A HISTORY OF AIR POLLUTION CONTROL IN CHATTANOOGA AND HAMILTON COUNTY

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This booklet was originally written in 1977. Portions were taken from the film, "Air Pollution: What One City Did," which was created by the staff of WTCI Educational Television. The booklet was revised and updated in 1985, 1991, 1996, and 1999.

Photo by NASA, Courtesy of the Environmental Protection Agency.

INTRODUCTION

A popular misconception about air pollution is that it is created only by human activities. Nature itself contributes pollutants to the air but has also historically been able to mitigate their effects. Rain, wind, and gravity cleansed the results of drought, erosion, eruptions, and fire.

More recently, however, technological development has brought dirtied air beyond nature's ability to cleanse. Chattanooga has suffered from this sort of overload as much as has any city. More, indeed, than most. The story of her fight against air pollution could well be that of most others . . . but it is not. Chattanooga has made tremendous progress in controlling a critical situation, while many larger, wealthier cities with similar problems have been bogged down in litigation, indecision, or indifference.

What made Chattanooga different? The most accurate answer appears to be that several important ingredients came together when they were needed. The timing was right.

In 1969, air pollution levels in Chattanooga were severe. Public outrage over destruction of the environment was at a peak. Correspondingly, polluters were conciliatory. A tough air pollution control ordinance had just been adopted for the city and the county, and the agency enforcing the new ordinance was reasonable.

How these various factors formed and brought forth a success story is the subject of the following pages. And since airborne smoke and fumes began their insidious attack upon the community long ago, we must begin the story with an earlier time . . .

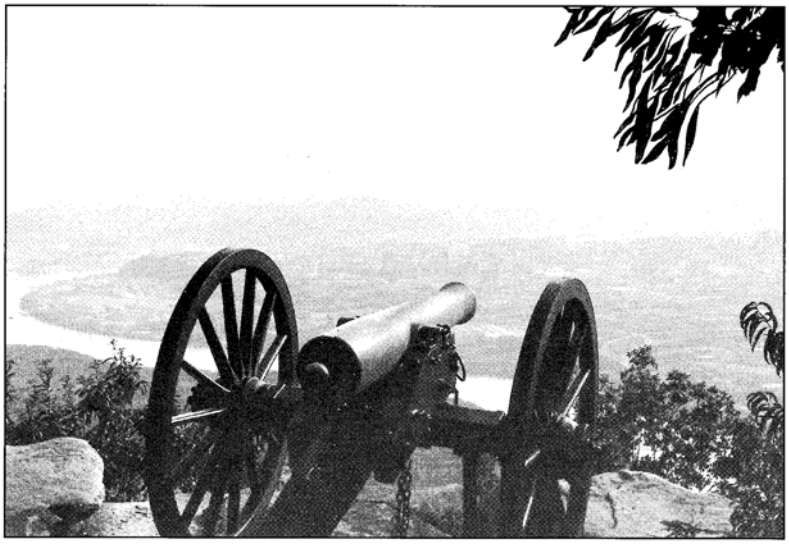
Chapter 1
THE EARLY YEARS

The land where Chattanooga now stands first drew attention in the annals of white man's history around 1540 during Fernando DeSoto's exploration of the new world. Here was a place of astounding natural beauty, blessed with towering mountains and the sparkling waters of the fast-moving Tennessee River. The land was beloved by the Cherokee Indians and eventually became dotted with their settlements. Around 1817 John Ross, perhaps the most renowned of the Cherokee chiefs though himself only one-eighth Indian, began a ferry service and a warehouse along the nearby Tennessee River at a location soon to be known as Ross's Landing. From the gathering of settlers at Ross's Landing came the city of Chattanooga, so named in 1838.

For many years Chattanooga remained a rather obscure community because of the transportation problems presented by the mountains and turbulent portions of the river. But the puff and scream of what was dubbed the "iron horse" signaled an end to the isolation, and the city began to grow. Railroads converted the area into an industrial focal point, connecting the North and South. Chattanooga's stature as a geographical vital link was evidenced during the Civil War as two major battles were fought for the city's control.

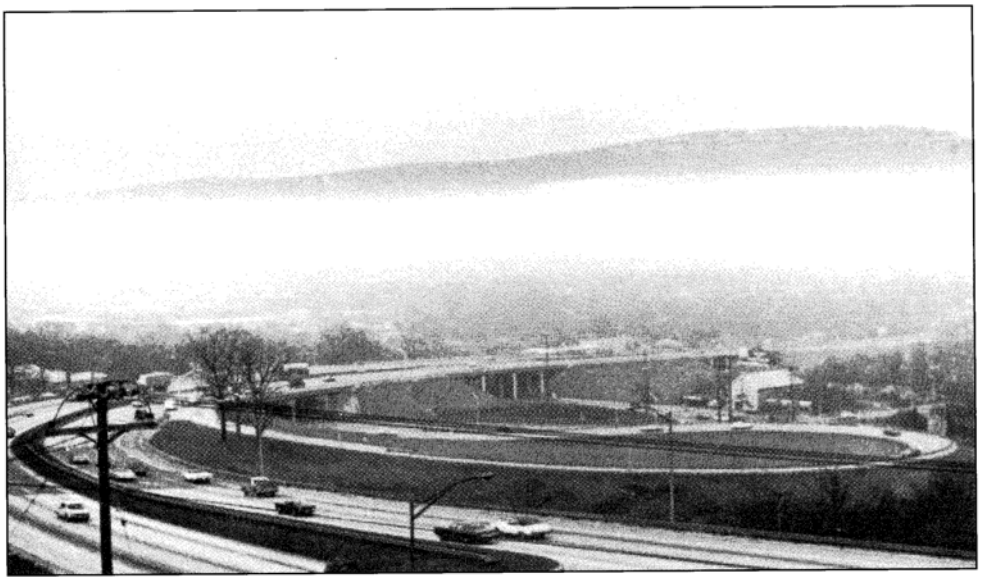
Rugged terrain would never allow agriculture to be the means of the city's growth, but if agriculture was not, industry certainly was! Industries of all kinds were attracted by the abundance of natural resources such as coal and a powerful river. The area's desirability increased as the Tennessee Valley Authority (TVA) built dams supplying inexpensive hydroelectric power for the burgeoning foundries, chemical plants, and numerous other industries, large and small. The continuing development brought Chattanooga to the per capita ranking of eighth in the nation for industry in 1974. But as industry grew, so did the city's pollution.

The air pollution problem in Chattanooga has always been compounded by the topographical and meteorological features of the area. Mountains and



Civil War battles were fought for the city's control.

ridges surround the city. The rays of the rising sun strike these higher elevations before they can strike the valley floor. Consequently, at times, a layer of air warmed by its proximity to this higher terrain stretches over a layer of cool valley air. Cool air does not rise above warm air. So local air pollution, instead of clearing the high borders and dispersing in the atmosphere, can be held within the city's valley like steam within a lidded pot. Generally, the severity of an atmospheric temperature inversion can be lessened by the intermixing which a strong wind would cause; however, Chattanooga's average wind speed is a meager 6.6 milers per hour. Put simply, what all these conditions mean is dirty air!

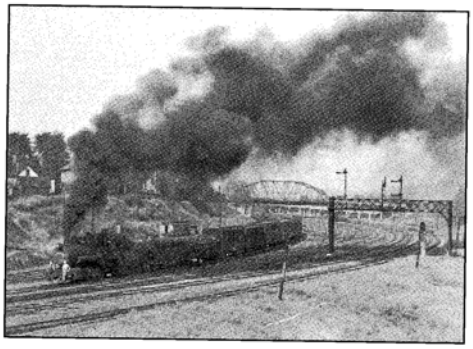


View of Chattanooga from Missionary Ridge during an atmospheric temperature inversion: steam within a lidded pot (Photo by George F. Hall).

Chapter 2
BOILER INSPECTION AND SMOKE CONTROL

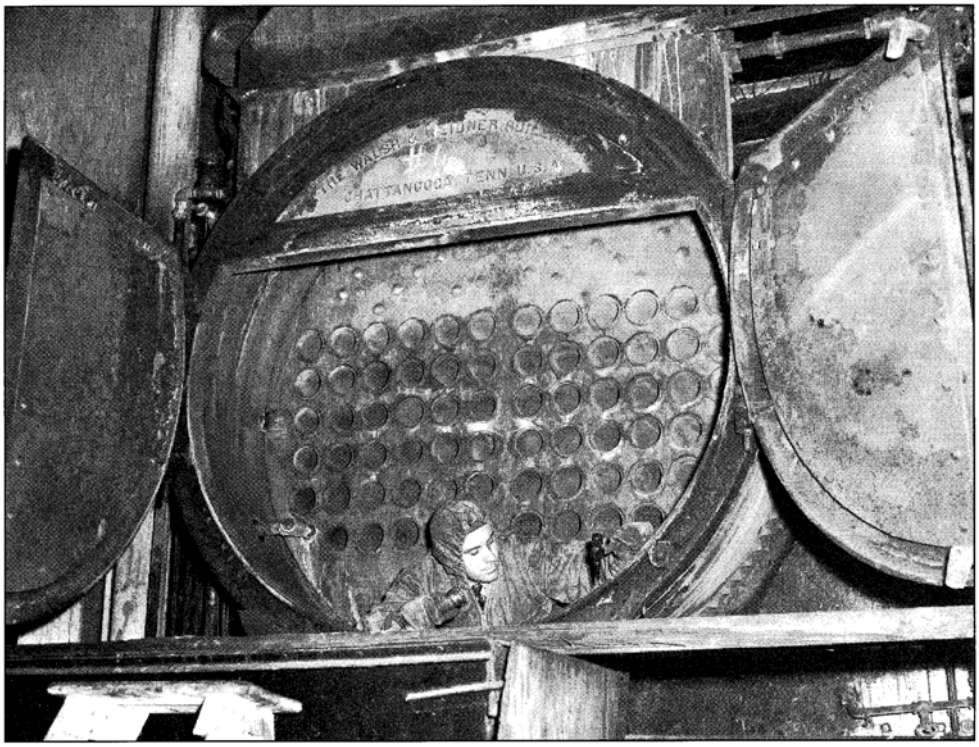
The move in the long struggle to control air pollution came in 1924. Local government passed a Boiler Inspection / Smoke Control Ordinance which could deal with the major source of the city's irritating smoke problem: the burning of soft coal. The Smoke Regulation and Boiler Inspection Commission authorized under this Ordinance made considerable progress toward smoke control. Unfortunately, the industrial demands of World Was II interrupted the efforts, as full production was needed. Concerned citizens had begun to realize, though, that something should *and could* be done, that billowing smokestacks need not accompany economic success.

Boilers like the one used by this hotel (above) and railroads which ran right through downtown (below) were pinpointed as major sources of air pollution.

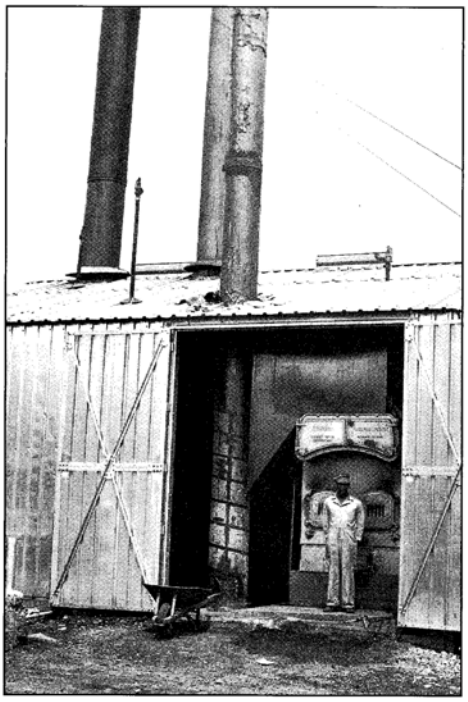


In the mid-1940's, the air began to look cleaner. As for controls, boiler inspections continued, and the output of the industries' smokestacks was being measured by the capturing of ash fallout in dustfall jars. Then a new trouble—a dramatic rise in dustfall—entered with the growth of the railroad industry. Ironically, the "iron horse" which had opened up the city was now helping to obscure it from view. Following deliberations, however, the Southern Railway System cooperated with the Smoke Control Bureau's request to install smoke-consuming devices on the locomotives.

But in time, the realization came that there were just too many holes in the dike to plug. The controls placed on trains decreased dustfall from that source, but many other sources of dust and smoke defied overall air



Boiler inspector at work.



A worker at a dairy company poses below a newly installed flyash trap, an early pollution control device set between the boiler and its smokestack (Photo by Kenneth B. Kile).

improvement. More stringent laws were needed. Hence, in 1948, formulation of a new ordinance was begun. An ordinance was finally passed by the City Council in 1951, whereby the Bureau of Smoke Abatement was given a measure of control over all sources of air pollution.

The word "measure" deserves emphasis because the extent to which city, county, state, and federal governments should share the responsibility of controlling pollution had not been determined. Beginning in December 1956, the federal and state departments of health conducted a six-month study in which the issue of responsibility was addressed. Their report recommended that local agencies be encouraged to deal with pollution problems to the best of their abilities. Nothing that air pollution is also a state-wide concern, the report further recommended legislation that would organize a state air pollution control program to give assistance to local agencies and to pursue solutions on its own where no local programs existed.

The stage for action was being set—and none too soon. Also included in the health departments' findings were reports that the pollution situation in eastern Tennessee, including the Chattanooga area, were particularly bad. Combustion of soft coal for heating ranked as a major cause of dirty air, while the use of other polluting fuels was also cited as on the rise. Industrial emissions, listed as another major pollution contributor, were predicted to increase steadily.

Chapter3
FROM BAD TO WORST

Meanwhile, air pollution had been receiving world-wide attention with disasters in such cities as London, New York, Los Angeles, and New Orleans. One air pollution episode drawing much attention occurred in the small city of Donora, Pennsylvania on October 27, 1948. Approximately 6,000 people—nearly half Donora's population—became ill, and 20 people died. Matters had become more serious. Pollution which discolored the sky was unfortunate, but pollution which sickened and killed human beings was unbearable.

Certainly there was reason for concern in Chattanooga. Contemporary reports ranked Chattanooga among the most heavily polluted cities in the country. A United States Public Health Survey, for example, showed that from 1957 to 1961, Chattanooga was the third worst in the nation for particulate pollution. By 1963, in Hamilton County the mortality rate from tuberculosis, though by some to be linked to air pollution, was three times the national average and double the Tennessee rate. Speculations were that air pollution was also causing respiratory diseases such as chronic bronchitis and emphysema.

POLLUTED AIR SICKENED 6,000

Report on 20 Smog Fatalities Released

WASHINGTON, Oct. 14 (AP)—Polluted air, pinned motionless by unusual weather, turned a creeping fog into a weapon of death at Donora, Pa., a year ago.

That conclusion was reached by the public health service in a 200-page report released last night. It followed many months of investigation by a team of 25 scientists.

The soot-laden fog, or smog, snuffed out 20 lives and made 6,000 persons ill. It began Oct. 27, 1948.

It sickened 15 per cent of the dogs in town—and killed 10 of them, three cats, 250 chickens and some pet rabbits and canaries. It didn't seem to bother cattle, sheep, horses or pigs.

"Our scientists tell us it was a rare phenomenon," said Federal Security Administrator Oscar R. Ewing.

"We hope and pray it will never recur—and it need not, if recommendations made by industrial hygiene engineers in this report are carried out."

Ewing added that he will ask Congress for $250,000 to carry on efforts to prevent air pollution.

The report recommended that cities and heavy industries take steps to reduce sharply the amount of smoke and grime their chimneys and exhaust pipes belch into the air.

It said the weather bureau should broadcast an alert when an "anticyclone"—like that which hovered over Donora—approaches smoke-blanketed valleys of eastern states. An anticyclone is a system of moderate winds revolving clockwise about a dead center.

The alert should be followed, it said by a "warning to take preventative measures" when the anti cyclone actually enters the industrial area and conditions are right for fog to form.

Finally, the report said, industries and cities should be required to observe the warning by curtailing smoke-producing activity or, if necessary, closing plants and buildings entirely.

The air pollution incident in Donora, reported in the article above, heightened awareness of the need for change.

One of the organizations early to respond was the Hamilton County Tuberculosis Association, which became actively involved in 1963. That year, and for six years following, the organization held annual symposiums on the medical facts-of-life about air pollution. Featured at these informative sessions were distinguished medical authorities whose talents were enlisted by an Association committee headed by Dr. Spires Whitaker.

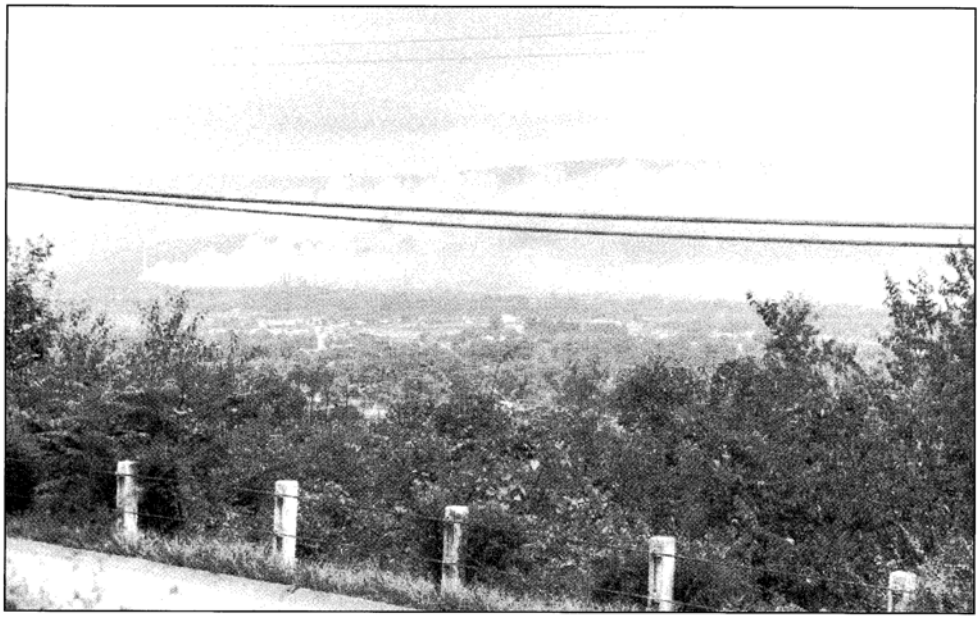
Of course Chattanoogans needed no speech to tell them that a pollution problem existed. They had tangible evidence, observable especially near congested industry, by the huge ammunitions factory, and in downtown areas near the foundries. So various citizens' groups acted. Complaints were registered with the Bureau about fumes and odors, and pressure was exerted for an increased spectrum of control for the Smoke Abatement Board.

Reflecting on that period of occasionally frustrated activity, former Tennessee State Senator Ray Albright, a leader of the then-active North Hamilton County Air Pollution Committee, surmised, "We had no help at all. No place to turn. In 1966, we approached city officials, county officials, we even asked for help from a local university. They wouldn't even run tests for us. A number of citizens' groups got together, and the press and television were always invited to our meetings. They would take pictures of the pollution. This generated interest in other areas of the city. Three reporters in particular took up the air pollution issue: Ed Baker of *The Chattanooga Post*, Springer Gibson of *The Chattanooga Times*, and J. B. Collins with *The Chattanooga News-Free Press*."

Mr. Gibson's revelation of a United States Department of Health, Education, and Welfare (HEW) study was one of a series of articles helping to solidify public opinion in trying to correct the pollution problem. Among Mr. Collins' many contributions was the influencing of the reorganized Air Pollution Control Bureau to set up its own public affairs office.

Ralph Kelley, Mayor of Chattanooga at the time, has shed some light on the city's prevailing attitude. "Elected officials," he said, "just want to do what is best for the community, and what's reasonable. And while we wanted clean air, we certainly didn't want to close down every factory in Chattanooga; this is a major manufacturing city. I knew it [pollution] was a problem generally. I didn't know the exact extent of it. It seemed to me that we ought to have some technical study to find out just where we were. So we asked that the Department of Health, Education, and Welfare conduct the first clean air study for Chattanooga. This report attempted to classify Chattanooga and tell us just where we stood in the extent of our problem."

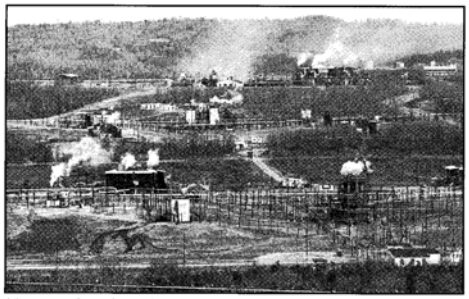
The HEW study to which Mayor Kelley referred revealed that particulate matter—smoke, flyash, and more generally, dust—was the primary pollution problem, with gaseous emissions of secondary concern. The concentration of material suspended in the air far exceeded the national average for cities of a similar size, and measurement of the soiling that occurred included some of the highest levels ever recorded anywhere.



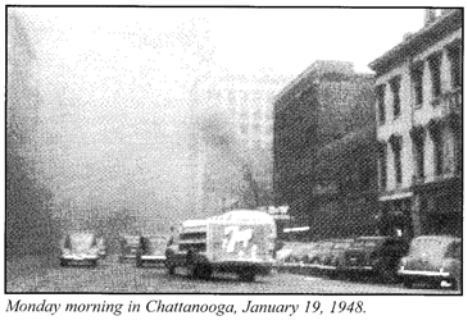
Tangible evidence.

Additionally, the study noted that on forty percent of the days during the test period, visibility was reduced because of the density of the particulates in the air. The study also reiterated the contribution of weather and terrain factors to the severity of pollution.

The study duly noted the relative effectiveness of the current smoke abatement program but also expressed the opinion that continued growth in the area would necessitate a broader pollution control program. The broader program, according to the recommendation,



Nitrogen dioxide at the Ammunitions Plant.



Monday morning in Chattanooga, January 19, 1948.

should be aimed at the elimination of the suspended particulate problem. Finally, to enhance the effectiveness of the effort, a strong liaison between government agencies was urged.

At the time of that report, there was general agreement that more pollution control action needed to be taken, but the specifics had not yet been laid out. One large variable was what would be required of industry. Mayor Kelley expressed a belief that responsible industrialists recognized that reasonable controls would be required of them wherever they located. He also acknowledged, however, the frustrating position in which industry had been placed. The federal government was saying clean up but was giving no specific standards.

So in 1967, Mayor Kelley again petitioned the help of HEW, this time for a comprehensive, area-wide air quality survey. Chattanooga needed statistics that would provide a broader base for technical standards and articulate ordinances. The study lasted a year. Not surprisingly, Chattanooga was found to have big problems in the area of suspended particulates. Moreover, dangerous levels of nitrogen dioxide were monitored near the Volunteer Army Ammunition Plant. The study also recorded the detrimental effect that these pollutants were having on various materials and vegetation.

Newspaper reports of this latest study underscored the severity of Chattanooga's pollution problem. Because of its suspended particulate, Chattanooga had previously been ranked as one of the worst—but now, according to the HEW report stamped January 1969, it was *the worst* polluted city in the United States.

Sometimes car lights were used in the daytime downtown (Photo by Cecil Pierce).

Chapter 4
CLEANING UP

Chattanooga's surging interest in pollution control coincided beautifully with the passage in 1965 of the first Federal Clean Air Act. The legislation paved the way for further action on the local level throughout the country. More specifically, it provided federal funds for the development of an air pollution control program in Chattanooga.

In 1967, the city's Chamber of Commerce deliberated on its contribution to that development. Chamber President Tom Duff asked Alex Guerry, a local industrialist and civic leader, to undertake a study and recommend to the Board first of all whether or not the Chamber should become involved in this matter. That question arose not only because of the technical complexity of the issue, but also because of the Board's varying personal interests as manufacturers or as clean air crusaders. If Chamber participation was deemed wise, Mr. Guerry was also to recommend an effective course of action.

In a pragmatic five-page report, Mr. Guerry did recommend involvement, stating, "Despite the possible dangers and disadvantages, I favor a major air pollution effort by the Chamber. I have one major provision, however—that there be a clear majority commitment to real action—to do something significant . . ."

The Chamber did become significantly involved in accordance with several steps of action recommended in Mr. Guerry's report. Briefly, those steps were: 1) Determine standards; 2) Pass laws; 3) Enforce the laws; and 4) Seek community support for an ongoing program.

The important process of determining standards presented a technically arduous challenge. To meet the challenge the Chamber asked Dr. Marion Barnes, president of Covenant College and a noted authority on air pollution control, to head what was termed the Technical Subcommittee. The responsibility of this task force was to draft the technical section of a proposed air pollution control ordinance for the city of Chattanooga.

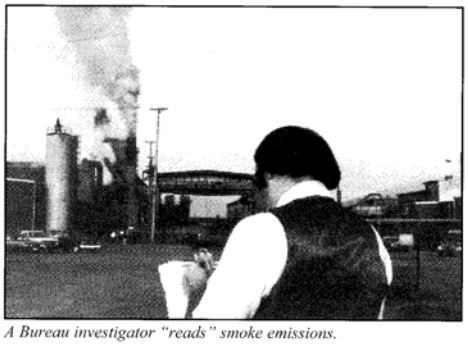
"Drafting of the ordinance was the first major step," remarked Dr. Barnes. "It was necessary to do this in order to correct some of the weaknesses of an earlier law, also to provide for more representation of the total citizenry on the Air Pollution Control Board. The earlier Board was rather small, and it was composed largely of representatives of industry. It was felt that it was desirable to have a general representation on the Air Pollution Control Board."

Dr. Marion Barnes.

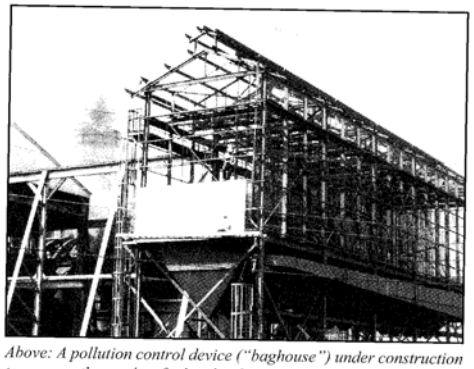
A brief set-back occurred in 1968 when federal funds were withdrawn from Chattanooga for failing to develop an adequate program. The time had come to adopt and enforce the program which had been under discussion. After two years of drafting, debating, and revising, the new Chattanooga-Hamilton County Air Pollution Control Regulations were passed in 1969 by both Chattanooga and Hamilton County, and eventually by each municipality in the county. Federal funds were once again approved for the local air pollution control program.

The law created an expanded Air Pollution Control Board of nine unpaid citizens, appointed by the Mayor and the County Executive, and one ex-officio member representing the Chattanooga-Hamilton County Health Department. Dr. Barnes was elected Chairman of the newly appointed Board. Placed under the authority of this Board and its administrative arm was an Air Pollution Control Bureau, headed by a Director selected by the Board and approved by the Mayor and County Executive.

The new law also allowed open burning by permit only, placed regulations on odors and dust, outlawed visible automotive emissions, set a four-percent cap on sulfur content in fuel, and controlled the production of sulfur oxides. Limits were also set on the industry's visible emissions, with the thickness of the smoke emissions to be evaluated by a method known as the Ringelmann number system. October 14, 1972 was set as the deadline for all existing major sources of



A Bureau investigator "reads" smoke emissions.



Above: A pollution control device ("baghouse") under construction to vacuum the smoke of a local industry.

Below: Children from the Ben Mott School release balloons on Clean Air Day to encourage public support for air pollution control.

pollution to be in compliance with a specified (Ringelmann #2) opacity level of smoke emissions. More stringent levels were scheduled to be met by 1974. These more stringent levels would be required of any new industry arising during the interim.

The steps for achieving compliance had been established. Standards were set, laws passed, and an agency organized to see that compliance was accomplished. When this aggressive program was initiated in 1969, a lot of cleaning up had to be done. But once reliable standards and a reasonable approach to attain them were employed, virtually every industry rallied behind the effort.

And the effort bore fruit; every major air pollution source in the county met the 1972 compliance deadline at an estimated expense of $40 million. As on a national basis industrial cooperation could hardly be taken for granted, this accomplishment was no small matter. The feat was celebrated during "Clean Air Week," October 20-26, 1972. On that occasion, the message was declared, "Now you can breathe in our city."

The air improvement drew national attention. The national Air Pollution Control Association awarded Chattanooga First Place in their Annual Cleaner Air Week ceremonies designed to recognize pollution control progress. And such distinguished members of the media as The Wall Street Journal, The New York Times, ABC-TV, and CBS-TV did stories heralding the success. So also did U. S. News & World Report, which stated of Chattanooga, "This city was known as the most polluted

city in the nation. Now Chattanooga is rated as one of the cleanest cities."

By the time that the 1974 deadline neared, the previously set Ringelmann goal had become obsolete as a more sophisticated measurement system had been developed. Improvement in air quality had continued, though, and was duly recognized. In 1974, Chattanooga was the only city in the nation to receive the Quality of Life Award in the category of air pollution abatement, an award issued by an air-conscious magazine, The Environment.

A complimentary summary of these first years of the modern-day Chattanooga-Hamilton County Air Pollution Control Board and Bureau can be found in the words of former Oregon Governor Tom McCall. In a visit to Chattanooga during the period, he concluded, "When a city of which industry is polluting such a great part can turn things around, as Chattanooga apparently has done in the past five years, it does represent a truly Herculean effort. And it is an effort that is rewarded, even though it is expensive. It is rewarding in itself, because this is what industry has to do as a corporate citizen. It is rewarding to the neighbors of these industries to have the air that much cleaner. And there is also a large, large cash payoff. Those tourists who might have been alienated by what was severe air pollution in 1969, 1968, and before that, can now return with the assurance that beauty can be fully enjoyed!"

Billboards of the 1960's, above (Photo by W.C. King), and the 1970's, below, reflect a change in air quality and public attitude.

Chapter 5
THE SPECIFICS

The clean air accomplishments in Chattanooga and Hamilton County have been aided by carefully made plans coordinated with the federal government's overall air quality plans for the country. Basically, the format is as follows: the federal government determines national standards for various air pollutants; communities measure to see if they meet those standards; and the communities develop pollution reduction plans for those pollutants that fail to meet the standards. Upon review, these plans are presented by the state governor to the federal government as part of the state's overall plan, known as the State Implementation Plan (SIP), to achieve acceptable air quality throughout the state. The federal government then accepts the SIP or returns it for revamping.

The federal government agency involved is, of course, the Environmental Protection Agency (EPA) which was created by executive order of President Nixon. Following its formation, the EPA eventually singled out seven pollutants— hydrocarbons, lead, sulfur dioxide, nitrogen dioxide, carbon monoxide, particulate, ozone, and—as most urgently needing attention. For those so-named "criteria" pollutants the EPA set National Ambient Air Quality Standards (NAAQS) to be attained by 1975.

Hydrocarbons have not been monitored directly in this county. This class of pollutants has been dropped from EPA's criteria list. The apparent reasoning was that controlling for ozone concentrations would also control hydrocarbons, a precursor to ozone.

Lead pollution has never appeared to be a problem in Hamilton County. The greatest source of lead air pollution was the exhaust of vehicles burning leaded gasoline. The problem was usually associated with larger cities with heavier traffic than Chattanooga. Furthermore, with the phasing out of leaded gasoline during the 1980's, air concentrations of lead have virtually disappeared nationwide.

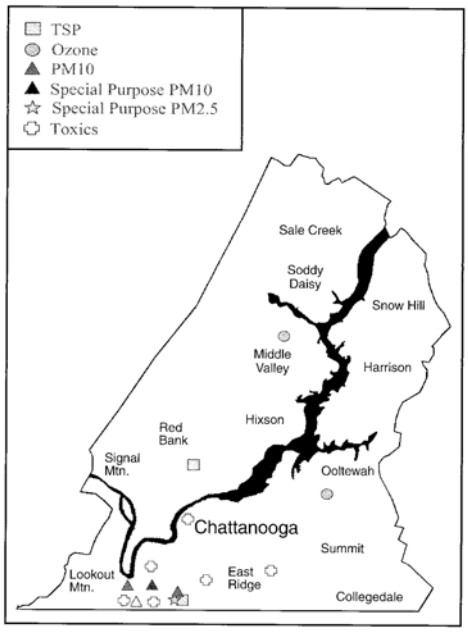
Sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) were monitored by the Bureau in the early years following its formation in 1969. The levels of SO_2—a gas resulting primarily from the burning of sulfur-containing fuels such as coal and oil—were not found to be a problem. Concentrations of NO_2—a gas resulting mostly from high temperature combustion of automobile or industrial fuel—were determined to be hazardously high near the Volunteer Army Ammunitions Plant

(VAAP). The NO_2 emissions from the ammunitions factory ended in 1975 when the factory stopped operations at the close of the Vietnam War, and since then, air concentrations of that pollutant in Hamilton County have been found to be within EPA guidelines.

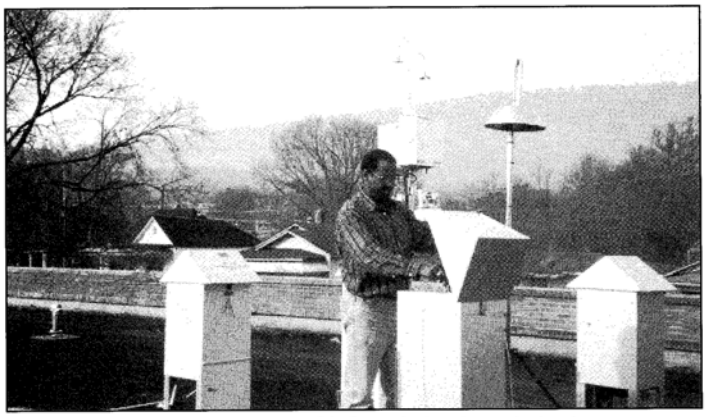
Significant levels of carbon monoxide (CO) were first detected when a CO monitor was moved to the downtown area of the city in 1978. CO is almost entirely an automobile-related pollutant, so the concentrations of this pollutant downtown can be attributed to the combination of heavy traffic and the "street canyon" effect of tall building which curtail the natural dispersion of pollution into the atmosphere. In 1984, EPA determined that the downtown monitor was not in an acceptable location, and the monitoring was discontinued.

As part of a special monitoring project in South Chattanooga, CO monitoring soon began again and CO levels were found to be well within the national standard. Also, during the 1980's and into the present, it would be reasonable to expect that CO levels have decreased because of the increasingly larger percentage of newer vehicles on the road that have air pollution control equipment (which is designed to reduce CO and other pollutants), as older cars without the equipment are retired.

As has been mentioned, particulate was Chattanooga's most pressing criteria pollutant problem. EPA's primary, health-based standard for particulate was set at an annual average of 75 micrograms of particulate per cubic meter of air ($\mu g/m^3$). The annual average in Chattanooga in 1969 was nearly triple that level: 214



This map shows the 1998 Hamilton County monitoring sites.

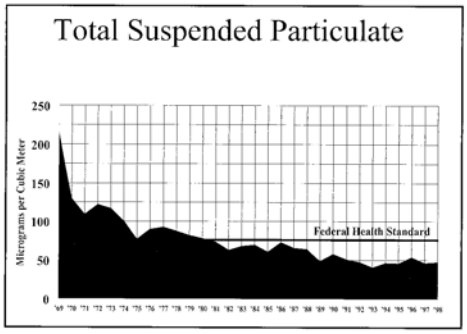


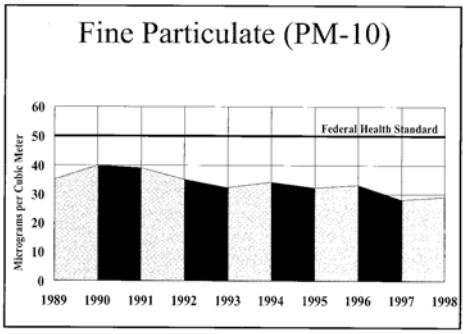
Instrument Technician Ben Morgan at one of the Bureau's air toxics monitoring sites.

micrograms! But tremendous strides toward attaining the standard occurred quickly. In just one year, the highest annual average measured in the city dropped nearly fifty percent to 113 micrograms.

Improvement continued less dramatically, the greatest problems having been addressed, and it fluctuated somewhat with industry production levels. A new booster, however, was provided by the 1977 Amendments to the Clean Air Act. Due largely to a lack of incentives, national clean air progress had been sluggish under the 1970 Act. The 1977 Amendments "put teeth" into the attainment schedule. New deadlines with significant penalties for noncompliance were set. In addition, the Amendments required more sophisticated pollution control equipment, categorized under the title of Reasonably Available Control Technology (RACT), on major stationary pollution sources in areas which were still dirtier than the primary standards set by EPA. States were to present SIP's with these new equipment provisions by July 1, 1979.

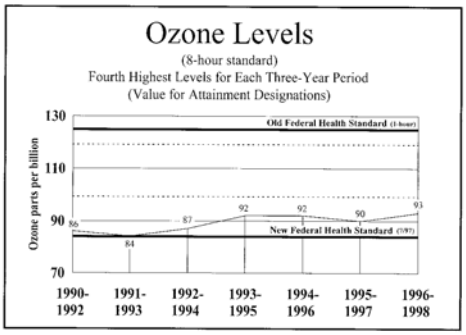
Chattanooga took part in that SIP process because EPA had designated a roughly four-by-seven mile section of downtown Chattanooga as "non-attainment" of the primary and secondary particulate





standards. The drafting of an acceptable SIP was an arduous and lengthy project tackled by the Board and Bureau with the aid of a dedicated citizens' advisory committee. Deliberations lasted several years as EPA required substantial revisions to the city's air pollution control ordinance. The final, accepted proposal for particulate projected the industrial investment required to meet the RACT requirements to be over $23 million.

The measures, though not without pain, were effective. In 1981, Chattanooga dipped below the 75 microgram level for the first time with the highest annual reading being 74 micrograms. The primary standard



attainment deadline of December 31, 1982 had been met with time to spare.

The good record had to continue. The previous high reading had brought the threat, and in some cases the imposition, of federal sanctions. Federal funding for concerns such as highways or the local air pollution control program itself can be cut off from non-complying cities. Also, as was the case in Chattanooga, restrictions automatically are imposed on the expansion of existing industry or the development of new industry if a city is designated as being in "non-attainment" of the particulate standard.

For EPA's designation of a city as "non-attainment" to change to "in-attainment," there must not just be one good year, but a persisting pattern of good air. This pattern was displayed in Chattanooga such that in 1984, the fourth straight year of particulate levels below the primary standard, the city was officially redesignated "in-attainment" of the primary standard—a noteworthy accomplishment which even drew the praise of Lee Thomas, the administrator of EPA. In an April 1985 letter to Mayor Gene Roberts, Mr. Thomas wrote, "Twenty years ago Chattanooga was one of the worst offenders in the nation in terms of its air pollution levels. At times during the 1960's it ranked first among U. S. cities with unhealthy levels of particulates, one of the pollutants regulated by EPA. Today, in contrast, the City is in compliance with EPA primary standards for particulates. Certainly you have come a long way, and your progress can serve as a model for other communities faced with similar problems."

The primary particulate standard is designed to protect human health. Historically, EPA has also had a secondary particulate standard designed to protect animal and plant life and materials. This stricter standard of 150$\mu g/m^3$ for a 24-hour average reading was originally to have been met by 1990. Chattanooga had data good enough to submit for designation as "in-attainment" for this secondary standard, but the submission would be moot in light of a development in 1987.

That is the year that EPA directed that particulate matter be measured differently. The agency determined that very fine particulate is what presents a health threat since this material can elude the body's defenses and penetrate deeply into the lungs. EPA said only this subcategory of particulate should be measured. It is referred to as PM_{10}, an acronym representing particulate matter 10 micrograms or less in diameter. (A human hair measures about 100 microns in diameter.) The PM_{10} standard is 50$\mu g/m^3$ on an annual average. Chattanooga has consistently had annual readings better than that standard.

Ozone (O_3) has been monitored by the Bureau since 1979. This pollutant is the principal component of modern day smog and is the most pervasive air pollution problem in eastern Tennessee, where significant concentrations can be found even in rural areas. It is not from any pollution source but rather is formed by the reaction of other pollutants—particularly NO_x and volatile organic compounds—in the presence of sunlight.

Compliance with the ozone standard required an average of no more than one exceedance at each monitoring station per year over any three-year period.

Field Technician Arthur Carree prepares a particulate monitor.

That requirement was first met locally with the 1984-1986 data. Several years passed, however, before Hamilton County was officially declared to be "in-attainment" of the ozone standard. That declaration was made on December 13, 1989 at a Chattanooga press conference attended by numerous dignitaries including EPA Director of the Office of Air Quality Planning and Standards Gerald A. Emison, and EPA Region IV Administrator Greer Tidwell. Mr. Emison summed up the significance of Chattanooga's clean-up as he announced, "You all have done what has not been done in very many places in the United States."

In July of 1997, the EPA finalized new National Ambient Air Quality Standards (NAAQS) for particulate matter and ozone. The new particulate standard will require the monitoring of $PM_{2.5}$ (particulate matter that is smaller than 2.5 microns in diameter). EPA is adding an annual $PM_{2.5}$ standard set at a concentration of 15 micrograms per cubic meter (mg/m^3) and a new 24-hour standard set at 65 mg/m^3. The revised 8-hour ozone standard has replaced the previous 1-hour standard for our area. The new standard is set at a concentration of 85 parts per billion (ppb). Areas will be allowed to disregard their three worst measurements every year and average performance over three years to determine if they meet the standard.

In summary, within the first twenty years of its modern air pollution control program, Chattanooga was declared in compliance with every federal air pollution health standard. Originally, there were seven criteria air pollutants. EPA removed hydrocarbons from that list, and then there were six. Of those, three pollutants—SO_2, CO, and lead—proved not to be problems locally. As for the remaining three, particulate levels were reduced dramatically through the 1970's, and the standard was officially attained in 1984; NO_2 levels dropped below the standard when our one large source of NO_2 stopped operating in 1975; and ozone concentrations were brought under control in the mid-1980's, and the standard was officially attained in 1989. Areas will not be designated as in or out of attainment relative to the new standards for ozone until 2000 and for particulate matter until 2002. The designations will be based on the three most recent years of air quality monitoring data at the time they are made.

Chapter 6
NATIONAL INFLUENCE

Through the years, the Chattanooga-Hamilton County air pollution control program has impacted more than the local area. From its beginning, the program has proven to be a leader in its field.

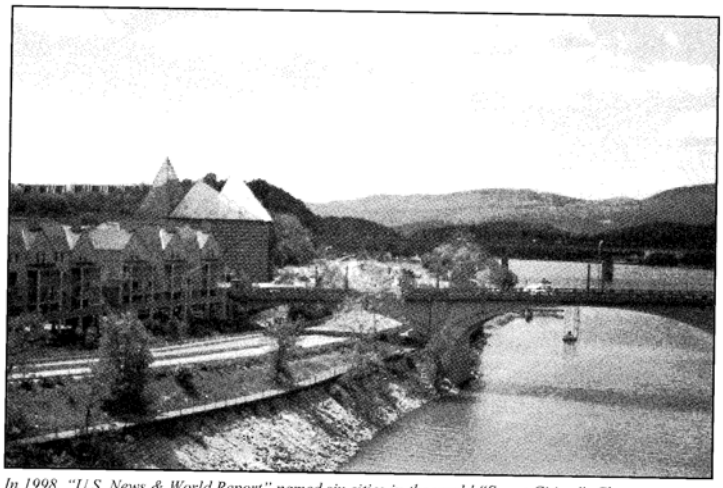
One of Chattanooga's first contributions in the air pollution field occurred via the 1967 U.S. Department of Health, Education, and Welfare studies on NO_2 emissions from the Volunteer Army Ammunitions Plant. Data generated from these studies were the primary basis for the current EPA national standard for NO_2 as well as for the development of the catalytic converter used in automobiles to control this criteria pollutant, according to officials conducting the study.

Chattanooga has contributed in numerous ways to the study and control of toxic pollutants as well. Toxic air pollutants are contaminants which are less widespread and found in smaller concentrations than criteria air pollutants but which can still, in spite of those limitations, pose significant health threats.

One of the first innovations toward control of these more obscure air pollutants occurred in the early 1970's when the Bureau succeeded in persuading the State Court of Appeals to enjoin further production of herbicides at a Chattanooga chemical plant. Toxic emissions from that plant were determined to be damaging local vegetation. To check for compliance with the prohibition, the Air Pollution Control Bureau placed biological monitoring stations, including greenhouses, around the circumference of the chemical plant. During the growing seasons for many following years, Bureau staff made monthly biological inspection tours utilizing a rating scale developed by a staff member.

In the mid-1980's, Chattanooga's air pollution control program received considerable attention for being on the cutting edge of toxics research via its involvement with Piney Woods, a South Chattanooga residential area bordered by numerous industries. Piney Woods residents had approached the Air Pollution Control Board in 1983 and requested that a health survey be conducted and that action be taken on air toxics in their community.

The Board requested and received the aid of the Tennessee Department of Health and Environment to conduct a health survey. While the study ensued, a private consultant was retained to conduct an air toxics



In 1998, "U.S. News & World Report" named six cities in the world "Smart Cities." Chattanooga was chosen as one because of its clean air story and its downtown revitalization.

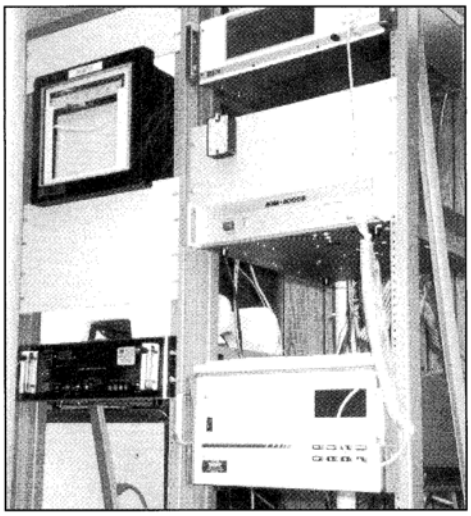
study of the Piney Woods region. This study was followed by a short-term air toxics monitoring project conducted by EPA to cross-check the accuracy of the consultant's predictions. Both toxics studies indicated no health threat from air pollution, but upon a citizen group's request for more study, the Board then joined with the Tennessee Valley Authority (TVA) in the most intensive air monitoring project ever conducted in Tennessee. All criteria pollutants and a large number of toxic air pollutants were monitored continuously for more than a year. This study likewise indicated no health threat posed by air pollution.

The information from the health study completed around that time, however, was interpreted by the State to indicate that the number of some self-reported health problems by Piney Woods residents was "statistically significantly greater" than some self-reported health problems by a similar community not bordered by industry. No outdoor air problem having been identified, the Board then joined again with TVA

to conduct an indoor air pollution study. Some elevated levels of NO_2 were found in South Chattanooga public housing. These levels were associated with the malfunction or misuse of gas appliances. An education and remediation program was undertaken, and a routine gas appliance inspection and maintenance program was established.

Chattanooga became involved in another innovative toxics project in 1985. The six-county metropolitan area around Chattanooga was selected by EPA to be the national Environmental Methods Test Site (EMTS). The main objective of EMTS was to develop ways of measuring the kinds and amounts of toxic pollution to which people from different walks of life are exposed. Among the studies undertaken were the development of a computerized mapping system, testing of particulate monitors, testing of formaldehyde monitors, and a study of the accumulation of toxic chemicals in the human body. The project concluded in 1988 following congressional funding changes and a shift in research direction within EPA.

The Chattanooga air pollution program also has had national influence through the involvement of its leadership in policy development. J. Wayne Cropp, Director of the Air Pollution Control Bureau during the 1980's, served as president of the Association of Local Air Pollution Control Officials (ALAPCO), an organization representing more than 165 local programs nationally. For numerous following years, Cropp headed ALAPCO's air toxics committee, which contributed to the formation of the air toxics portion of the 1990 CAA amendments. Current Bureau Director Robert H. Colby



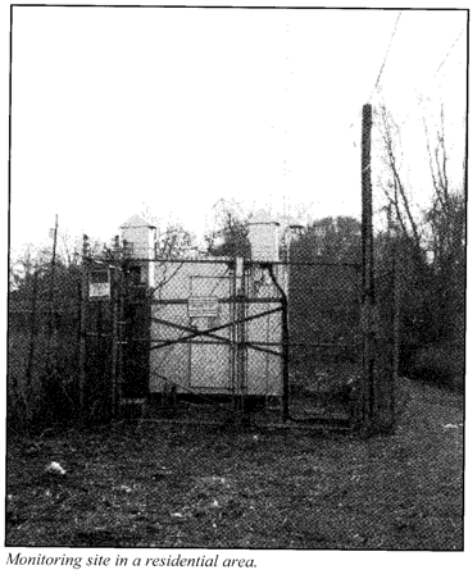
The inside of a monitoring trailor with ozone monitoring equipment.

continues this legacy of involvement, having served as ALAPCO president as well as ALAPCO's air toxics committee chairman since 1993. He has also been deeply involved in implementation issues surrounding the 1990 Clean Air Act Amendments at the national level.

Chattanooga's designation as a clean city for ozone must not go without mention either. Ozone has proven to be the most difficult criteria pollutant for the country to control, a fact evidenced by the more than

100 U.S. metropolitan areas that still fail the ozone standard. By being redesignated to "in-attainment," Chattanooga and Hamilton County showed the nation that the clean-up of this stubborn pollutant is an achievable goal.

Chattanooga's "can do" message was given a broad platform on the twentieth anniversary of Earth Day, April 21, 1990. The widely distributed magazine



Monitoring site in a residential area.

Sports Illustrated featured the environmental turnaround that occurred here, assessing it as "not a miracle but a nuts-and-bolts model of how though government, cooperative businessmen and a very alarmed public can make a dirty world clean again."

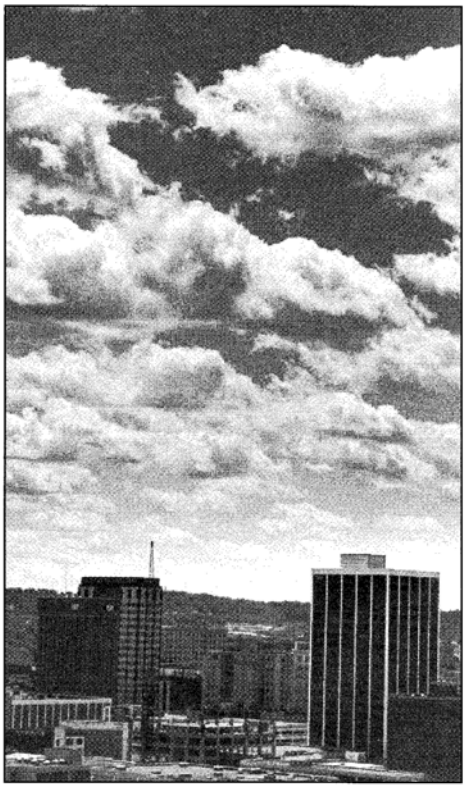
Chattanooga's "can do" message is having an impact overseas, too. Chattanooga is becoming internationally known for its clean-up efforts. Visitors from all over the world are coming to Chattanooga to see how the city that was known as the dirtiest city in the nation in 1969 has made such a remarkable turnaround. Visitors hear about the Chattanooga Institute which fosters sustainable development and the Futurescape study that was done by the Regional Planning Agency to determine what Chattanooga's citizens want their city to look like. They learn about plans for the redevelopment of the Southside, the possibility of creating eco-industrial parks, and expanding the greenways. They can also catch a ride on one of Chattanooga's electric buses (manufactured by a local firm) from the largest fleet of electric buses in the world.

Finally, Chattanooga's improvements in air quality are credited in part for spurring a broader environmental movement now developing in the community. Interested citizens and community organizers are working to see Chattanooga become a prototypical "sustainable community," where both people and nature can prosper, and where, in turn, the lessons learned and resources developed can be of use to other communities interested in being good stewards of their environment.

Chapter 7
TRANSITIONS

Today's air pollution control program bears little resemblance to the program which began in 1924. In those beginning days, "staff" reportedly consisted of one lunch-hour boiler inspector. In contrast, the present four-department Bureau consists of 21 individuals trained in diverse fields such as engineering, law, electronics, and chemistry.

Pollution measurement has moved way beyond the earlier days when dust was captured in one-gallon mayonnaise jars. Now, electronically-controlled samplers draw ambient air through pre-weighed filters, and sophisticated computer systems measure gaseous pollution and communicate data via telephone lines directly to a computer at Bureau headquarters.



Pollution control equipment has also developed greatly from the days of the original boiler flyash trap. Unhealthful pollutants are sucked out of smokestack emissions by gigantic vacuum systems, cast away by centrifugal force, electrically charged and attracted to oppositely-charged plates, destroyed by afterburners, and washed free by clashing streams of chemicals.

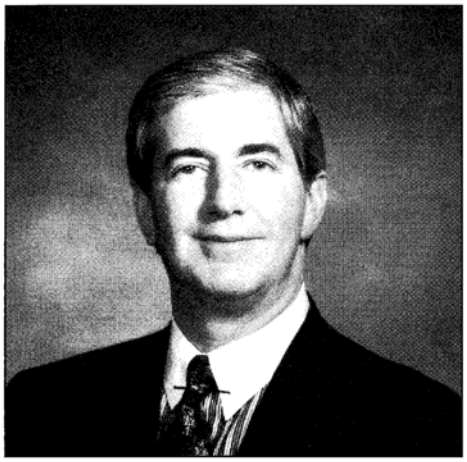
The emphases of the air pollution control program have shifted as needs have changed over the years too. In the early 1970's, the large-scale, obvious sources of criteria pollutants, especially particulate, were tackled first. In the alter 1970's and into the next decade, continued reductions in particulate were sought through fine-tuning and through controlling smaller sources, and increased attention was given to reducing chemical fumes that could lead to ozone formation. With the advent of the 1990's, Chattanooga had attained every criteria air pollution standard, and while considerable attention continued and does continue to be given to guarding the improvements already achieved, a whole new set of challenges was placed before us.

Those challenges were in the Clean Air Act amendments signed into law by President Bush on November 15, 1990. Because Hamilton County is in compliance with air health standards, some of the stringent requirements of the CAA do not apply here. Some new stringent requirements do apply, however. The most notable being air toxics and a new permitting system.

The 1990 CAA named 189 toxic chemicals for EPA to regulate. EPA listed the kinds of facilities to be regulated, the emissions standards to be achieved, and the technology to be used. State and local air pollution control programs are to carry out these determinations. The Air Pollution Control Bureau has been developing an air toxics program since the early 1980's. The toxic compounds that are or could be released in this county have been listed along with their various sources. A system is in place to project total amounts of these compounds in the outdoor air and the associated health risks. A staff position of air toxics coordinator was established to operate the program. A site study has been conducted by the Bureau for at least five air toxics monitoring sites under the EPA Urban Air Toxics Monitoring Program, and the Bureau has begun an outreach program to explain new regulations to businesses before inadvertent violations occur.

The 1990 CAA also required that a permitting system be developed for seeing that the amendments are carried out. The Bureau developed a permitting system which was approved by EPA in 1996. This local program, called the Part 70 Operating Permits Program, was required by Congress to develop a fee structure to pay for the administrative costs of permit programs for major sources. This shift in payment takes the burden from taxpayers and places it on the sources of pollution.

Some sources, which because of their potential-to-emit would be considered major sources of air pollution and therefore subject to Part 70 requirements, have agreed to enforceable permit limitations to reduce their potential-to-emit. As long as these sources do not violate the conditions which are placed in their current



certificates of operation, they are not subject to Part 70 requirements and fees.

There are various other elements in the CAA which are of interest in one fashion or another to all local citizens. There are cleaner fuel requirements and tighter emissions standards for vehicles. There are measures for addressing regional and global problems such as acid rain, depletion of the ozone layer, and global warming. And there are statutes for increasing EPA's authority to impose civil and criminal penalties.

The Air Pollution Control Bureau's approach to these new developments in the process of cleaning the air is to progress with the art. According to Bureau Director Robert H. Colby, "We will be working with the federal EPA to determine as early and precisely as possible how many new laws will be put into play, and we will stay in communication with Chattanooga's industries." Mr. Colby adds, "Local citizens and industries can be proud of and grateful for the good air quality which they have already helped to achieve. Moreover, the whole community continues to have the opportunity to be contributors and to influence the direction of this city's efforts to make this a more healthful and beautiful place to live."

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