugh left the Bureau in 1955 and was replaced by Mr. George A. Jutze who continued the ongoing research projects conducted at the Bureau.

By 1956, the Research and Testing Section was operating:

- 5 sticky paper locations,
- 20 dustfall stations,
- 3 soiling index locations,
- 1 high volume air sampler, national study, and,
- 1 sulfur dioxide location, special study.

The volume of data that the Research and Testing Section was collecting was so great that the Section began entering the data on IBM punch cards beginning in1955. IBM punch cards were the only means of entering data into a new technology, the computer.

Mr. Charles E. Schuman was hired in 1957 to replace Mr. George A. Jutze as head of the Research and Testing Section. Mr. Jutze was promoted to be the first Air Pollution Control Officer for the Metropolitan Air Pollution Control Program. The Section was staffed by just two persons: the supervisor, Mr. Schuman, and an air pollution technician. Mr. Schuman eventually became the Director of the Department from 1982 to his retirement in 1990.

A great national debate was occurring among air pollution professionals during the early 1950s concerning the source of the ever increasing smog in Southern California. One group felt it was caused by all the refineries built in California during and after the war. The other group felt it was the exhaust from the increasing number of automobiles. Professor A.J. Haagen-Smit, at the California Institute of Technology, helped settle the debate. He was able to create smog in his laboratory by subjecting gasoline fumes to ozone in 1954. The understanding that automobiles were a major contributor to smog formation changed the way officials looked at air pollution. As a result, research flourished in atmospheric chemistry and the formation of smog. This increased awareness that air pollution was much larger than just smoke abatement resulted in the Bureau changing its name to the Bureau of Air Pollution Control and Heating Inspection in 1955.

The issue of automobile exhaust and air pollution was the focus of a Citizen's Committee appointed by the City Manager in 1955. The committee's recommendations resulted in the passage of Ordinance 275 in 1957 that prohibited excessive smoke from motor vehicles. Police could now cite automobiles for

excessive visible emissions. The Cincinnati Safety Lane, where automobiles had to pass an annual safety inspection, cooperated with this ordinance by failing all vehicles entering the safety lane that were visibly smoking.

Two new research studies were initiated in 1958. The first was a study of carbon monoxide concentrations in Downtown Cincinnati. This study was a measure of the effect automobile exhaust had on air quality in a congested area. The second was a study of the relative concentration of ozone in the air. Ozone was measured by exposing a strip of unvulcanized rubber for one week under tension. The degree of cracking along the edge of the rubber strip was related to ozone concentration.

The Bureau also received a U.S. Public Health Service grant in 1958 to develop a way to quantify odors. The 2-year study produced an instrument called the Scentometer. The Scentometer was used to measure the intensity of an odor but could not identify the odor itself.

By 1959, the Bureau was making an impact on Cincinnati's air quality.

- Smoke violations were reduced 80% from 1949 levels,
- Dustfall was reduced 60% from 1941 levels,
- Soiling Index had decreased 25% since 1952,
- Total suspended particulates (hivol) decreased 25%

1954	192 ug/m^3
1959	144 ug/m^3

The Bureau completed 1959 with 23 regular staff and a budget of $156,630. In October 1959, the office was moved from 417 Lincoln Park Drive to 2400 Beekman Street. The Lincoln Park Drive building was part of Cincinnati's urban renewal plan and was scheduled for demolition. The site later became the location of Taft High School. The instruments located on the roof were relocated to the roof of the Downtown Public Library.

Cincinnati's inhalable particulate concentrations were actually doing better than most areas around the country. The results of the U.S. Public Health Service national study of high volume air sampler results produced the following comparison:

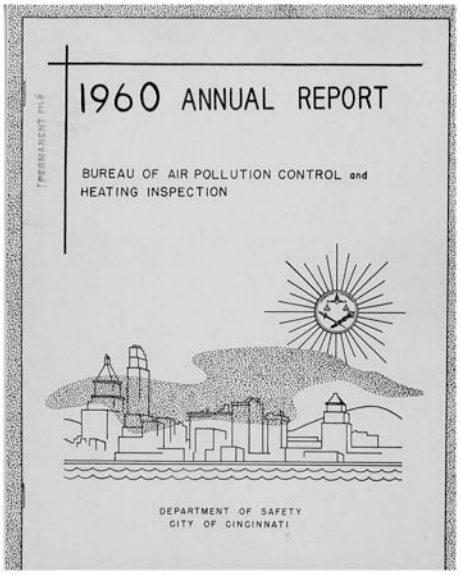
-	Cincinnati average	(1953 – 1957)	149 ug/m^3
-	Ohio average	(1953 – 1957)	157 ug/m^3
-	National average	(1953 – 1957)	163 ug/m^3

The History of Air Pollution Control in Cincinnati, Ohio

The 1960s – The Beginning of the Environmental Movement

Charles Gruber proved to be very astute in his understanding of air pollution and where it was heading in the future. In the Forward to the 1960 Annual Report, Mr. Gruber wrote,

> *"While visible pollutants made up largely of smoke particles are steadily being reduced year by year, the problem of obnoxious gases and odors are demanding more and more attention. The role of automobile exhausts in the contamination of Cincinnati's atmosphere has occupied much time during the year. City Council has before it, a resolution to request the Automobile Manufacturer's Association and their member companies to voluntarily equip all 1962 model automobiles shipped for sale in the Cincinnati area with a device to prevent the escape of unburned hydrocarbons to the atmosphere... The subject of air quality standards ... has been much discussed in recent years. This subject will gain more and more attention in the years to come."*



Mr. Gruber foresaw the need to reduce pollution from cars and convinced City Council in 1961 to pass a resolution asking automobile manufactures to voluntarily equip cars for sale in Cincinnati with Positive Crankcase Ventilation (PCV) values beginning in 1962. The automobile manufacturers weren't willing to comply with the City's request. It wasn't until the federal government passed the Air Quality Act of 1967 that manufacturers were required to equip automobiles with PCV values for national distribution.

He also foresaw the need to establish national air quality standards as the only way to protect public health on a national scale. However, it wasn't happening fast enough for Mr. Gruber. He lobbied City Council to act. Finally, in 1969, City Council adopted ambient air standards for the Cincinnati area. The standards set limits on sulfur dioxide (SO_2) concentrations in the air and inhalable particulate matter limits at 100 $\mu g/m^3$. The sulfur content of coal was also restricted to no more than 1.25%.

The inspection section remained quite busy during the 1960s. They annually reviewed 3,000 to 4,000 permits to install new gas, oil, or coal-fired heating equipment. They also conducted thousands of annual inspections of fuel-burning equipment, investigated 600-700 citizen complaints, and continued to investigate the causes of all carbon monoxide deaths in Cincinnati

The Bureau remained very active in the Air Pollution Control Association (APCA). The 53rd Annual Air Pollution Control Association Conference was held in Cincinnati in 1960. Seventy-two papers were presented to over 600 attendees. Mr. Gruber's contributions to the field of air pollution control both in Cincinnati and at the national level were recognized in 1963 when the APCA awarded him the Frank A. Chambers Excellence in Air Pollution Control Award. The Chambers Award is the highest honor that can be bestowed on a member of APCA.

National Smoke Abatement Week continued as an annual event in Cincinnati throughout the 1960s and was eventually replaced by Earth Day in April 1970. The emphasis of National Smoke Abatement Week was always to educate the public. Typically there were banners hung from downtown light poles, radio spots on the effects of air pollution and extensive print coverage of air quality issues.

The federal government was beginning to take a more active role in air pollution control in the 50s and 60s. The U.S. Public Health Service, Taft Engineering Center in Cincinnati had been conducting air sampling and research projects since the 1950s. The first Clean Air Act of 1963 appropriated $65 million to spur state agencies to establish air pollution control legislation. The first Clean Air Act was replaced by the Air Quality Act of 1967 which, for the first time, set regional emission standards and required that automobiles be equipped with control devices to close the crankcase vent tube, a large source of emissions from automobiles.

Local changes were also following on the heels of the national changes. The Bureau was elevated to Division level in 1965. They were now the Division of Air Pollution Control and Heating Inspection in the Department of Safety. The Division also divided the Inspection group into two sections in line with their areas of responsibility; namely, the Mechanical Equipment and Inspection Unit and the Air Pollution Control Unit. Each unit had a supervisor, seven inspectors, and a clerk typist.

The Metropolitan Air Pollution Control Association (MAPCA) also experienced some changes. Mr. George Jutze resigned to go to the U.S. Public Health Service and Mr. Richard Lemkuhl was hired to replace him. The MAPCA changed its name in 1963 to the Intercommunity Air Pollution Control Association.

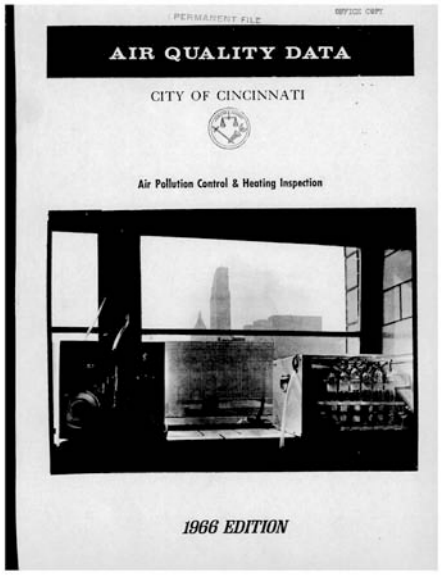
The Public Health Service began issuing smog alerts in 1963 to mid-western and eastern states when weather conditions were favorable for photochemical oxidant formation. Cincinnati recorded a three-day smog episode on May 17-19, 1962 when a high pressure system and light winds pushed total oxidant concentrations to 0.25 ppm. There were many complaints of eye irritation reported by the public.

The Division continued to seek U.S. Public Health Service grants to research new methods of measuring air contaminants. One such grant funded a project to evaluate the effectiveness of using adhesive-coated materials to measure particulate loading in emissions streams from smoke stacks and incinerators. Three technical papers were produced as well as the final report which was completed in 1969.

The Research and Testing Section significantly increased their activities during the 1960s. A grant from the U.S. Public Health Service provided the resources to purchase and install the first Continuous Air Monitoring Program (CAMP) station in 1961. The monitoring station was located at Central Parkway and Anne Street across from Music Hall. The CAMP station was the first of eight stations installed around the country. The instruments were selected to measure concentrations of air pollutants associated with automobile exhaust. Continuous measurements of carbon monoxide (CO), sulfur dioxide (SO_2), nitric oxide (NO), nitrogen dioxide (NO_2), total oxidants (TOx), and total hydrocarbons (THC) were collected. An air pollution technician was hired to operate the station.

The CAMP station produced a considerable amount of data. The collected data was turned over to the U.S. Public Health Service for statistical processing. This processing resulted in a three-month delay in receiving the data at the Division. As a result, it was decided to prepare a separate Air Quality Data Report in 1966. Separate Progress and Data Quality Reports continue to be published today. The first Air Pollution Emissions Inventory Report was prepared in 1967.

The gas bubbler, a new air monitoring instrument, was introduced in 1966 and placed into operation at the CAMP station. It collected 24-hour composite samples of five gaseous pollutants: SO_2, NO_2, TOx, aldehydes, and ammonia. The analytical instruments at the CAMP station absorbed air pollutants in specialized chemical solutions. As a result, the Division had to expand its laboratory services both to prepare reagents for the instruments as well as to analyze the returned samples for pollutant concentrations.



The Research and Testing Section ended 1969 operating the following instruments:

- 1 CAMP Station
- 2 gas bubblers
- 3 total suspended particulate air samplers (hivol)
- 10 dustfall buckets
- 3 soiling index instruments

Particulate matter concentrations in the atmosphere continued to decrease through the 1960s. Settleable Particulates (dustfall) concentrations decreased 15% since 1960. Soiling index dropped by 60% for the same period. The annual mean for total suspended particulates decreased 20% from 145 $\mu g/m^3$ in 1960 to 104 $\mu g/ m^3$ in 1969. Particulate matter concentrations were improving but the role that gaseous pollutants played in unhealthy air quality was becoming more apparent. Smog had become a household word in the 1960s. Greater attention was being placed on automobile exhaust and its effects on air pollution.

The decade closed with the Division at 24 staff members and a budget of $228,690. Federal grant money, as well as payments from seven communities (the Intercommunity program), was used to supplement City money to fund the Division. The year 1969 also marked the end of an era with the retirement of Mr. Charles Gruber. He oversaw the Division's transformation from smoke abatement and heating inspection into an air pollution control agency. He was well liked by his staff and admired by his professional colleagues. Mr. Gruber went on to teach at the University of Cincinnati, College of Engineering. Mr. Eugene D. Ermenc was hired to replace Mr. Gruber in October of 1969.

The History of Air Pollution Control in Cincinnati, Ohio

The 1970s - Federal and State Control Begins

The decade of the seventies was an exciting time for air pollution control in Cincinnati. The creation of the Environmental Protection Agency further propelled the environmental movement dispersing more money to local and state agencies and greatly increasing environmental research. But it was also the beginning of national control over how air pollution would be regulated. Cincinnati experienced growing pains and frustrations as the U.S. EPA and Ohio EPA assumed control of what used to be a local program.

Mr. Eugene Ermenc, the newly appointed Superintendent of the agency, saw the coming changes in air pollution control and initiated a reorganization of the agency in 1970. The Division, which once reported to the Department of Safety, was now reassigned to two different departments. The Air Pollution Control Section was moved to the Department of Sewers and the Heating Inspection Section was moved to the Department of Buildings. The new Division of Air Pollution Control was ready to meet and respond to the new national challenges it would soon face.

The defining moment of the environmental movement happened on Earth Day April 22, 1970. In the past, the emphasis of National Smoke Abatement Week was always on education. Earth Day was much different. The activism of the 1960s was very evident during all Earth Day celebrations across the country. The participants demanded a cleaner, healthier environment which was evident in their chants and slogans. They wanted to force environmental issues into the mainstream of political debate. Politicians were watching and listening. What followed was a rapid succession of legislation in 1970 and 1971 creating the U.S. Environmental Protection Agency, the Clean Air Act Amendments and the Clean Water Act. The environmental movement was now given credibility at the national level.

The increased regulation, enforcement, and monitoring required by the U.S. EPA regulations resulted in a significant increase in workload and personnel to manage it all. Butler and Warren Counties didn't want to create their own environmental departments so they sought the help of the City of Cincinnati Air Pollution Control to help them administer an air program in their respective counties. In 1971, contracts were signed between Butler and Warren counties and the City of Cincinnati to provide them with air quality services. The Southwest Ohio Air Pollution Control (SWOAPC) program was born. A satellite office was set up in Atkinson Square at Tri County to support the new counties. Fourteen additional engineers, inspectors, and technicians were hired. The agency ended 1971 with a staff of 38: 24 in the city program and 14 in the county program.

The Ohio Local Air Pollution Control Officers Association was also formed in 1971. OLAPCOA provided a forum for the air directors of the 12 local air agencies in Ohio to discuss air pollution issues and control strategies around the state.

Change continued in 1972 with the formation of the Ohio Environmental Protection Agency (Ohio EPA). Soon after opening for business, Ohio EPA signed contracts with the local air pollution control agencies to act as agents of the Ohio EPA for air quality issues in their respective regions.

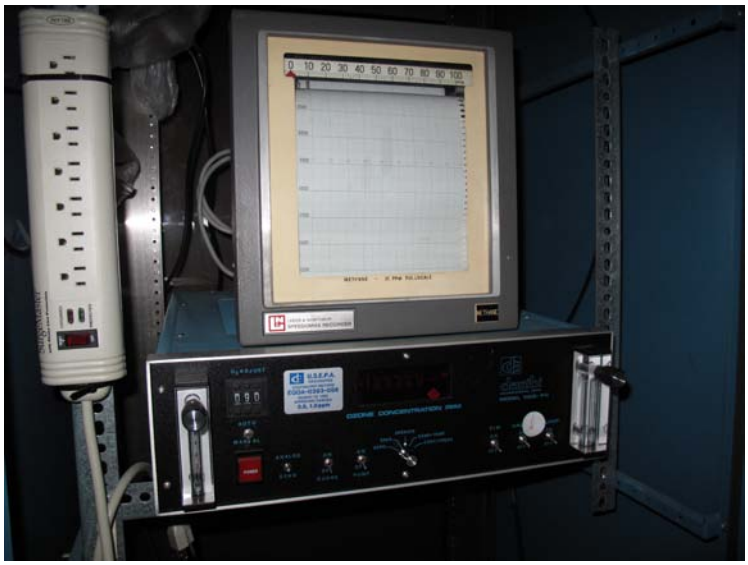
Federal assistance grants began in 1971 that provided funds to support the increased workload required by the 1970 Clean Air Act Amendments. The federal grant money paid for additional staff to process permits, conduct inspections and to increase the size and scope of the air monitoring network. In five short years from 1970 to 1974, the Division's budget increased from $152,000 to $1.1 million. Operating

funds were received from the City of Cincinnati (25%), the Ohio EPA (25%) and the U.S. EPA (50%). Along with the increased funding and added responsibilities, the Division grew from 20 to 67 persons over the same time period. The Division eventually stabilized at 58 persons and ended the 1970s at that staffing level.

The Technical Services Section was the biggest recipient of federal grant dollars during the 1970s. The high volume air sampler network, that collected particulate matter data, increased from 15 to 39 instruments. The gaseous pollutants: sulfur dioxide, nitrogen dioxide and total oxidants, were collected using the multi-gas bubbler. The bubbler network increased from 2 to 11 instruments.

Then there was the addition of six CAM stations. These Continuous Air Monitoring Stations (CAM) were specially modified mobile homes that housed instruments to monitor seven air pollutants on a continuous basis. The CAM stations also contained meteorological instruments that collected data continuously. Each station required an operator to maintain the instruments and to collect the huge volume of data generated. Each CAM station cost approximately $100,000. The CAM station located behind Drake Hospital was the first of its kind in the U.S. It was installed in 1972 and began producing data in 1973. These stations were modeled after the federal Continuous Air Monitoring Program (CAMP) station which the US Public Health Service installed in downtown Cincinnati in 1961.

In 1972, the Technical Services Section moved into remodeled space owned by the Metropolitan Sewer District at 1675 Gest Street. The Gest Street location housed all aspects of the Technical Services Section: administration, air monitoring equipment, laboratory, microscopic analysis, instrument maintenance and repair. The new laboratory provided much needed space to prepare reagents for the new CAM stations, the analyses of the multi-gas bubbler solutions and weighing the increased number of high volume air sampler filters. The CAM station instruments and the multi-gas bubblers all used wet chemistry techniques to absorb pollutants into chemical solutions. The solutions were analyzed for pollutant concentrations using colorimetric analyses.



Beginning in 1975, the older colorimetric analysis instruments were being replaced with new chemiluminescence instruments for monitoring air pollutants. These new instruments used light energy at specific wavelengths to detect pollutant concentrations in the air. Absorption of pollutants into chemical solutions was no longer necessary. The chemical solution method for measuring total oxidants was replaced with an instrument that could measure ozone (O_3) directly in the air. In the ensuing years, chemiluminescence instruments were also deployed for NO/NO_2; SO_2; and CO. The conversion to these new instruments meant reduced laboratory time preparing reagents, no spills or leaks at CAM stations, and more accurate measurements. The conversion process continued over the next five years.

Reducing and controlling air pollution from industrial sources was still a major concern for the Engineering and Inspection Sections. One of the major control strategies for reducing particulate matter in ambient air was to switch as many industrial boilers from coal to natural gas. This strategy was very successful in bringing the region into compliance with the National Ambient Air Quality Standards (NAAQS) for Particulate Matter by the late 1970s. This was a good strategy until the national energy crisis began in 1975 and continued into the late 1970s. Natural gas was in short supply and no new hookups were allowed. The energy crisis was so severe that in 1978 Ohio Governor James Rhodes declared an energy emergency and, among other things, allowed industry to turn off air pollution control equipment to save energy. The elimination of natural gas conversions and some air pollution control equipment not operating resulted in the fluctuation of particulate matter measurements around the 75 ug/m^3 national standard for the rest of the decade.

Another control strategy targeted the four municipal solid waste incinerators operated by the City of Cincinnati. These incinerators were significant sources of uncontrolled particulate matter and many citizen complaints. The incinerators began shutting down in 1973 and continued until the final incinerator ceased operation in 1976.

Several innovative programs were initiated by the Division during the 1970s. In 1974, the Technical Services Section purchased two instruments to measure hydrocarbons and carbon monoxide concentrations in the tailpipe of automobiles. These instruments were deployed at the City's Safety Inspection Lane for preliminary testing and on January 1, 1975 were officially part of the Safety Inspection Lane test. Hamilton County became the first area in the country to require residents to pass a tailpipe test in order to receive a Safety Lane sticker which was required to park within the City of Cincinnati. Vehicles that failed the test had to be repaired and return for a follow-up test. The first year 220,000 automobiles were tested with a failure rate of 30%. The following year, the failure rate dropped to 18%.

Another innovative program was the Uniformed Air Pollution Motor Patrol. A 1974 Cincinnati ordinance authorized the hiring of four uniformed inspectors to enforce visible emissions violations from mobile sources. The four inspectors received law enforcement officers training, wore uniforms, and drove police cars painted bright green with decals identifying them as Air Pollution Control. Their primary focus was

patrolling expressways and major highways looking for vehicles spewing excessive smoke, pull them over and cite them for the violation. Along with citing smoking vehicles, the mobile patrol issued citations for parked cars with expired safety lane stickers. A little over 2000 citations were issued in 1975 for expired safety lane stickers. For all its successes, the motor patrol was disbanded in 1979 due to cuts in the City budget.

The 1970s also saw the advent of the air quality index, a system to alert the public when poor air quality might adversely affect the health of sensitive populations and the general. Ohio EPA established a statewide Air Quality Index (AQI) in May 1973. Ohio's alert level of 200 was set at 0.10 ppm for total oxidants. At this concentration, several alerts were called each summer in the Greater Cincinnati Area. An official air quality alert could only be declared by the Governor for any region in the State. Cincinnati's first formal air quality alert was declared by the Governor over the weekend of July 27 – 29, 1974. The AQI reached a high of 232 over the weekend. While air quality alerts could only be declared by the governor, air stagnation advisories could be called by the local air agencies if the air quality was poor but not expected to persist over a several day period.

By 1977, there were over 30 different air quality indexes being used around the county, each having a unique set of advisory and alert levels. As a result, the U.S. EPA proposed a national Pollutant Standard Index (PSI) to standardize the index across the country. U.S. EPA's PSI program began on January 1, 1979. The PSI's alert level was 0.20 ppm ozone which was double the alert level of Ohio EPA's AQI. Needless to say, no alerts were called under the EPA PSI because the Cincinnati area never exceeded the 0.20 ppm level for ozone.

The City of Cincinnati was experiencing budget problems during the late 1970s and was looking for ways to trim its budget. One of the proposals to save money was to drop the Division of Air Pollution Control and turn the program over to Hamilton County. Council members reasoned that the Division was now a regional organization and should be funded by regional organizations and not the City. The City stood to save $321,000 by transferring the program to the County. So, as expected, Council voted to drop the Air Pollution Control Division. The County agreed to accept the program and the transfer took place on January 1, 1980. Mr. Eugene Ermenc, the Director of the Division, opened the 1979 Annual Report with the following comment,

"The year 1979 was a traumatic year for the Division of Air Pollution Control."

He concluded the Report with the following observation,

"The City of Cincinnati has rung down the curtain on an air pollution control effort in effect since 1886. After 94 years of a continuous program, the year 1980 will end the financial participation of the City in funding the Division of Air Pollution Control...(T)his Division...looks forward to a new era of true regional cooperation."

The Division ended 1979 with a staff of 58 persons and a budget of $1.3 million. There was an Engineering Section, an Inspection Section, and a Technical Services Section. There were two offices (Beekman Ave and Atkinson Square), one laboratory (Gest St), six CAM stations, and numerous intermittent and continuous monitoring instruments. There was also much trepidation about what lay ahead for the Division under Hamilton County control.

The History of Air Pollution Control in Cincinnati, Ohio

The 1980s

The new Southwest Ohio Air Pollution Control Agency began the 1980s with a functioning regional air pollution control program in place but unsure about what to expect under Hamilton County control. The staff of 58 was very unsettled because, officially, everyone lost their jobs on January 1, 1980 and had to reapply to the County for their old jobs. Eighty-five percent of staff reapplied for their jobs and were hired with the remaining 15% staying with the City of Cincinnati taking other available positions. The Division moved ahead with 43 filled positions.

Seventy-three (73) years of air pollution regulations that helped clean the air in Cincinnati were wiped out with a single vote. All ordinances under the City of Cincinnati's Title X Municipal Code were repealed with the move to County control and all future air quality services were now to be regulated under Ohio Law.

Changes continued in 1980. The Atkinson Square office, which provided services to the outlying counties, was deemed too expensive to maintain and was moved to Lockland. By 1982, the Lockland office was closed and all engineering and inspection operations for the outlying counties were consolidated at the Beekman St. office.

The Vehicle Inspection and Maintenance Program continued in 1980 but fewer and fewer cars were being tested since its inception in 1976. After a first year high of 220,000 automobiles, the number had decreased to only 98,000 by 1980. The program officially ended in February 1981.

The Ohio EPA was not happy with the organization of the Division. More specifically, the quality of the permits being sent to Ohio EPA was poor and there were too many inspectors for the work load. When the inspectors conducted facility inspections they had limited knowledge of the permit conditions controlling emissions from the facilities. The Engineering Section was very guarded about giving facility information to the inspectors. When not conducting facility inspections, the inspectors would drive around in their districts looking for visible smoke violations. This was an offshoot of the "old days" when visible emissions violations were common place because of the large number of coal-fired boilers around town. By 1980, there were very few coal-fired boilers left in existence. Most had been converted to natural gas. Although changes in the organizational structure were requested by Ohio EPA, the Division was resistant to any change. Ohio EPA's pressure to reorganize was so great that the Director, Mr. Eugene Ermenc, decided to retire in August 1981. Mr. Charles E. Schuman was appointed the new Director by the Hamilton County Commissioners. Mr. Schumann had been the manager of the Technical Services Section up to that time.

In late 1981, Ohio EPA assigned Mr. James Liggett from Ohio EPA's Southwest District Office at Dayton, Ohio to oversee the Division. His job was to review all permits prior to submission to Ohio EPA and to review all plans for reorganization. This oversight was not well received by the Division, especially the Engineering and Inspection Sections. Still, work began on a reorganization plan in 1981 and continued through 1982. The end result was the creation of an Industrial Programs Section which incorporated both the engineering and inspection sections. So, on the last day of 1982, 14 positions were eliminated but only 11 staff were actually laid off.

Tensions were high on January 1, 1983 when the inspectors went to the engineers and announced, what can we do? The inspectors knew nothing about permit writing and the engineers knew nothing about

conducting facility inspections. An intensive training program for permit writing and facility inspections was a priority through 1983. In the ensuing years, the section began writing better permits; conducting more thorough facility inspections; and processing more enforcement actions. In 1984, the Industrial Programs Section developed a PTI tracking system to ensure adherence to Ohio EPA's requirement to review all PTI applications within 30 days. The section also began processing Enforcement Action Requests (EARs) on long-time violators to the delight of EPA Region 5. Mr. Liggett's oversight of the Division continued until 1986 when Ohio EPA felt the Industrial Programs Section was operating in an acceptable manner.

During this time, federal funds were decreasing from a high of $698,000 in 1980 to a low of $506,000 in 1985 which resulted in the reorganization and lay offs in late 1982. Staffing levels decreased from 46 to 32 persons. Ohio EPA funding did increase during this time to help offset EPA's funding cuts but not enough. Overall, the Division budget declined from $1.3 million in 1980 to $1.09 million in 1984. The annual funding level then stabilized at the $1.2 million range for the remainder of the 1980s.

New programs were being initiated almost on a yearly basis. With the passage of the 1977 Clean Air Act Amendments, the Industrial Programs Section now had to address New Source Review and Prevention of Significant Deterioration in permit reviews. They also received authority to enforcement the new National Emissions Standard for Hazardous Air Pollutants Regulation for Asbestos in 1983. The Technical Services Section began the Gasoline Testing Program in January 1983 to spot check gasoline stations because some stations were selling leaded fuel for unleaded fuel and charging the higher prices.

The 1980s was also a decade of change for the Technical Services Section. After two decades of operation, the multi-gas bubblers were retired from service in 1981. The new electronic instruments for ozone, sulfur dioxide and nitrogen oxides were far more accurate, required no reagents to operate and could run continuously. That same year, the Drake CAM Station was retired and some of the instruments were moved to a new site in Norwood.

The concentration of lead in the air, as measured by analyses of high volume air sampler filters, was started in the laboratory in 1978. The University of Cincinnati, Department of Environmental Health was heavily involved in lead inhalation research and wanted to conduct analysis of ambient air with the Division's assistance. At the completion of the project in 1984, it was agreed that UC would continue to perform the analysis of our lead samples as long as they could use the data. The Division laboratory ceased to perform lead analyses on hivol filter papers in 1985.

Current research of inhalable particulates implicated fine particulates, particulate matter less than 10 microns (PM-10), to be directly associated with adverse health effects in humans. As a result, EPA promulgated a new National Ambient Air Quality Standard for PM-10. The first PM-10 instrument was installed at St. Bernard in 1984 followed by a second installation at Lockland in 1985. By the end of the decade, the Section was operating five PM-10

instruments in Hamilton and Butler Counties. The high volume air samplers were no longer supported by EPA.

Determination of pollen and mold counts was started in the spring of 1986. Pollen and mold spores were collected daily using a Rotorod Sampler. The rods were retrieved each morning and the number of pollen grains and mold spores was counted using a microscope. The counts were provided to the news media for dissemination to the public.

The first volatile organic compound (VOC) canister was installed at Carthage in 1989. A 24-hour sample was collected in the canister and sent to a laboratory for analysis. The analysis checked for the presence of 35 VOCs but only about eight VOCs were detected on a regular basis.

The decade ended with the following statistics in the 1989 Annual Report:

Budget	$1.29-million
Staff	32
PTIs	254
PTOs	773
Complaints	949
CAM Stations	5
Ozone Instruments	8
PM-10	5
Air Toxics Canisters	1
Gasoline testing	Continues
Pollen and mold	Daily

The History of Air Pollution Control in Cincinnati, Ohio

The 1990s

Significant change was coming for Southwestern Ohio Air Pollution Control Agency (SWOAPCA). Lead contamination was found at the Beekman Street office and the Metropolitan Sewer District was developing plans for a tertiary treatment plant on the site of the Gest Street Laboratory. The Agency would have to move from both sites. A county-owned building was available at 1632 Central Parkway and was offered to the Agency. Renovations to the second floor were completed by April 1990 and the Agency moved into the remodeled space in May of that year.

The Agency was now consolidated under one roof. The staff of 33 operated in four Sections:

Administration – Management, accounting, and public affairs
Industrial Programs – Permitting, inspections, enforcement, and complaints
Technical Services – Air monitoring, pollen/mold, air quality index
Special Activities Section - Stack test observations, VOC canister network, emission inventory program, modeling, and continuous emissions monitors

Prior to the move, Mr. Charles E. Schuman retired as Director of SWOAPCA after 33 years of service to the agency. The laboratory manager Mr. Harry G. St. Clair was appointed Acting Director in May 1990.

The Clean Air Act Amendments (CAAA) of 1990 was signed into law by President George H. W. Bush on November 11, 1990. These amendments brought sweeping changes to air quality programs. The CAAA addressed acid rain through the control of sulfur dioxide and nitrogen dioxide emissions; addressed stratospheric ozone depletion through control of CFC propellants; established a new facility permitting system under Title V of the amendments; established new automobile gasoline reformulation requirements and new automobile emission standards; and, addressed air toxic compounds by establishing New Source Performance Standards (NSPS) and National Emissions Standards for Hazardous Air Pollutants (NESHAP) under Section 111 and 112 of the amendments. The changes were sweeping and much work lay ahead for the agency to accomplish everything that was required.

Money and staffing were key issues to address all the CAAA programs. 1990 started with 33 staff members and a budget of $1.58 million. By 1995, the budget had increased to $2.87 million and the staff increased to 42 mostly to accommodate the new Title V permitting requirements. The budget peaked in 1996 at $3.13 million and slowly decreased to $2.4 million by 1999.

The sources of funding also changed during the 1990s. In 1990, the $1.58 million was apportioned among Federal 43%; OhioEPA 31%; Hamilton County 18%; and, the other Counties 8%. The Boards of County Commissioners of the four counties were increasingly reluctant to contribute to the operation of the agency. So, during 1991 and 1992, contracts were signed between the Agency and all the local health departments in the four-county area to adopt OhioEPA regulations into the health board regulations. These contracts then allowed SWOAPCA to enforce OhioEPA regulations through the local health departments in the four-county area. Additionally, these agreements allowed SWOAPCA to charge an annual fee to all the facilities that were regulated. With the concept of "local fees" in place, the four county administrations no longer contributed to the operation of the Agency.

Also in 1994, the OhioEPA began charging a Title V fee on all major contributors of air pollution. The first fee payment was due in 1994 for 1993 emissions and was set at $17.58 per ton of emissions. The

Title V fees became a significant source of operating revenue for OhioEPA and the local air agencies in Ohio.

The purpose of the 1990 CAAA was to introduce programs and regulations to significantly reduce ambient air concentrations of ozone, sulfur dioxide, nitrogen oxides and toxic air pollutants. Through the 1980s, only slight improvements in ambient concentrations of these compounds were observed. So, many new programs were initiated through the Amendments with a particular focus on reducing volatile organic compound (VOC) emissions, the precursors to ozone formation.

Stage 1 Vapor Recovery began in the early 1990s to reduce the amount of gasoline vapors released during tanker deliveries at gas stations. Then, Stage 2 Vapor Recovery was initiated in 1994 to capture gasoline vapors while fueling cars. The Regional Ozone Coalition (ROC) was formed to initiate a public awareness campaign to advise citizens about steps they could take during smog alert days to reduce the effects of smog. The ROC members included Ohio and Kentucky government agencies, businesses, and community organizations. The "Do Your Share for Cleaner Air" campaign started with ten tips of things to do during smog alerts: carpool, reduce trips, fill-up after 6:00 p.m.; and, cut grass after 6:00 p.m., to name a few. Television spots were purchased to promote the "Do Your Share for Cleaner Air" campaign.

E✓Check was another program required by OhioEPA to reduce the amount of exhaust emissions from cars in nonattainment areas. Cars were placed on a dynamometer and taken through a series of driving conditions all while the tailpipe emissions were being monitored. OhioEPA built testing stations in the Cincinnati, Cleveland/Akron, and Dayton/Springfield areas. A company was hired by Ohio EPA to operate all the test stations in Ohio for 10 years. Although not very popular, the emissions reductions achieved by the E✓Check program were significant. It was estimated that 18.8 tons of vehicle emissions per day were reduced through the program.

Slow but steady reductions in the ozone concentration in Southwest Ohio finally resulted in a three-year average that met the 1-hour ambient air quality standard of 0.12 ppm for 1992, 1993, and 1994. As a result, OhioEPA submitted a redesignation request to USEPA - Region 5 in 1995. Before USEPA acted on the request, the Southwest Ohio region violated the ozone standard in 1995 and the request was denied.

The next chance for redesignation of the 1-hour ozone standard occurred in 1998 when the department again registered a three-year average ozone concentration below the 0.12 ppm standard for the years 1996, 1997, and 1998. OhioEPA again submitted a redesignation request to USEPA - Region 5 in 1999. Several local environmental groups opposed and challenged the redesignation request slowing the process. Through the court battles that ensued, the region continued to meet the ozone standard in 1999 and again in 2000. USEPA finally approved the redesignation request and Southwest Ohio was officially classified as attainment of the 1-hour ozone standard in 2000. But, a new 8-hour ozone standard now had to be met.

USEPA released two revised ambient air quality standards in 1997: one for 8-hour ozone and the other for particulate matter less than 2.5

microns (PM-2.5). The revised ozone standard did not require changes in the monitoring network, only a change to the averaging times of the ozone concentrations. However, the PM-2.5 standard required the establishment of a whole new monitoring network, with all new equipment. The new equipment was very sensitive and required considerable maintenance and calibration. The new teflon filter disks were smaller than the PM-10 filter papers and required a microbalance to measure the minute amount of fine particulate matter collected. A special temperature and humidity-controlled weighing room was required but, none existed in Ohio. Although efforts were made, it was very difficult to precisely control the temperature and humidity of the weighing room at the Central Parkway laboratory.

Changes to the agency continued throughout the 1990s. Harry G. St. Clair continued as Acting Director until May 1992. What followed was County oversight by several Assistant County Administrators until August 1992 when Ms. Judith A. Zimomra was appointed Director of the newly formed Hamilton County Department of Environmental Services (HCDOES). Ms. Zimomra was wearing two hats at this time. She was the Solid Waste Program Manager, also located at 1632 Central Parkway, at the time of her appointment to HCDOES. However, she did not remain in these positions for very long. She left HCDOES in December 1992. Mr. Barry A. Burton a Senior Budget Analyst for Hamilton County was appointed the Acting Director of HCDOES in November 1992. By January 1993, the Solid Waste Management District was adsorbed into HCDOES as a fully functioning Division. Mr. Burton was appointed the Director of the new, combined department in October 1993.

Mr. Burton oversaw many operational changes at the Department. Job classifications and salary ranges were adjusted to reflect the levels of other local air agencies. He also purchased additional computers and established the agency's first computer network. He oversaw the hiring of additional staff to accommodate the many new requirements of the 1990 Amendments. After three years, Mr. Burton left the Department in April 1996 and Mr. Cory R. Chadwick was promoted as the new Director. Mr. Chadwick had been the Air Quality Program Manager at HCDOES.

Through the mid-1990s, HCDOES requested to move from the Central Parkway location. The neighborhood was not a safe place to work. The agency cars were repeatedly broken into, drug transactions were observed taking place around the building and one employee even had a gun pulled on him returning from lunch.

Finally in 1997, Hamilton County notified HCDOES that they had purchased two buildings on William Howard Taft Road in Clifton from the Ohio National Life Insurance Company and that we would be moving our offices to this location. One of the two buildings was a two-story doctor's office where HCDOES would occupy the entire first floor. An architect was hired and renovations began in 1998. The entire first floor was gutted to the outside walls and the space was rebuilt to the Department's specifications. Offices, cubicles, a breakroom, fileroom, laboratory, and a state-of-art controlled environment room was built for weighing PM-2.5 filters. This was the first PM-2.5 weighing room in Ohio and one of only a few in the entire region. In February 1999, HCDOES moved into its newly renovated space at 250 William Howard Taft Road.

Although the Department officially moved in February, the PM-2.5 weighing room had been operating in the new location for several months. Since no other controlled environment room existed in Ohio, the room was rushed to completion and filter weighing began before the renovations were officially

completed. The Monitoring & Analysis Section was now responsible for weighing all PM-2.5 filters in Ohio. As the PM-2.5 monitoring network slowly came on line in 1998 and 1999 the number of filters weighed increased to approximately 15,000 annually. Two additional staff members were hired: one to process the PM-2.5 filters and the other for field work. Preliminary data indicated that Southwest Ohio would be nonattainment for the annual PM-2.5 standard of 15 $\mu g/m^3$.

The Title V permitting system, as envisioned by the 1990 Amendments, was supposed to simplify the permitting process for industry and the permitting agencies. To qualify for a Title V permit a facility had to release over 100 tons per year of any single pollutant. Each facility would hold only one Title V permit which combined all their individual sources of air pollution into one document. However, the workload for processing each Title V permit actually increased because of the additional monitoring and reporting requirements included in the permits.

Ohio EPA made several changes to the state Title V program to simplify the permit review process. The first was to establish direct internet links to all local agencies and Ohio EPA district offices in 1995. Next, Ohio EPA developed a permit software system called STARS that provided a structured format for all submitted Title V permits. The STARS software also provided standardized language to use for each cited state or federal regulation. Permits were written at the local or district level using the STARS software and electronically submitted to Ohio EPA for review. The permit was then reviewed and revised electronically on STARS without having to mail the permit back and forth between the agencies and Ohio EPA. Although the software was not perfect, the system worked reasonably well. HCDOES was responsible for completing 78 Title V permits in Southwest Ohio. For each Title V facility, all existing Permits to Install (PTI) and Permits to Operate (PTO) had to be re-evaluated and incorporated into the single Title V permit. Each Title V permit was very labor intensive to complete which necessitated the hiring of additional staff in 1995.

Title V facilities also benefited from Ohio EPA's new STARS software. There was a separate program titled STARSHIP that enabled Title V facility representatives to electronically complete and submit a Title V application. The application was then imported into STARS so the permit engineers could review it.

The 1990 Amendments also created a new focus on toxic air pollutants. The National Emissions Standards for Hazardous Air Pollutants (NESHAP) of the late 1980s did not have the desired effect for regulating hazardous air pollutants (HAPs) because it focused on individual HAPs. So, the 1990 Amendments created the Maximum Achievable Control Technology (MACT) standards under Section 112 of the Amendments that developed regulations for specific source categories. In 1996, USEPA issued the first MACT standards for three source categories: Chromium Electroplating Operations; Solvent Degreasing Operations; and Drycleaners. Over the ensuing years, additional MACT Standards were issued for different source categories all adding to the workload of the permit engineers. However, the MACT standards were having their intended effect. Hundreds of thousands of pounds of HAPs were being removed from the environment. The effect was also being observed in the air toxics monitoring program that recorded decreasing trends for many industrial solvents by the late 1990s and early 2000s.

As the new century began, Southwest Ohio was meeting all six National Ambient Air Quality Standards for 1-hour ozone, PM-10, sulfur dioxide, nitrogen oxides, carbon monoxide and lead. However, it was obvious the region would be designated nonattainment for the new 8-hour ozone standard and the new annual PM-2.5 standard. The monitoring section was phasing out the PM-10 instruments while phasing in the new PM-2.5 instruments. The laboratory remained busy weighing all the PM-2.5 filters for the State of Ohio. The permit section continued to complete Title V, PTI and PTO permits as well as respond to over 600 complaints annually.

As the 1990s came to an end, HCDOES was well positioned to take air quality monitoring, permitting and enforcement into the next century. The Department had weathered much change and yet made significant improvements in air quality in Southwest Ohio.