



Office of the Commissioner


STATE OF NEW JERSEY,
DEPARTMENT OF ENVIRONMENTAL
PROTECTION.

NOTICE OF PUBLIC HEARING

TAKE NOTICE, that the New Jersey State Department of Environmental Protection will hold a public hearing on proposed Chapter 14 of the New Jersey Air Pollution Control Code: CONTROL AND PROHIBITION OF SMOKE FROM DIESEL-POWERED MOTOR VEHICLES.. The hearing will be held on August 19, 1970, beginning at 10:00 A.M., at the Fine Arts Center, Rider College, Route 206, Trenton, New Jersey. This hearing will be held in accordance with the provisions of the Air Pollution Control Act (1954) as amended by Chapter 106, P.L. 1967.

It is recommended that at the time of the public hearing or prior thereto, a brief or briefs be submitted to the Department on all matters desired to be brought to the attention of the Department concerning the provisions of the proposed new Code Chapter 14.

The text of the Code Chapter to be considered in the public hearing is presented on the following pages, along with other pertinent information.


Richard J. Sullivan
State Commissioner of Environmental
Protection

Date of this Notice:

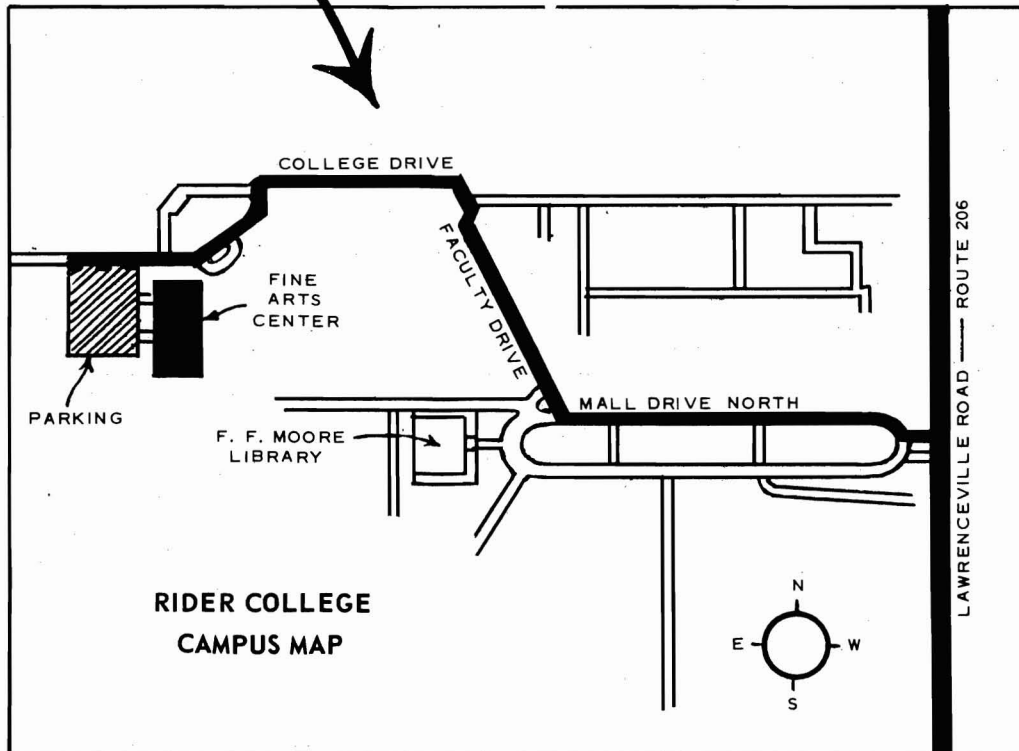
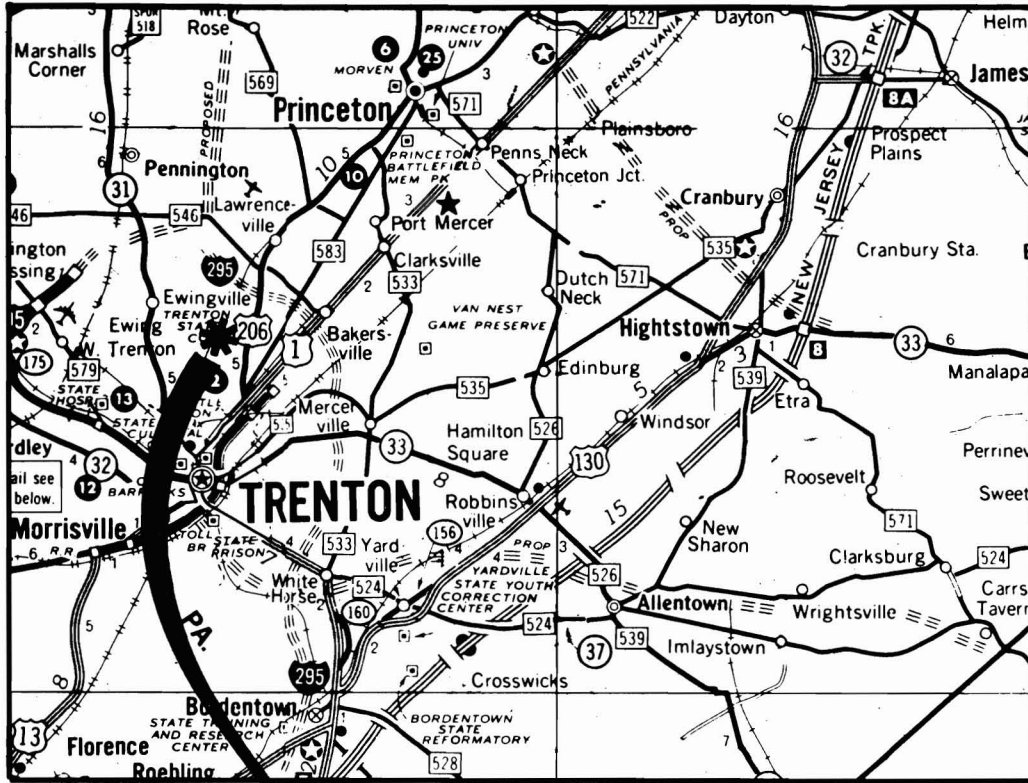
25 June 1970

LOCATION OF PUBLIC HEARING

August 19, 1970 - beginning at 10: A.M.

RIDER COLLEGE - FINE ARTS CENTER BUILDING

Route 206, Trenton, N. J.



PROPOSED AIR POLLUTION CODE CHAPTER 14

FOREWORD

Smoke from diesel trucks and buses is a form of air pollution that is particularly objectionable to the public.

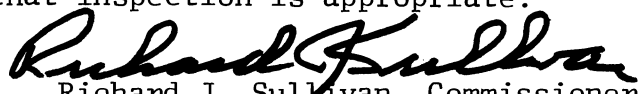
While air pollution comes in many forms and from many different kinds of sources, apartment house incinerators, certain smelly industrial processes and diesel vehicles account for the vast majority of complaints made by our citizens.

Of perhaps even more importance, however, is the fact that the diesel is believed to contribute about 6% of all the particulate pollution of our atmosphere: in our northeast metropolitan area at least 6,000 tons a year of partially burned fuel particles. Unless all sources of such pollution are strictly regulated, it will not be possible for us to achieve an acceptable level of quality of our general outdoor atmosphere. Most sources of particulate pollution--such as fuel burning equipment, foundries--and other industrial processes, incinerators, airplanes, and the open burning of refuse are now under regulation. The diesel vehicle is not.

If it is feasible substantially to reduce the diesel smoke entering our atmosphere, we should do so. In fact, it is feasible. If a diesel vehicle is well maintained, uses quality fuel, is not overloaded, and is operated properly by the driver, it will not produce those clouds of smoke we so often see. Instead, it will be able to meet the strict standards in proposed Chapter 14 of the State Air Pollution Control Code.

In the code chapter two methods of smoke measurement are proposed. One is against a visual standard for use on moving vehicles. Another, more precise method requiring instrumentation, can be used only on standing vehicles. It is hoped that the visual standard will be applied by State and local police and road enforcement officers of the Division of Motor Vehicles. The operators of diesel vehicles with smoke exceeding the standard will be in violation of Motor Vehicle law and be subject to a ticket and fine. The instrumentation method will be used by the Public Utilities Commission in its inspection of buses. Buses will fail inspection if smoke is measured above the standard.

The use of this instrumentation in motor vehicle inspection stations is held in abeyance. The administration is now making a complete re-examination of the effectiveness of the annual motor vehicle inspection program. When the study of the inspection system is complete and decisions made, we will know whether the incorporation of the diesel test as a part of that inspection is appropriate.



Richard J. Sullivan, Commissioner
Department of Environmental Protection

9 July 1970

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NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION

AIR POLLUTION CONTROL CODE

PROPOSED CHAPTER 14

CONTROL AND PROHIBITION OF SMOKE FROM DIESEL-POWERED MOTOR VEHICLES

Section 1 DEFINITIONS:

- 1.1 PERSON: Includes corporations, companies, associations, societies, firms, partnerships and joint stock companies as well as individuals, and shall also include all political subdivisions of this State or any agencies or instrumentalities thereof.
- 1.2 MOTOR VEHICLE: Includes all vehicles propelled otherwise than by muscular power, excepting such vehicles as run only upon rails or tracks.
- 1.3 DIESEL-POWERED MOTOR VEHICLE: A motor vehicle propelled by a compression ignition type of internal combustion engine; for purposes of this chapter passenger automobiles are excluded.
- 1.4 SMOKE: Small gasborne and airborne particles, exclusive of water vapor, from a process of combustion in sufficient number to be observable.
- 1.5 EXHAUST EMISSIONS: Substances emitted into the atmosphere from any opening downstream from the exhaust ports of a motor vehicle engine.

- 1.6 **VISIBLE SMOKE:** Smoke which obscures light to a degree readily discernible by visual observation.
- 1.7 **OPACITY:** The property of a substance which renders it partially or wholly obstructive to the transmission of visible light expressed as the percentage to which the light is obstructed.
- 1.8 **FREE ACCELERATION TEST:** A procedure for measuring the opacity of smoke emitted from a diesel-powered motor vehicle engine, which procedure includes a specified engine operating mode and the use of a smokemeter.
- 1.9 **DIESEL ENGINE OPERATING MODE:** A procedure for operating the engine of a stationary diesel-powered motor vehicle during a free acceleration test during which the following steps are taken:

STEP 1 - With engine running, transmission in neutral and handbrake secured, depress acceleration pedal slowly to a fast idle (1200-1300 rpm).

STEP 2 - Accelerate the engine from the fast idle to maximum governed revolutions per minute (rpm) by depressing the accelerator pedal as rapidly as possible.

STEP 3 - As soon as governed rpm is attained, release the accelerator pedal and allow engine to coast down to fast idle (1200-1300 rpm).

STEP 4 - Repeat Steps 2 and 3 twice in rapid succession to clear out engine then repeat in rapid succession until three consistent peak smoke opacity measurements are observed on the smokemeter. The three consistent peak smoke opacity measurements shall be the opacity measured by the free acceleration test.

1.10 SMOKEMETER: A device constructed in such manner as to measure smoke opacity by light obstruction between a light source and photoelectric cell which will indicate the percent opacity of smoke at a point approximately six (6) inches from the engine exhaust outlet. The device shall be of design meeting "Specification for Diesel-Powered Vehicle Smokemeter" on file with the State Commissioner of Environmental Protection and approved for use in New Jersey by the State Commissioner of Environmental Protection.

Section 2 PUBLIC HIGHWAY STANDARD:

2.1 No person shall operate a diesel-powered motor vehicle or permit a diesel-powered motor vehicle which he owns to be operated upon the public highways of the State if the vehicle, when in motion, emits visible smoke in the exhaust emissions within a distance of approximately twelve (12) inches from the exhaust outlet, for a period of more than five (5) seconds, or when stationary emits smoke in the

exhaust emissions having an opacity greater than twenty (20) percent as measured by the free acceleration test.

Section 3 INSPECTION STANDARD:

- 3.1 Any diesel-powered motor vehicle which is subject to inspection by the Division of Motor Vehicles or by the Public Utilities Commission, as a condition of compliance with said inspection, shall not emit smoke in the exhaust emissions from the engine having an opacity greater than twenty (20) percent as measured by the free acceleration test. However, no test shall be performed by the Division of Motor Vehicles as a condition of compliance with inspection until sixty (60) days after notice of the condition of inspection requirement is issued by the State Department of Environmental Protection.

LEGAL BACKGROUND

The problem of motor vehicle air pollution was recognized by the New Jersey Legislature in 1966 (See appended statute). In amendments to the motor vehicle and air pollution statutes, the Department of Health was delegated authority to establish standards and requirements for the control of air contaminants from motor vehicles, after consultation with the Division of Motor Vehicles. The Department of Environmental Protection Act of 1970, Chapter 33, Laws of N.J. 1970, transferred all functions, powers and duties relating to air pollution heretofore exercised by the Department of Health and the commissioner thereof to the Department of Environmental Protection and the commissioner thereof. Therefore all references made herein to the commissioner and the Department of Health shall be deemed to refer to and mean the commissioner and the Department of Environmental Protection.

The Legislature directed that the standards were to be set at such levels as to be reasonably attainable by properly functioning motor vehicles, including vehicles manufactured with emission control devices or systems.

The statute specifically provides that motor vehicles subject to inspection by the Division of Motor Vehicles or other authorized bodies, as a condition of inspection, comply with standards and requirements for control of air contaminants to be established by the Department of Health. In New Jersey, the inspection of diesel-powered vehicles is conducted by two agencies: the Division of Motor Vehicles, trucks and tractors; the Public Utilities Commission, buses.

The Department is also charged with establishing standards for smoke and other contaminants emitted from any motor vehicle operating upon the public highways. Enforcement of the on-the-road standards is vested in all agencies authorized to enforce traffic regulations, including state and municipal police. Violators of this provision are subject to a penalty of not less than \$25.00 nor more than \$100.00.

Proposed Chapter 14 of the New Jersey Air Pollution Control Code (Control and Prohibition of Smoke from Diesel-Powered Motor Vehicles) sets forth standards for diesel-powered vehicles only. Included are both classes of standards authorized by statute, those applicable to all diesel-powered motor vehicles operating upon the public highways (Section 2) and those applicable to vehicles subject to state inspection (Section 3).

MOTOR VEHICLE LAW ON PAGE 16

BASIS FOR PROPOSED CODE

GENERAL INFORMATION

The State Department of Health, shortly after adoption of the Motor Vehicle Law in 1966, engaged the services of Stevens Institute of Technology, Davidson Laboratory, to assess the state of the art of legal regulation and control of smoke from diesel-engine-powered vehicles. Davidson Laboratory was further requested to evaluate the effectiveness of engine maintenance, fuel factors, and engine loading on exhaust emissions, and to provide data on the smoking characteristics of the diesels on New Jersey's highways. The results of the Davidson Laboratory studies are contained in a report entitled "Diesel Exhaust Smoke Emission Study for New Jersey State Department of Health," by Richard G. Kolb and Irmin O. Kamm, dated December, 1967. This report is available for review in the offices of the New Jersey State Department of Environmental Protection, Division of Environmental Quality, and at the State Library. In drafting proposed Chapter 14 of the New Jersey Air Pollution Control Code, the Department of Environmental Protection was guided but not completely bound by the recommendations contained in the report.

The following pertinent information extracted from the 1967 report provides the background and rationale for the standards and test procedures set forth in the proposed code. The material quoted below has been selected from the report and slightly edited for syntax and ease of reading.

KINDS OF DIESEL SMOKE

"Three kinds of diesel smoke are recognized -- blue, cold and hot.

"Blue smoke is caused by excessive lubricant in the combustion chamber and is usually the result of worn rings or both worn rings and worn valve guides.

"Cold smoke is principally a fog (or aerosol) of unburned or partly oxidized liquid particles of fuel or of fuel in combination with lubricating oil. It is the result of quenched combustion when the air-fuel ratio is high, and occurs most often when an engine has just been started, when it is idling, or when its is at light load; and it is generally grey or white.

"Hot smoke is the result of sluggish burning of the fuel particles. It consists chiefly of solid carbonaceous particles (soot) which form when there is a lack of air in a locally overrich mixture in the combustion chamber or when overfueling is practiced. It might also occur during warm-up operation under load, when the fuel-air mixture approaches stoichiometric (chemically correct) proportions. This is the kind of black smoky exhaust which is usually associated with diesel engines and can be considered the principal cause of public complaint. It is also a subject of special interest to the truck or bus operator who is concerned with economies of operation.

CAUSES OF BLACK DIESEL SMOKE

"There is one fundamental cause of excessive smoke: incomplete combustion. There are numerous other contributory factors, however, some of which are listed below:

(1) Overfueling above the manufacturer's recommendations

Overfueling by adjusting fuel delivery improperly can produce engine power higher than the factory-rated power and can also make up for the power lost because of engine wear, but it results in a higher smoke density and usually in a higher fuel cost.

(2) Defects in the fuel pump or injectors

Defects in the fuel pump or injectors might be sticking needles, worn injection nozzles, or an improper spray pattern caused by deposits which partially block the injector holes.

(3) Decreased air supply

Decreased air supply could be caused by clogged or dirty air filters, high altitude, or excessively high air intake temperature.

(4) Mechanical condition

General deterioration of components with time and wear can cause excessive lube oil consumption, sometimes with loss of compression pressure in the cylinders. The most common causes of this condition are stuck or worn piston rings, worn valves and guides, and worn cylinders and pistons.

(5) Acceleration

Acceleration of the engine rpm produces a temporarily overrich condition because, although fuel is added instantaneously, breathing capacity, dependent on rpm, is temporarily reduced. The overrich condition is more likely to occur with open-chamber engines than with precombustion-chamber engines.

(6) Driver

Some drivers apparently believe that if there isn't smoke there isn't enough horsepower. Although drivers or mechanics can adjust diesel injection pumps or restrict the fuel return line from injectors to increase horsepower, they will increase smoke emission by doing so.

Another driver fault is engine lugging. This practice involves the use of a transmission gear which is too high for the grade, resulting in a drop in engine rpm below the recommended range.

Many driver problems can be avoided by strict driver education and by supervision in the proper use of the gearbox. If driver abuse of the vehicle can be reduced, costs for repair, maintenance, and operation can be lowered.

(7) Fuels

The tendency of diesel engines to smoke has been found to be related chiefly to the viscosity, volatility, and ignition quality of the fuels used.

When an engine is improperly designed, maintained or adjusted, light fuels of suitable ignition quality can be used for better control of smoke. The ignition quality of diesel fuel is that quality which makes it suitable for compression-ignition engines. Increasing the cetane number above a certain limit increases smoke because the fuel ignites before it is properly mixed with the available air, or because the cracking rate is greater than the oxidation rate. The use of a fuel with too high a specific gravity also causes an increase in smoke, although this kind of fuel is less expensive than normal diesel fuel and has a higher energy content per gallon.

Thus the degree of black smoke can be influenced by the chemical nature of the fuel; more volatile fuel generally causes less black smoke than a heavier fuel. However, the improvement resulting from the use of a more volatile fuel is less than that which can be obtained by adjusting engine or operating conditions. The use of lighter fuels of suitable ignition quality is followed by some reduction in power and a loss in fuel economy. The satisfactory performance of the heavier fuels used in European bus operations clearly shows that smoke control can be effected by means other than a resort to fuels approaching kerosene in volatility.

METHODS OF REDUCING BLACK SMOKE

"(1) Additives

During the past two years, it has been shown that additives can effect a worthwhile reduction in smoke regardless of engine make. Some reports have indicated that additives can contribute to cleaner engines, less wear, and a small saving in fuel consumption.

(2) Maintenance

In order to reduce hot smoke to an acceptable level it is necessary to limit the amount of fuel that can be injected into the cylinders. Reducing fuel delivery reduces power, and reduced power leads to smoke reduction. Black (hot) smoke is caused by lack of sufficient air or by the injection of an excessive amount of fuel, both of which result in incomplete combustion. Regular maintenance of the fuel injection pump, injectors, and air-intake system is the best way to avoid black smoke. Yet there are problem areas, such as the shortage and high cost of skilled labor, and the cost of spare parts. Basically, the maintenance problem resolves itself into one of economics. Engines smaller than needed are purchased and uprated by over-fueling and straining; neglect is encouraged.

(3) Derating of Engines

Since the diesel engine is so easily operated at a relatively rich fuel-to-air ratio, it is up to the manufacturer and dealer to resist the temptation to increase the advertised engine output. The question of "How much smoke?" can easily become a question of the propriety of yielding to this temptation and perpetuating competition in horsepower per pound of engine weight or dollar cost.

(4) Operation

The specified engine operating range is based on extensive laboratory testing (before production) by each of the manufacturers. It is important that drivers be trained to operate within the recommended engine-rpm range.

Also important is adherence to the manufacturer's recommendation of engine horsepower for particular application and service.

(5) Fuel

Engine ratings and smoke limits are based on the use of fuel of proper ignition quality, viscosity, and volatility. To limit smoke it is essential that the recommended fuel be used, rather than one which does not meet the proper specifications.

SUMMARY

"Engines in proper mechanical condition, operating in the proper fuel-to-air ratio range, do not produce excessive exhaust smoke. However, under certain conditions (e.g., during acceleration and gear changes), a puff of smoke is emitted regardless of the type or condition of the engine. This puff is more noticeable than it would be if the same amount of smoke were emitted over a longer period at a lower smoke density.

"It is universally recognized that DIESEL SMOKE CAN BE CONTROLLED and that an excessively smoking engine costs more to operate than a clean-running engine. Effective smoke control requires proper maintenance procedures for the operation of diesel vehicles. More importantly, it requires a stronger incentive than economy alone; it requires a continuing enforcement program.

"A primary responsibility of engine manufacturers is to develop efficient systems and to rate engine output so that smoke limit will be acceptable. Some engines which were developed years ago, but are still in use, may have inherent smoke levels that are excessive by current standards. But technology has so improved the combustion efficiency and the mixing of fuel and air in the diesel cycle, that the modern diesel engine does not emit objectionable smoke when the engine is operated correctly with the proper fuel and when it is well maintained."

STANDARDS AND ENFORCEMENT PROCEDURES

INSPECTION STANDARD

The free acceleration test specified in this proposed chapter is a procedure for measuring the opacity of smoke emitted from the engine of a stationary diesel-powered motor vehicle. The procedure requires accelerating the free-running engine from fast idle to top governed speed several times in rapid succession. The peak opacity of the smoke from the exhaust is measured by means of a smokemeter.

The prescribed engine operating mode allows for the measurement of the smoke opacity from the exhaust while the vehicle is stationary at an inspection site. Studies conducted for the State Department of Health show that the peak in the smoke opacity which occurs during the prescribed engine operating mode can be equated with the opacity at full vehicle load on the highway.

The smokemeter of the type specified by the State Department of Environmental Protection has the capability of measuring the percent of light obscuration between a light source and a photoelectric cell within approximately 12 inches from the exhaust outlet. Detailed specifications for the smokemeter include such factors as instrument configuration, sensitivity, accuracy, response time and maintenance. These specifications together with operating instructions are on file with the State Department of Environmental Protection and will be on file with the Division of Motor Vehicles if this proposed chapter is adopted.

PUBLIC HIGHWAY STANDARD

A visual standard using no instrumentation is proposed for on-th-road enforcement. Visible smoke which obscures light to a degree readily discernible by visual observation would be prohibited. It is the opinion of the Department of Environmental Protection that exhaust smoke having a light obscuration of less than 20 percent within 12 inches from the exhaust outlet is not readily discernible by visual observation, and that the standards set down in proposed Chapter 14 can be reasonably applied by enforcement officers. The visual concept would be applied to all diesel-powered vehicles including buses, trucks, and tractors while under load on public highways.

In preparing the proposed code, it is recognized that smoke in excess of the visual standard usually occurs when starting vehicles from a dead stop and when changing gear ratios; hence, an exception is permitted as provided in Section 2.1 for a period not greater than five seconds. Law enforcement officers are expected to exercise reasonable judgement in the application of this exception.

NEW JERSEY AIR POLLUTION CONTROL LAWS

Published by the New Jersey State Department of Health, Air Pollution Control Program, John Fitch Plaza, Trenton, N. J. 08625.

MOTOR VEHICLE LAW

Chapters 15 and 16 of P. L. 1966 (Title 39:3-70:1 and 70:2, and Title 26:2C-8:1 to 8:5), as amended by portions of P. L. 1967, c. 106. Supplements the Air Pollution Control Act (1954).

NOTE: Other portions of the 1954 Act, as amended, and other air pollution laws are available. They include:

- General Provisions of 1954 Act as amended
- Emergency Control Act
- Permit for Construction, Installation and Alteration of Equipment
- Air Pollution Scholarship and Intern Program
- Tax Exemption for Air and Water Pollution Control Equipment
- Mid-Atlantic States Air Pollution Control Compact

The provisions concerning motor vehicles contained in the 1966 Supplement to the Air Pollution Control Act (1954) are amended by portions of P. L. 1967, c. 106.

C. 39: 3-70.1

Any motor vehicle which is subject to inspection by the Division of Motor Vehicles or any other duly authorized body shall, as a condition of compliance with said inspection, pass such tests as may be required to demonstrate that the motor vehicle complies with any standards and requirements for the control of air contaminants established by the New Jersey State Department of Health which are applicable to such motor vehicle.

C. 39: 3-70.2

Any person who operates a motor vehicle or owns a motor vehicle which he permits to operated, upon the public highways of this State which emits smoke and other air contaminants in excess of standards adopted by the department shall be liable to a penalty of not less than \$25.00 nor more than \$100.00 which shall be enforced in accordance with the provisions of Chapter 5 of Title 39 of the Revised Statutes.

C. 26: 2C-8.1

The department, after consultation with the Director of the Division of Motor Vehicles, shall have the power to formulate and promul-

gate, amend and repeal codes, rules and regulations establishing standards and requirements for the control of air contaminants from motor vehicles.

C. 26: 2C-8.2

Any code, rule or regulation establishing standards and requirements for the control of air contaminants from motor vehicles shall be applicable to such classification of motor vehicles as the department shall determine to be necessary to carry out the purpose of this act and shall apply to such motor vehicles not earlier than 180 days following the date of adoption.

C. 26: 2C-8.3

Such codes, rules and regulations shall establish standards and requirements for the control of air contaminants from motor vehicles manufactured with air pollution control devices, systems or engine modifications consistent with the requirements of the "Motor Vehicle Air Pollution Control Act" (77 Stat. 392, 42 U.S.C. 1857) and any amendments and supplements thereto.

C. 26: 2C-8.4

Such codes, rules and regulations shall establish standards and requirements for control of air contaminants which can reasonably be attained by properly functioning motor vehicles without the addition of any air pollution control devices, systems, or engine

modifications provided such vehicles were not manufactured with pollution control devices, systems or engine modifications in accordance with the "Motor Vehicle Air Pollution Control Act" (77 Stat. 392, 42 U.S.C. 1857).

C. 26: 2C-8.5

All codes, rules and regulations shall be formulated and promulgated in the manner provided for in Section 8* of the act to which this act is a supplement.

* Section 8 (P. L. 1954, C. 212, C. 26:2C-8), reprinted here for your convenience, states:

The department shall have power to formulate and promulgate, amend and repeal codes and rules and regulations preventing, controlling and prohibiting air pollution throughout the State or in such territories of the State as shall be affected thereby; provided, however, that no such code, rule or regulation and no such amendment or repeal shall be adopted except after public hearing to be held after 30 days prior notice thereof by public advertisement of the date, time and place of such hearing, at which opportunity to be heard by the department with respect thereto shall be given to the public; and provided, further, that no such code, rule or regulation and no such amendment or repeal shall be or become effective until 60 days after the adoption thereof as aforesaid. Any person heard at such public hearing shall be given written notice of the determination of the department.

Note

Effective May 2, 1970 wherever Department and/or Commissioner of Health appears it shall mean and refer to the Department and/or Commissioner of Environmental Protection, Division of Clean Air & Water, shall mean and refer to the Division of Environmental Quality of the Department of Environmental Protection.