STATE OF NEW JERSEY

Hon. William T. Cahill, Governor

Department of Environmental Protection

Hon. Richard J. Sullivan, Commissioner

New Jersey Clean Air Council

John P. Horton, Chairman

Report of the Annual Public Hearing

of the New Jersey Clean Air Council

on

THE ENVIRONMENTAL IMPACT ON AIR POLLUTION:

THE RELATIONSHIP

between

AIR QUALITY, PUBLIC HEALTH, AND ECONOMIC GROWTH

in

NEW JERSEY

1972

New Jersey Clean Air Council

Department of Environmental Protection

John Fitch Plaza, Trenton, New Jersey 08625

PART I: INTRODUCTION AND SUMMARY OF KEY FINDINGS

Introduction

In September 1971 thirty-four young football players from Quibbletown Junior High School in Piscataway, New Jersey, became ill during a practice session. The illnesses were subsequently attributed by some to air pollution levels in the area. This incident occasioned widespread public concern at the time over the effects on health of air pollution. Other occurrences, less dramatic but nonetheless still significant, engender the same concern. New Jersey, the most densely populated state in the nation and with corresponding concentrations of automotive vehicles and industrial enterprises, has air quality problems to match.

There have been dramatic illustrations of air pollution affecting health in other states and countries as, for example, the 1952 "killer smog" in London which caused almost 4,000 deaths or the 1948 air pollution crisis in Donora, Pennsylvania, which led to the deaths of twenty people. More recently the smog-related illness of 35 men in Houston[1] and the alarm over the possible health effects of the three day "pollution episode" in New York City[2] have commanded the attention of the public. In considering the relationship between air quality and health in New Jersey, however, the Clean Air Council resolved to explore not only the dramatic, well-publicized incidents, but also the more subtle aspects of the issues. To this end the Clean Air Council organized the first day of its 1972 public hearings around the question of the long-range medical effects of air pollution. Most directly the Council sought to inform itself on the nature of the hazards to human health posed by the quality of the ambient air in the state of New Jersey.

1. New York Times, July 11, 1971.
2. New York Times, July 25-30, 1970.

In choosing to focus its attention on the long-range medical effects of air pollution, the Council recognized the need to consider what changes could be anticipated in New Jersey. Still mindful of its principal concern with health, the Council conducted additional hearings to determine the projected magnitude, direction, and implications of certain aspects of New Jersey's future growth. Specifically, the Council sought to determine the projected growth of population, industry, transportation, and energy needs in the state and what this anticipated growth implied for air quality. As a feature of its inquiry into growth projection, the Council resolved to explore some of the strategies currently being studied as means to control the impact of growth upon air quality. Chief among these strategies was the concept of land use and planning.

In the course of its three public hearings,* therefore, the Clean Air Council sought to inform itself on a range of issues all related to the medical effects of air pollution, given present air quality conditions and the conditions likely to exist under projected growth.

The basic assumptions underlying the Council's conduct of these public hearings may be simply stated:

1) Air pollution does affect health adversely.
2) The greater the level and duration of pollution the more serious its effect on health.
3) Given present technology and consumption patterns, the growth of population, industry, transportation and power generating sources will lead to an increase in air pollution levels.

* Held on March 28, 1972, at Piscataway, N.J. and April 27 and 28 in Trenton, N.J.

4) There may be strategies or techniques whose implementation would tend to minimize the effects of growth of air quality.

Given its focus and operating assumptions the Council then proceeded to solicit the testimony of expert witnesses and to encourage the attendance at and participation in its public hearings by concerned citizens. The results of the testimony and presentation of these witnesses are discussed below. Here, however, it will be useful to summarize the key findings of the Council resulting from its hearings.

SUMMARY OF KEY FINDINGS

In the Area of Health and Air Pollution:

1) There is a clear connection between levels of air pollution and human health. For some of the major pollutants, such as the oxides of sulphur and nitrogen, the connection may be specified, but for other pollutants, particularly the low level contaminants such as nickel, cadmium, and vanadium, the exact nature of the relationship cannot be specified, given present data.

2) To the Council's knowledge, there is no program in New Jersey to collect the data necessary to determine more precisely the relationship between air pollution and health.

3) As has been discovered in the case of asbestos, the health implications of certain pollutants are very long range and may not be apparent for at least twenty years.

4) The present air pollution monitoring system in New Jersey is not sufficiently extensive to alert many communities of impending air pollution emergencies, nor does the system permit ex post facto analysis of emergency situations such as that at Quibbletown.

5) Among state agencies and departments there appears to be little interest in or center of responsibility for efforts to investigate the health effects of air pollution in the state.

KEY FINDINGS CONCERNING GROWTH PROJECTIONS FOR NEW JERSEY

1. Population is expected to expand from a current level of 7 million to approximately 12 million by the year 2000.

2. The number of registered vehicles is projected to increase from 3.7 million in 1970 to approximately 5.25 million by 1980. The total of vehicle miles traveled is projected to increase from 39.1 trillion miles in 1968 to 91.9 trillion miles in 1990.

3. Consumption of electricity is expected to double every ten years. Substantial new generating capacity will have to be constructed to satisfy this demand.

4. Total employment in New Jersey is approximately 2,600,000. To accommodate the expected growth in the labor force, the economy will have to provide an average of 50,000 jobs per year over the next decade.

5. Since 1945, New Jersey has lost over one million acres of farmland to industrial, residential and commercial construction. The present composition of land use is approximately as follows:

Developed Land	34%
Land in Farming	21%
Forests; Usable Undeveloped Land	25%
Unusable Land	20%

KEY FINDINGS CONCERNING THE RELATIONSHIP BETWEEN AIR QUALITY AND GROWTH

1. Several divergent views on the relationship between growth and air quality were presented at the hearings. Many of the environmental groups equated growth with environmental degradation and recommended a sharp curtailment of growth as the price of biological survival. The representatives of several state agencies (Departments of Labor & Industry, Transportation, and the Public Utilities Commission) accepted growth as normal and viewed their primary responsibility as the accommodation of the projected growth trends, while air quality, of lesser concern to these agencies, was considered by them to be the primary responsibility of the Department of Environmental Protection. A third view was that it is less the fact of growth than the way we grow, and the uses that we make of our growth, that lie at the bottom of the environmental problems.

2. Several city planners pointed out the relationship between land use transportation and air pollution. An improved mass transit system is an efficient way of reducing the level of automotive emissions and conserving natural resources. To be economically feasible, however, mass trans-

portation requires certain potential passenger densities at both the origin and destination ends of the transportation system.

3. Preliminary projections by the National Academy of Science indicate that the implementation of the 1975-76 automobile standards will result in a decline in the level of Hydrocarbon and Carbon Monoxide emissions until 1990 when the level will begin to increase due to the increased automobile population. While New Jersey can expect to experience similar phenomena, the exact year when the automotive emissions will increase depends on automotive maintenance practices, the effectiveness of the inspection systems, the rate of obsolescence of pre-1968 cars, the volume of vehicle traffic, etc.

4. In the next thirty years, 90% of New Jersey's growth seems likely to take place on the fringes of its metropolitan areas. Under existing municipal planning and zoning controls, most of the inhabitants of the new areas will have no choice but to live in single-family houses and to work in office buildings, factories, or institutions which will be located on widely scattered sites. If the growth patterns of New Jersey's 567 municipalities are allowed to continue, most of the citizens of New Jersey will live in a completely auto-dependent world and mass transportation will have been permanently designed <u>out</u> of New Jersey's land use and transportation system.

5. New Jersey's reliance on the property tax as the principal means of financing state and local expenditures has had an adverse effect on environmental quality. High rates have discouraged the maintenance of open space and accelerated the conversion of agricultural land to industrial, commercial, and residential purposes. Competition among municipalities for

tax ratables has encouraged industrial concentration and the expansion of a low-density land-use pattern, characterized as urban sprawl.

6. According to the Department of Environmental Protection, New Jersey won't be able to meet Federal primary or secondary standards for particulates by 1975, and has asked for, and been granted an extension of time to meet the standards for Carbon Monoxide. In response to this projection, New Jersey has organized a cooperative research project with New York and Connecticut to determine what policies must be implemented in order to attain the Federal Air Quality standards.

7. Given the present data base, it is difficult to predict whether air pollution attributable to industrial growth will remain within federal standards. However, efforts are underway in the Department of Environmental Protection to assess the impact on air quality of industrial growth.

KEY FINDINGS CONCERNING STRATEGIES FOR MINIMIZING THE IMPACT OF GROWTH UPON AIR QUALITY

State-Wide Zoning

A number of witnesses asserted the delegation of planning and zoning controls to 567 separate municipalities has resulted in an unrelated, low-density land-use pattern. To improve this situation, more centralized control over growth, such as a state land-use plan, may be necessary. Otherwise, present growth trends will continue to result in urbanization and sub-urbanization: diffuse uncoordinated development which could, among other things, further encourage an extensive highway system and preclude the possibility of an economically feasible mass-transportation system. The controversial Hackensack Meadowlands project is, in this one sense, an important precedent for regional planning and development control in New Jersey.[1]

Mass Transportation

There is overwhelming evidence that an expanded mass-transit system in New Jersey would reduce the need for highway expansion and result in considerably less pollution per passenger mile. Despite the repeated recommendations of the Clean Air Council and other environmentally concerned organizations to begin the construction of a comprehensive transit system for New Jersey, the proposed Transportation Bond for November reflects a continuing commitment to the private automobile as the principal form of transportation in metropolitan areas.

1. See the remarks of Chester Mattson, Transcript, Vol. III, pp. 208-223. See, as well, comments critical of aspects of Meadowlands Development in the testimony of Dr. Stephen Ayres, Transcript, Vol. I, pp. 52-53; Roger Hulley, Transcript, Vol. II, pp. 266-268; Mrs. Margaret Hallaway, Transcript, Vol. II, pp. 27-41.

The Department of Transportation has proposed a Bond Issue of $650 Million with only $240 Million allocated to mass transit, only a very slight increase over the percentage allocated in the 1968 Bond Issue.

Tax Incentives

Government must eliminate the principal determinant of environmental degradation, namely, misplaced incentives in the economic system. If polluters can continue to use the air as a free resource for waste disposal, the citizens of New Jersey will continue to pay the costs attributable to contaminated air.

Stricter Standards

Stricter environmental standards will be necessary in order to prevent economic growth from causing a deterioration in New Jersey's ambient air quality. The relationship between growth and air quality is a complex one -- depending in part upon the composition and distribution of growth, available technology, patterns of consumption and transportation -- and standards will have to be adjusted in light of the changing relationship.

Several witnesses discussed the possible construction of new sources in a region where the New Jersey air-quality standards were not being met. These witnesses asked that the power of the State to prevent such construction be clarified.

Controlling Demand for Electricity

A national energy policy is needed on a nationwide basis to provide guidance and equitable treatment on sources of fuel, energy consumption, power-plant construction and siting, environmental control, and the cost of power. In addition, in order to reduce air pollution attributable to the generation of electric power, it may be necessary to eliminate preferential

rates for high volume used, raise the cost of power during peak periods, and impose taxes on power plants' emissions of nitrogen oxide, and particulate matter. Other techniques such as increased use of effective insulating materials, architectural design for efficient use of power (e.g., air conditioning), and siting buildings to maximize heating potential of the sun and cooling features of the land would also help to control demand for electric power. Finally, greater attention must be given to consumer education.

Control of Population Growth

In the ultimate analysis, "pollution" problems are "people" problems, created not only by the numbers of people involved but also by their patterns of consumption. The population problem may be solved only by a national population policy designed to limit total population and encourage a more balanced distribution of the population.

KEY FINDINGS CONCERNING THE RELATIONSHIP BETWEEN GROWTH, HEALTH AND ENVIRONMENTAL QUALITY

1. Strategies devised to deal with problems of air pollution must take into account the effect of these strategies upon other environmental aspects such as water quality and solid waste management. The problems must be understood and dealt with comprehensively.

2. There are environmental costs to growth but we do not even know exactly what these costs are in terms of health or environmental degradation. Furthermore, we do not know what costs the citizens of New Jersey are willing to pay either to sustain economic growth or to protect the environment.

3. Finally, testimony showed that despite the fact that air pollution does not respect political boundaries or bureaucratic division of activity, virtually all of the programs of state agencies described before the Council were designed to meet local or agency needs with almost no reference to broader environmental impact.

PART II: SUMMARY OF RECOMMENDATIONS

Perhaps no chief executive officer has ever been more active in protecting the environment of his state than Governor William T. Cahill. The formation of the Department of Environmental Protection, the appointment of its first Commissioner, the active support of the Department's activities, the State motor-vehicle inspection program -- all speak for the Governor's concern in this area.

Furthermore, the Clean Air Council commends the Commissioner, Richard J. Sullivan, for his progressive leadership of the Department of Environmental Protection; the Council is favorably impressed with the vigorous pursuit by the Department of its valuable programs.

The Clean Air Council believes that continued future improvement in the quality of our environment depends on the recognition that all parts of State Government must participate in environmental planning.

To our knowledge, no group to this time has studied the complex interrelationships between health, air pollution, and economic growth. Therefore, the Clean Air Council, having considered the evidence presented in testimony before it (such as population growth, increase in the number of motor vehicles, industrial expansion, uncoordinated development) and persuaded thereby that additional steps must be taken immediately to protect both the health of New Jersey's citizens and the integrity of New Jersey's environment, makes the following recommendations:

1. The Commissioner should urge the Governor to make an immediate and forceful statement of Gubernatorial concern on the related issues of health,

air pollution, and economic growth. Not only should this statement inform the public, but it should also be an important step toward overcoming the fragmentation of political and bureaucratic responsibility and diffusion of authority surrounding these issues.

The Governor's statement of concern should include the requirement that environmental impact statements be prepared and submitted to the Governor's office by each state agency for any action which could directly or indirectly affect the quality of the environment. Thus, each department or agency should be required to assess the impact of its proposed programs and to consider the alternatives to these programs. In addition, it should be required that each department or agency re-evaluate its present activities, and to consider whether these activities could be changed, before completion, to improve the environment.

2. The Clean Air Council is not opposed to growth in New Jersey. It is, however, opposed to the kind of growth in which real environmental and social costs are not properly considered. As a means of assuring that growth in the state is properly coordinated and controlled, the Clean Air Council recommends the implementation of a state land-use plan which would include state-wide zoning guidelines.

Furthermore, the impact of economic growth on air quality occurs in many different ways. The Department of Environmental Protection should undertake to analyze these complex effects, so that appropriate strategies may be devised and followed to minimize this impact.

3. In light of projected increases in automotive population and the numbers of miles driven the Clean Air Council calls, as it has for the past

three years, for the development of a mass-transit plan and rapid implementation of this plan.

4. The Clean Air Council recommends that there be established in the state, through appropriate legislation, an Environmental Health Center which would be responsible for conducting continuing research into the relationship between air quality and health. The Center should also be responsible for studying air-pollution emergencies by means of the immediate dispatch of "epidemiological flying squads" which would determine the cause and possible health effects of the emergency.

These are the major recommendations of the Council. Other recommendations are discussed in the text.

PART III: DISCUSSION OF KEY FINDINGS AND RECOMMENDATIONS: HEALTH AND AIR QUALITY[1]

During its public hearings on the subject of the long-range medical effects of air pollution the Clean Air Council was pleased to hear the testimony of a dozen witnesses. A number of professional specialities, including epidemiology, allergic medicine, and pulmonary-respiratory diseases, were represented among the expert medical witnesses who testified. In addition to these medical specialists, several concerned citizens representing various environmental organizations also appeared. A complete list of witnesses is given in Appendix II.

There can be no doubt that air pollution affects human health in many ways. In those dramatic incidents, such as those noted at the beginning of this report, which result in serious illness or death, the link between pollution and health is unmistakable.

There are, however, many other less dramatic but nonetheless significant effects of pollution on health and it is to these effects that the Clean Air Council directed its particular attention. A number of witnesses cautioned that much is yet to be established in this field, that properly designed research efforts of considerable scope and sophistication will be necessary to prove the kinds of linkages between air pollution and health which many assert. The Clean Air Council acknowledges that there are gaps in our understanding of these complex relationships but these gaps only serve to strengthen

1. For a discussion of this issue see the article "Air Pollution and Human Health," by Lester Lave and Eugene Seskin, Science, 21 August 1970. The article includes an excellent bibliography.

the Council's concern. The Council does not view its position as alarmist or extreme when it calls for immediate action by the Governor and responsible state officials to provide the data-gathering and processing equipment, the personnel, money, and political authority to undertake serious research into the relationship between air pollution and health. There are air-pollution conditions being created whose full health effects may not be known for decades. To temporize under these conditions would, the Council feels, be imprudent.

There is abundant circumstantial evidence linking various levels and types of air pollutants to morbidity and/or mortality. As one witness framed the issue:

> "Polluted ambient air is considered in terms of four levels of health effects: 1) production of premature death; 2) induction of chronic disease; 3) increased prevalence of minor illnesses and reduced performance; 4) psychological or nuisance effects."[1]

Several witnesses referred to studies which have established statistically significant relationships between the death tolls from heart and respiratory diseases and air pollution. Importantly, one such study noted that the levels of air pollution involved are not unusually high. Other diseases linked prominently to air pollution are bronchitis, cancer of the respiratory tract, especially lung cancer, emphysema, and mesothelioma.[2] Mesothelioma is, in many ways, an especially troubling case. A rare form of cancer, mesothelioma attacks the chest and stomach walls and always brings death within one to one and one-half years after it has been contracted. The disease has been very strongly associated with exposure to asbestos.

[1]Mrs. Gordon Gibson, Transcript, Vol. I, p. 122.

[2]See the testimony of Dr. William Nicholson, Transcript, Vol. I, pp 54-81.

It was recently reported that the town of Manville, New Jersey, an asbestos industry center, reported 52 deaths from mesothelioma, an extraordinarily high figure for a town of 15,000. The "gestation period" for mesothelioma is from 20 to 40 years, an excellent example of a long-term health effect of air pollution. Given the abundant uses of asbestos in our society, for example in insulation, fireproofing, automotive brakelinings, and even in clothing, the opportunities for exposure are manyfold.

Furthermore, mesothelioma indicates the importance to health of a quantitatively minor pollutant. It is, of course, proper that most attention be paid to the major pollutants, the oxides of carbon, nitrogen, and sulphur, and to controlling the sources of emissions, primarily the internal combustion engine and fossil-fuel power plants. But what became evident to the Council in the course of its deliberation was that there was a full range of other pollutants whose effects on health are just now beginning to be understood. Asbestos, as we have learned, is one; lead, cadmium, platinum, vanadium,nickel, and fluorine are among those which have been mentioned. Cadmium, for example, once absorbed by the body, has been associated with cardiovascular and kidney disease. The inhalation of fluorine can lead to subacute fluorosis. The Council, while not wishing to divert attention from the better documented and quantitatively more serious implications for health of the major pollutants, does wish to point out the potentially serious implications for health of other, quantitatively minor pollutants. The Council feels a particular sense of urgency in that the synergistic effects of these minor pollutants in the air are so little understood. As an example of the magnitude of the problem, while more than 300 motor-fuel additives have already been registered with the Environmental

Protection Agency, the exact chemical compostion of the resultant blended fuel is not required to be divulged to the E.P.A., and, in fact, may not even be known. The situation therefore obtains in which complex chemicals are being discharged into an already complex chemical environment, the atmosphere, with unknown and unpredictable implications for health.[1]

Having described certain conditions in which air pollution causes death, it is now necessary to consider other, non-lethal effects. There is substantial medical evidence that air pollution is related to the contraction or exacerbation of asthma, pneumonia, and bronchitis. There are many other non-lethal effects caused by specific pollutants such as enervation, malaise, impaired physical and intelligence faculties, sinusitis, eye and nose irritation and other ailments.[2]

At least as important as the production of specific health problems may be the damage to air passages and lungs caused by prolonged exposure to polluted air and, equally so, the accumulation over time of certain pollutants in the body. Prolonged exposure to lead is an example. At concentrations found in ambient air, lead is not directly toxic but it is an indirect health hazard, leading to the risk of toxicity from other sources by increasing the body burden of lead. Thus, the risk of lead poisoning among inner-city children who ingest chips of lead-based paint may be as much as 20% greater than it might otherwise be, because of the buildup in the body of air-borne lead.

Carbon Monoxide is another case in point. Exposure to 1600-2000 parts of CO per million parts of air for 1 - 1 1/2 hours may cause death, and lesser concentrations may cause serious physiological responses, including

[1] See the testimony of Dr. Carl Shy, Transcript, Vol. I, pp. 138-172 especially pp. 164-166.

[2] See the testimony of Dr. Stephen Ayres, Transcript Vol. I, pp 24-54 .

the aggravation of heart disease. Even at levels as low as 50 parts per million experiments have indicated noticeable deterioration in judgment and reaction time. Studies have yet to demonstrate conclusively that such impairment can be linked to traffic accidents but it appears reasonable to assume that prolonged exposure to levels of CO in excess of 50 p.p.m., such as in congested traffic, could lead to impairment of driving skills.[1]

The health effects of non-lethal doses of pollutants together with the serious implications for health of some of the minor pollutants led the Council to consider the question posed by one witness:

> "In the regional Air Pollution Warning System, air pollution alerts are based on levels of SO_2, CO, and smoke level over a given period of time. When any two of these pollutants exceed a minimal acceptable level, an initial watch is called which is converted into graded warnings as the levels increase and the duration increases. This allows us to be warned of the occasional danger peaks in air pollution. However, what of the other pollutants to which our city dwellers are constantly exposed?
>
> In the City of Newark, during 1971, the 6-9:00 A.M. average level of non-methane hydrocarbons was higher than the established minimal primary standard level 100% of the time. In other words, Newark's air showed hydrocarbon levels in excess of 0.24 ppm, which by Federal standards is considered detrimental to health 100% of the time between 6-9:00 A.M. The minimal acceptable level of CO for an eight hour average is 9 ppm, and in Newark this is exceeded 5% of the time.
>
> Particulate matter exceeds the acceptable primary standard if the average geometric mean is over 75 micrograms per cubic meter. In Newark, the average geometric mean is 147.6 micrograms per cubic meter, about twice the acceptable level.

[1] See the testimony of Mrs. Aimlee Laderman, Transcript, Vol. I, p. 189

> Therefore, without signalling air pollution alerts, the levels of pollution in Newark are frequently or continuously within the harmful to health range."[1]

Unfortunately, it is not clear exactly what this implies for the health of the citizens of Newark and its environs. While some of the known relationships have been discussed above, others can be discussed only speculatively. The City of Newark leads the United States in the number of new cases of tuberculosis contracted annually. Is this shocking statistic related to air pollution? The high rate of infant mortality is another example. Cadmium may be a cause of high blood pressure, particularly among Newark's black population. Newark has the highest levels of vanadium in the country; the combination of vanadium with cadmium has been suspected of causing heart disease. It has been suggested that certain pollutants may affect intelligence, emotional stability, and personality traits such as aggressiveness or passivity. But the conclusion is, we don't know.[2]

Can we afford not to know? The Clean Air Council thinks not. To this end, the Council urges immediate action on its recommendations. To safeguard the health of New Jersey's citizens and their environment, steps must be taken now to define the relationships between health and air pollution. In the words of one expert medical witness,

[1] Written testimony submitted by Dr. William Weiss.

[2] See testimony of Dr. Donald Louria, Transcript, Vol I, pp. 104-121

...."[New Jersey] is losing the battle to control air pollution... the increasing population density which in New Jersey is the highest in the country, and the increasing automobile density which is also highest in the country, combined with the tremendous density of chemical industries, produce increasingly severe air-pollution problems which are outpacing the control measures. We look toward a reduction of the minimal levels of air pollution as a hope for relief of the problem, and yet, the polluting potential which is increasing in our State inevitably will result in increasing the minimal levels of air pollution. This problem cannot be given secondary importance. It is a major epidemic problem in which the State of New Jersey must assume a leadership role since it is in the unhappy position of being a leading offender."[1]

Growth Projections for New Jersey

The first step in determining the environmental impact of future growth is to make projections for the components of the growth process which have a direct impact on environmental quality. While there are many factors which influence environmental quality, the public hearings focused on the following areas:

1) Population
2) Number of Registered motor vehicles and total vehicle miles traveled
3) Energy consumption
4) Industrial growth
5) Patterns of land use

[1]Written testimony submitted by William Weiss,

At the outset it should be emphasized that forecasting growth trends, even with sophisticated models, is subject to considerable error. The most common forecasting method is to plot the past values of any variable (e.g. population) and try to discover a trend. For example, if population has grown over the last ten years at 1.5% per year it could be forecasted to grow at the same rate for the next ten years. A more sophisticated method is to build a complex regression model that relates growth to a number of key factors. Future population growth in New Jersey could be a function of previous growth rates in population, expected growth in per capita income, wage rate in New Jersey compared to wages in other states, etc. Lastly it must be pointed out that growth projections are frequently self-fulfilling prophecies.

Population

One of the most widely-publicized problems is that of population growth. This problem is of particular concern to the citizens of New Jersey since the area's population density of 1,000 per square mile gives it the distinction of being the most densely populated state in the country. The population projections presented at the hearings were based upon a book entitled Population Projections for New Jersey to 2000 by Minor Civil Divisions by Bruce E. Newling. It was estimated that New Jersey's population would rise from 7.1 million in 1970 to approximately 12 million by the year 2000. Assuming that the United States' population will stabilize at 330 million, New Jersey's population will eventually expand to 16.9 million. It was also noted that the population of Ocean, Monmouth, Middlesex, Essex, Passaic and Sussex Counties was growing faster than had been predicted by the computer model.

Vehicle Registration and Vehicle Miles Traveled

The uncertainty inherent in forecasting was clearly evident in the testimony of R.W. McMinn, Deputy Director of the Division of Motor Vehicles. The estimates of vehicle registration in New Jersey for the year 1980 ranged from 4.01 to 6.08 million depending upon what method of forecasting that was used. The best estimate seemed to be that total motor vehicle registration would increase from 3.7 million in 1970 to 5.25 million by 1980. Since total motor vehicle traffic in New Jersey is highly dependent on out of state traffic, it was necessary to estimate total vehicle miles traveled in the state. According to Mr. Andrews of the Department of Transportation, total vehicle miles should increase from 39.1 trillion miles in 1969 to approximately 91.9 trillion miles by 1990.

Energy Consumption

It is estimated that total energy consumption in the United States will grow at an annual rate of 3.5 percent which implies a doubling of total consumption every 20 years.[1] In view of the limited supplies of coal, oil, and gas, the world will eventually run out of its standard fuel resources. While it is impossible to predict when, many specialists cite the figures of M. King Humbert, a geophysicist with the U.S. Geological Survey, who predicts that 90% of all oil and gas will be gone by 2035 and 90% of all coal by 2300.[2] It is expected, however, that before the world's fossil fuels are exhausted, technology will provide alternative sources of power, probably through nuclear power.

[1] M.I.T. Study, Man's Impact on the Global Environment(SCEP), p. 291.

[2] Time Magazine, June 12, 1972, p. 50.

In the meantime, however, the focal part of this energy crisis -- the point at which demand is threatening to outstrip available supplies -- is in electric power. In New Jersey the consumption of electricity is expected to double every ten years. Public Service Electric and Gas, which provides 80% of the state's electricity, predicts that it will have to construct the following installations to meet what it believes to be the forthcoming demand for energy:[1]

1) 8 - Nuclear Installations (2,000-5,000 megawatts each)
2) 5 - Non-nuclear Installations (200-800 megawatts each)
3) 400 - Dispersed Installations (10-50 megawatts each)

Industrial Growth

Directly associated with a growth in New Jersey's population is an expansion of New Jersey's economy. The Department of Labor and Industry estimates that in order to provide jobs for the projected increase in the labor force, an average of 50,000 new jobs must be created each year for the next decade.

Land-Use Patterns

The trend in land use over the past decades has been away from agriculture and open space and toward commercial, residential, and industrial uses. According to the Department of Agriculture, New Jersey has lost over a million acres of farmland since 1945. Between 1966 and 1972, farm acreage in the state shrunk by 17 percent and the number of farms declined by 20 percent. There are now only 8,400 farms in the state of New Jersey.

[1]Talk presented by J.A. Casazza, "New Jersey's Energy Needs Through the Year 2000", Exhibit 36.

Current division of land use in New Jersey is as follows:

Land Use	Land Area, Acres	Land Area, %
1) Developed Land; urban and built-up areas; residential, industrial, and commercial developments; federal, state, county, and municipal recreation land	1,640,000	34%
2) Agricultural Land, farming	990,000	21%
3) Forests; usable undeveloped land ...	1,200,000	25%
4) Unusable Land	970,000	20%
Total -	4,800,000	100%

Projections indicate that in the absence of a state land use policy, the percent of the state's land in open space and agricultural land will continue to decline.

Relationship Between Air Quality and Economic Growth

The emergence of the environmental movement has forced society to re-evaluate the commonly held belief that economic growth is synonomous withprogress. In reply to the "more is better" philosophy, several environmental groups have asserted that an end to economic growth or a sharp curtailment of it is necessary in order to insure biological survival. A recently publicized report, entitled The Limits to Growth, concluded that:

> "If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continues unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity."[1]

[1] D. Meadows, Limits to Growth, p. 23.

An alternative view is that the principal cause of environmental degradation is not growth per se but the way we grow and the uses we make of growth. The root of the problem is that the production of wastes is an integral part of our production and consumption patterns. Environmental deterioration has occurred because we have disregarded the social costs of growth and have treated pure air, pure water, and the disposal of wastes as free resources. Air pollution created by an industrial plant is a classic case of social cost; the noxious gas emitted from the plant imposes costs on everyone downwind, yet the factory pays none of these costs -- they do not affect its balance sheet at all. It is quite understandable, therefore, that the United States has developed technology such as the internal combustion engine and fossil fuel power plants which discharge large quantities of pollutants into the atmosphere. The apparent negative relationship between growth and air quality can only be reversed if the United States develops production and consumption processes that conserve energy, generates less waste, recycles materials and treats waste before discharge into the environment.

The structure of land use and planning also has an impact on the relationship between economic growth and air quality. In New Jersey, industrial growth has been concentrated in a few areas, such as the Patterson-Newark-Elizabeth-Linden area and the Trenton-Camden area. Because of the large number of both stationary and mobile sources in these areas, and the resultant relatively high concentrations of the major pollutants (i.e.,CO, SO_2, NO_x, particulate matter, hydrocarbons, oxidents), the cleansing of the atmosphere by dilution and other natural processes is not adequate to reduce pollutants to desirably low levels. If industrial growth were spread

more evenly throughout the state, ambient air quality would improve by several means. First, improved traffic patterns would result in decreased emissions from mobile sources. Next, separation of sources from receptors (that is, industrial plants from residential neighborhoods) would provide increased dilution, and enable natural processes to improve air quality. For example, some particulate matter would fall out, or be washed out of the atmosphere by rain or snow; certain soil microorganisms are believed to remove carbon monoxide from the air.

The principal importance of land-use controls, however, is that there is a definite relationship between land use, transportation and air pollution. Mass transportation is an efficient way of reducing the level of pollution from mobile sources and conserving natural resources. As one participant pointed out:

> "In New York City the subway system carries 1.3 billion riders annually an average distance of about 5 miles at an expenditure of 2.3 billion kilowatt hours of electric power. This is a ratio of .35 kilowatt hour per passenger mile, probably the best bargain in air pollution avoidance in the nation."[1]

Even that much-maligned transit vehicle, the city bus, can contribute significantly to the reduction of air pollution. It has been estimated that thehydrocarbon emission of an automobile is 18 times greater than that of a diesel-powered bus.

However, in order to be feasible, mass transportation requires certain potential passenger densities at both the original and destination ends of the transportation system. On the basis of people's current preferences, the following relationships seem to exist between land use and the resulting choice of transportation systems:

[1] C. McKim Norton, p.6 (written testimony).

1) In low density residential areas (1 to 5 households per net acre) public transportation is only feasible for express commuter trips to major central business districts which account for only a small proportion of all trips.

2) In medium density areas (5 to 50 households per net acre), automobile trips decline dramatically as density increases. The threshold of local bus transit is roughly 7 households per net acre while local rail transit becomes significant in the range between 25 and 50 households per acre.[1]

Similarly, the destination ends of urban journeys must be clustered in central business districts or other large activity centers to make mass transit feasible.

Unfortunately, land use patterns in New Jersey seem to ignore the inter-relationship between transportation and air pollution. Most of the rapidly developing areas are characterized by large lots, scattered factories, shopping centers, hospitals, colleges, office buildings, etc. There are virtually no origin or destination clusters which are essential to support a mass transit system. Newark, Trenton, Camden, New Brunswick require major downtown centers with high density apartments, department stores, and a variety of other enterprises. If these growth trends continue, the New Jersey-New York region will create an eastern version of Los Angeles where the majority of the inhabitants will be wholly dependent on the automobile. Mass transportation will have been permanently designed out of the land-use transportation system.

[1] C. McKim Norton, p. 6 (written testimony)

In order to formulate a solution to the transportation crisis, it is essential to analyze the determinants of land-use patterns. In New Jersey, practically all of the land-use planning is delegated to 567 municipalities. The problem is magnified by the fact that the local governments are forced to rely on the property tax for over 75% of their revenue. Rapidly-escalating costs of municipal services have forced many cities to discourage the construction of high-density housing which costs more in public services than it produces in property taxes. Without a reformed tax structure and some consolidation of planning responsibilities at regional and state level, New Jersey will never have land-use patterns which will permit the operation of an economical mass-transportation system.

While we have by no means exhausted the determinants of the relationship between growth and air quality, it has been shown that this relationship depends in part on available technology, economic incentives, the distribution of growth, land-use patterns, and transportation systems. The real question, however, is that which the Clean Air Council sought to answer: What are the implications for air quality? Preliminary projections by the National Academy of Science indicate that the implementation of the 1975-76 automobile standards will result in a decline in the level of hydrocarbon and carbon-monoxide emissions until 1990 when the level will begin to increase due to the increased automobile population. While New Jersey can expect to experience a similar pattern, the exact year when the automobile emissions will once again begin to increase depends on the effectiveness of the inspection system, the rate of obsolescence of pre-1968 cars, the volume of vehicle traffic, and patterns of vehicle maintenance. Unfortunately, the Department of Environmental Protection's

data base is not adequate to predict the effects of future economic growth on New Jersey's air quality. The Public Utilities Commission has not conducted a formal study concerning the environmental impact of the projected expansion in electric generating capacity. It can be concluded that we really don't know how economic growth will affect air quality.

In view of the previous discussion concerning the relationship between health and air quality, it is imperative that New Jersey, through the Department of Environmental Protection, obtain the necessary data and undertake the rigorous analysis that is necessary in order to determine the impact of economic growth. Failure to take action on the Clean Air Council's recommendations will increase the probability that growth will cause a deterioration in ambient air quality.

STRATEGIES TO MINIMIZE THE IMPACT OF GROWTH ON AIR QUALITY

The way our economy is organized -- our production and consumption patterns -- is the essential cause of the negative relationship between growth and air quality. However, there are a number of different kinds of policies that would prevent, or at least reduce, the harmful side effects of our economic activities. Before discussing the Council's recommendations, we want to evaluate the policies that the state government has taken to minimize the impact of growth on air quality.

Air, Water, and Solid Waste

In the course of its hearings the Council, in addition to specific testimony on air quality, heard brief testimony on water pollution and solid waste management. The management of the waste of a large, densely populated,

and highly industrialized state requires strategies addressed to the total problem. While the Clean Air Council is mandated to concern itself specifically with problems of air quality it feels that it is not reasonable to consider the problem of air pollution in isolation from the related problems of water pollution and solid waste disposal. The regulation restricting the burning of agricultural waste may have led to a reduction in the level of certain pollutants in the ambient air but it has also resulted in the creation of a larger solid-waste disposal problem. The lesson is that waste management and pollution problems must be understood and dealt with comprehensively.

State Government and the Impact of Growth on the Environment

Unfortunately, the Council must conclude that the present structure of state government in New Jersey seems to discourage rather than to facilitate such comprehensive responses. Almost without exception the witnesses who represented state departments and agencies spoke to the Council of programs designed to meet departmentally related, not broader state, needs. There was also the impression that departments and agencies see their role as simply responding to demands upon them rather than seeking to channel or control these demands in any way.

The Public Utilities Commission, for example, apparently considers its functions as facilitating the expansion programs of energy companies. P.U.C., to the best of the Council's knowledge, has not yet conducted serious investigations into the rate structure of the utilities as a means either to control demand or reflect more accurately the total cost, including environmental costs, of energy consumption.

The Department of Labor and Industry sees its function as facilitating the provision of 50,000 new jobs per year but, again, has apparently not studied the serious implications for the environment of another half million workers in the next decade.

The Department of Transportation, despite the clear necessity for mass transportation programs, demonstrated once again in its latest bond issue that highways, with all of the degradation and depletion they imply, continue to dominate the Department's planning.

None of these criticisms is meant to deride these agencies and departments for doing what they think must be done. Rather they are meant to point out the limitations of the present structure. What is needed is an increased awareness on the part of government officials of the extent of the environmental impact of their decisions. This awareness could be formalized in the nature of environmental impact statements and more frequent consultations with D.E.P. concerning the environmental implications of proposed actions. What is essential is that decision makers not specifically mandated to concern themselves primarily with the environment make certain that the environmental impact of their decisions and actions form an integral part of the process of decision making.

Accordingly, the Council has recommended that the Commissioner urge the Governor to state again his concern for the quality of our atmosphere, and on the closely-related factors of health and economic growth. A requirement by the Governor for environmental impact statements to be submitted by each state department or agency would bring to a focus the attention necessary to maintain and improve our environment.

The Department of Environmental Protection has the qualifications to analyze these impact statements, and the Governor might place the responsibility for such analyses in the Department for its recommendation and comment. Final decisions would rest with the Governor, in the event of disagreement; he might, for example, request the Public Utilities Commission to consider measures to decrease demand for power as an alternate to construction of generating capacity, in planning to satisfy the state's energy needs.

Mass Transit

Returning to the subject of transportation, the proposed transportation bond issue reflects a continuing commitment to the private automobile as the principal form of transportation in metropolitan areas, despite the fact that an expanded mass-transit system would result in considerably less pollution per passenger mile. The Department of Transportation has allocated $410 million to highway development and only $240 million for mass transportation. Since one of the principal recommendations of many of the participants in the hearings was to greatly expand the state's mass transit facilities, the Clean Air Council urges the Governor and other responsible state officials to move immediately to formulate plans for a comprehensive system of mass transportation.

In addition, an efficient mass transit system has to be established on a regional basis. The Delaware Valley Port Authority and the Port Authority of New York should expand their mass transit systems. For example, the high speed Philadelphia-Lindenwold line should be extended to Atlantic City. More important, New Jersey should enact legislation which would enable the Port Authority of New York to become involved in other mass transit projects, such as the rail link from New York through Newark Airport into Union County.

Even with the development of an extensive mass transit system, the private automobile will continue to be an important means of transportation. It is necessary, therefore, to insure that the 1975-76 standards are as effective as possible. The Council would like to register its unequivocal support for the state inspection system which will eventually require all registered vehicles in New Jersey to meet minimum emission standards.

A State-Wide Land Use Plan

In view of the relationship between land use, transportation, and air pollution, the Council feels that there is a need for greater emphasis on state and regional planning. The implementation of a state-wide land use plan, as recommended above, would be an effective step toward providing the needed planning and co-ordination of development. At a minimum the state land-use plan should have as its goals:

1) Appropriate regional control in the location of major employment centers, such as regional shopping centers, hospitals, industrial parks, large housing developments, etc.;

2) A carefully designed regional open-space system;

3) The encouragement of transit usage by carefully channeling regional development in growth corridors readily serviceable by transit;

4) A rational spacing and hierarchy of highways;

5) The facilitation of priority programs to improve arterial highways which carry heavy automobile and bus traffic;

6) The discouragement of exclusionary zoning; planning and subdivision practices that segregate low, moderate and high-income households from their jobs.

Economic Incentives

We are going to make very little real progress in solving the problem of pollution until we recognize that much of the blame must be attributed to misplaced incentives in the economic system. Market prices fail to take into account the environmental damage (i.e. social costs) that the polluters inflict on others. The Public, private firms, government, regulated utilities, and others are able to use the air as a free resource for waste disposal while the citizens of New Jersey pay the costs of contaminated air. These social costs can be incorporated into the price system in a variety of ways: enforcing strict standards on emission, taxing the emission according to its volume of discharge, banning the discharge of toxic materials, imposing a recycling tax credit, etc.

Electric Power

In the case of electric power generation, there are further distortions due to the rate structure.[1] The principal inefficiency is that the rates during peak periods fail to reflect the true cost of providing power at peak times. Much of the generating capacity that is utilized during peak period is idle at off peak times. Therefore, the cost of supplying electricity at peak times should logically be considerably higher than off-peak power. It has been estimated that the real cost of power during peak periods may exceed off-peak costs by as much as a multiple of 10. The effect of not

[1]For a fuller discussion of these and other issues in the field of energy and pollution, see Toward a Rational Power Policy: Energy, Politics, Pollution, New York, 1972.

pricing peak power at its true cost is to greatly increase the peak demand and therefore the required capacity that the utility must build. Differential rates for peak and off-peak power would spread the demand for power more evenly throughout the day, thereby reducing the total generating capacity that New Jersey would require. In this connection, the Clean Air Council questions certain advertising policies of some utilities. It is at best ironic and may even be irresponsible to seek to attract new consumers at a time when the ability to accommodate increased demand is in doubt. Correspondingly, the Council lauds advertising which calls for energy conservation, or which educates the consumer on the selection of efficient appliances.

An additional inefficiency is that high volume users pay rates that are cheaper than low volume users, such as residential customers. Still another problem with the utility rates is that the utilities are allowed to discharge sulfur dioxide, nitrogen oxide and particulate matter into the air without paying any of the costs that these pollutants inflict on others. A corrective measure, which has recently been proposed by President Nixon, is to tax the utilities according to the volume of their emissions. If a certain tax per pound for each pollutant was implemented, the utilities would be stimulated to increase their investment in pollution abatement equipment. The added costs of power generation would be passed on to the consumer, thereby reducing the total demand for electricity.

The Clean Air Council feels that the inefficiencies cited above warrant that the state legislature appoint a commission to review the public utilities rate structure. The revised rate structure might include increased rates during peak periods, elimination of preferential rates for high volume users,

and the imposition of a tax on the emissions of sulfur dioxide, nitrogen oxide and particulate matter.[1]

The Real Estate Tax - A Misplaced Incentive

Another type of misplaced incentive is imbedded in the state and local tax structure. The property tax provides 54.4% of New Jersey's state and local revenues compared with a national average of 38.7%.[2] Considering only local government, most of the municipalities obtain at least 75% of their revenue from the property tax. This heavy reliance on the property tax affects the environment in several ways. First, competition among municipalities for ratables encourages poor land use because of the need to favor industrial development and discourage property uses, such as high density houses, which cost more in public services than they produce in property taxes. Second, high property taxes discourage the maintenance of open space and stimulate the sale of agricultural land for private development.

To counteract these undesirable trends in land use, it is necessary to reduce drastically the burden of the property tax. Therefore, the Council believed in the validity of the recommendations of the New Jersey Tax Policy Committee which would reduce the property tax by approximately 40% and urges the resubmission of the Governor's tax program to the Legislature.

Growth of Population

Although the Clean Air Council is disturbed by the prediction that the population of New Jersey will increase from 7 to 12 million by the year 2000, there is little that New Jersey can do to reduce the anticipated growth.

[1]The economics of power pricing in the United States is discussed in "Marginal Cost Pricing in American Utilities", The Southern Economic Journal, Vol.33, July, 1966, pp 58-70.

[2]Summary Report, New Jersey Tax Policy Committee, p. 6.

The two principal sources of population growth are the natural growth of the present population and immigration from other states. While every effort should be made to expand the state's family planning services, there are no constitutional means of restricting immigration. If population growth can't be contained, it is imperative to insure that the population growth will be distributed throughout the state in ways that facilitate the establishment of a mass-transit system. Furthermore, stricter standards and/or taxes will be necessary in order to prevent the increased production attributable to the population growth from causing a deterioration in air quality. The ultimate solution to the population problem may well be a national population policy which will limit total population and encourage a more balanced distribution of the population.

DISCUSSION OF KEY FINDING: THE RELATIONSHIP BETWEEN GROWTH, HEALTH, AND ENVIRONMENTAL QUALITY

As noted in the summary of key findings, the Council, having heard testimony on the subject of the medical effects of air pollution, undertook an investigation of the relationship between growth, health and environmental, including air, quality. The Council's decision to study this aspect of the problem proceeded from several basic perceptions. Undoubtedly there are environmental costs to growth. The degradation of air and water quality, depletion of natural resources, spoiling of the aesthetic quality of the environmental are all consequences of a certain mindless commitment to economic growth. Yet, despite these evident costs, there were abundant indications that state officials in their advertising and promotional campaigns were attempting to attract new industry, new people, new traffic to the state. Were these campaigns at all modified by a concern for the environment? Just as clearly as it understood that there are environmental cost to growth the Council was convinced that there are economic and social costs to inhibiting or even stopping growth. Given current rates of unemployment of the state, for example, it would be socially and politically infeasible to devise programs to preserve the environment at the cost of serious job losses. Similarly, the many projects which have been advocated to protect or improve the environment and human health, among other worthwhile programs, will require substantial government support. There will be more money needed, not less.

In considering these issues, the Council hoped for some evidence of

sensitivity (at least among state officials) to the interdependencies of costs and corrective measures. There was general agreement among the witnesses who testified that there will be environmental and health costs to growth, but there was no consensus as to what those costs will be or even how they could be measured. Most importantly, the Council saw no evidence that there is any effort underway by state officials to determine what price the citizens of New Jersey are willing to pay either to sustain economic growth or to protect the environment. Ultimately this is a political question requiring that the electorate be fully and reliably informed as to what options they face and the costs to them of each. The Council, therefore, renews its appeal for strong leadership by the Governor in this area as the most visible and persuasive spokesman on the full range of issues involving growth, health, and the environment. Further, the Council urges the establishment of the research and analysis centers noted elsewhere to provide the Governor and other responsible officials with the information needed to inform the public.

Conclusions

There are already hazards to health from living in New Jersey and breathing its air. Some areas and some persons are more affected than others but there are potential risks for citizens of all classes in all parts of the state. While the nature and extent of the risks are unclear, these hazards can be expected to grow in number and severity as New Jersey grows. Responsible state officials must take steps immediately to provide for a systematic study of the implications of projected growth in the state.

While economic growth in New Jersey seems destined to continue, it is the consensus of the Clean Air Council that we have to stop and reverse the ugly and destructive waste disposal practices of our modern society. To accomplish this, the citizens of New Jersey, acting through responsible governmental authorities and all other available resources will have to:

-- Ask producers and consumers to bear the brunt of outright bans on ecologically dangerous materials and pay the costs of drastically reducing the discharge of wastes into the environment.

-- Call on the taxpayer to foot the bills to overcome past neglect as well as finance future collective waste treatment, mass transportation, and open space.

-- Formulate a state land use policy to solve much problems as the destruction of fragile natural resources, the shortage of decent housing, the misuse of agricultural land, and the expansion of an inefficient transportation system, which are now recognized as beyond the capacity of local government acting alone.

It is ultimately the citizens of New Jersey who will have to decide what costs they are willing to incur in order to maintain a high quality environment. It is the responsibility of the state government to provide its citizens with accurate information upon which to base their choices.

It is our health, the integrity and quality of our environment which is at issue. The Clean Air Council wishes to thank the many citizens whose encouragement and support throughout the year, as well as in the 1972 hearings, revealed to the Council the depth of concern over these issues. The Council shares that concern and pledges its continued efforts to study, report on, and hopefully to improve the quality of New Jersey's air.

APPENDIX I

BACKGROUND OF CLEAN AIR COUNCIL

The Clean Air Council was created in the New Jersey State Department of Health by the enactment of Titles 26: 2C-3.1 to 2C-3.3, which amended the Air Pollution Conrol Act of 1954.

Title 26: 2C-3.1 abolished the Air Pollution Control Commission and transferred its functions to the Department of Health. The Air Pollution Control Commission, functioning from 1954 to 1967, promulgated New Jersey Air Pollution Control Code Chapters I through VIII, which codes still are enforced by the Division of Clean Air and Water.

Title 26: 2C-3.2 established the 17 - member Clean Air Council and prescribed its composition. The current members of the Clean Air Council are:

John P. Horton, Sc.D., P.E., Chairman
Irwin S. Zonis, Vice Chairman

Roslyn Barbash, M.D.
Samuel Brown, M.D.
Richard D. Chumney
Franklin W. Church, P.E.
James W. Conlon, P.E.
John Davidson
Frank J. Dodd
Barbara Eisler
Robert J. Haefeli, P.E.
John J. Hanson
Stephen F. Lichtenstein
Raymond M. Manganelli, Ph.D.
James H. Rook
Arthur R. Sypek
Vacancy

Title 26: 2C-3.3 sets forth the duties and powers of the Clean Air Council. The Council's basic function is to assist the State of New Jersey in the

prevention and elimination of air pollution by reviewing the performance of the Division of Clean Air and Water and by acting to stimulate public concern in air pollution matters. The Council's members are commissioned to investigate all aspects of New Jersey's Air Pollution Control Program and to report their findings and recommendations to the Commissioner of Health.

The Clean Air Council held its first meeting in September, 1968. Since that time, the Council has been actively involved in carrying out its mandated functions. Accordingly, under Title 26: 2C-3.3: (h), which states that the Clean Air Council shall: "Hold public hearings at least once a year in regard to existing air pollution control statutes, codes, rules and regulations and upon the state of the art and technical capabilities and limitations in air pollution control and report its recommendations thereon to the commissioner ...", four days of public hearings were held in February and March, 1969; three days of hearings in April, 1970; three days of hearings in April, 1971; and three days of hearings in March and April, 1972.

APPENDIX II

WITNESSES APPEARING ON MARCH 28, 1972

Dr. Frank Rosen

Dr. Steven Ayres, St. Vincent's Hospital, New York

Dr. William Nicholson, Mt. Sinai School of Medicine, New York

Dr. J. McGrath, Rutgers Medical School

Dr. Donald Louria, Rutgers Medical School

Mrs. Gordon Gibson, New Jersey Citizens for Clean Air

Dr. Carl Shy, Environmental Protection Agency, North Carolina

Dr. John T. Kaim, Rutgers Medical School

Mrs. Aimlee D. Laderman, Ramapo College of New Jersey

Mrs. Helen Ferguson, Rutgers University

Mrs. Katherine Pennell

Mrs. June Ejk

Mrs. Betty Schectman, Better Air for Bergen

WITNESSES APPEARING ON APRIL 27, 1972

Professor Leland Merrill, Jr., Director, Institute for Environmental Studies, Rutgers

Mrs. Margaret Hallaway, Kearny Environmental Committee

Phillip Alampi, Secretary of Agriculture

Professor John Keene, Department of City & Regional Planning, University of Pennsylvania

Associate Professor Michael Greenberg, Urban Studies Division, Livingston College

Assistant Professor George Hagevik, Center for Urban Policy Research, Livingston College

Mrs. Frank Rooney, Director, Leage of Women Voters of New Jersey

Andrew Vincze

Mrs. Lois Grayson, New Jersey Citizens for Clean Air

Mr. Harrison Goodman

Mr. Jerry Gray, Delaware Valley Regional Planning Commission

Mr. Robert Leurch

Mr. Roger Hulley

Miss Vivien Li, Youth Advisory Board, U.S. Environmental Protection Agency

Mr. L.E. Shindel

Mr. Stewart Smith, Chairman, Students for Environmental Design, Livingston College

Mr. Richard Willinger, Raritan Environmental Council of New Brunswick

WITNESSES APPEARING ON APRIL 28, 1972

Mr. Norman H. Childs, Executive Director, Delaware Valley Citizens Council for Clean Air

Mr. Bruce E. Newling, City University of New York

Mr. Charles Sheppa, N.J. State Department of Public Utilities

Mr. W. H. Roach, Chairman, Air Resources Management Committee, N.J. Chamber of Commerce

Mr. William Munroe, Chief, Bureau of Air Pollution Control, N.J. Department of Environmental Protection

Mr. Jack Andrews, Director, Department of Economic Analysis, N. J. Department of Transportation

Mrs. Diane T. Graves, Conservation Chairman, South Jersey Group, Sierra Clubs

Mr. Robert Mc Minn, Deputy Director, N. J. Department of Motor Vehicles

Mr. John Elston, N. J. Department of Environmental Protection

Mrs. Betty A. Little, Citizens for Conservation

Mr. Douglas Powell, Director, Middlesex County Planning Board

Mr. Mark Antell, Married Student Association, Rutgers University

Mr. Chester Mattson, Environmentalist, Hackensack Meadowlands Commission

Mrs. Halloway, Kearny Environmental Committee