State of California
Motor Vehicle Pollution Control Board

Report to
Governor Edmund G. Brown
and the
Legislature

January 12, 1961

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Honorable Edmund G. Brown, Governor of California
Honorable Hugh N. Burns, President pro Tempore
and Members, California State Senate
Honorable Ralph M. Brown, Speaker
and Members, California State Assembly
State Capitol
Sacramento, California

Gentlemen:

In accordance with the directive contained in Chapter 3, Section 24386.5 of the Health and Safety Code, we are submitting herewith the first Report of the Motor Vehicle Pollution Control Board. This Report covers the activities and accomplishments of the Board during its first six months of operation.

Respectfully submitted,

John T. Middleton

John T. Middleton, Chairman
Motor Vehicle Pollution Control Board

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INTRODUCTION

Air pollution, both a product of and a problem for today's civilization, is being evidenced in ever-widening areas of California. Its causes are the activities of California's 15-1/2 million people. The steadily improving standard of living, largely resulting from the expanding use of a variety of energy sources, creates the type of air pollution which occurs in a large portion of California. The combustion of organic fuels, whether by industry, agriculture, the individual householder, or by the motor vehicle, creates the products responsible for the greater part of air pollution in the principal urban areas of California.

It is now recognized that air is a vital natural resource and that its preservation is dependent on control over the pollution caused by California's 8 million motor vehicles. For that reason Governor Edmund G. Brown placed the subject before a special call of the Legislature in 1960. The importance of the problem and the need for State action was described by the Governor in his message to the Legislature as follows:

> "Clean, clear air is a natural resource which is vital to people, to plants, to our health and prosperity. If we fail to preserve and protect this resource, if we stand idle watching it become polluted by the curse of smog, the consequences will plainly be drastic.
>
> The vast majority of Californians recognize that smog is a menace to public health. We know that air pollution, aggravated by weather conditions, may produce a major disaster like that in Donora, Pennsylvania, in 1948. We know that the relationship between air pollution and chronic diseases of the lungs is highly suspicious. We know that experienced doctors regard air pollution as an insidious influence on people with heart conditions. And, above all, we know smog can make us feel sick or at least terribly uncomfortable.
>
> In addition, we know smog causes extensive damage to crops and other vegetation. California farmers lose about $8 million a year from crops ruined by smog, and the damage is thought to be rapidly increasing. Smog also reduces visibility, thus marring the scenery and increasing the danger for people traveling by air, freeway, or highway. In short, we know that the filth in our air is an enemy of our welfare.

Because of the consequences of air pollution, I had no hesitation when I became Governor a year ago in committing the resources of the State to the battle to clean up the air of our State. We have made important progress during the past year...

The principal goal of State government this year is the enactment of a program to control the pollutants from motor vehicles. Every responsible scientific group which has studied the subject is in agreement that the gases discharged from motor vehicles are a prime source of air pollution...Scientific opinion is unanimous that, at present, the control of pollutants discharged from motor vehicles is the most promising avenue for attacking smog."

The Motor Vehicle Pollution Control Board and a program to control motor vehicle created air pollution was authorized at this 1960 legislative session by the enactment of Assembly Bill 17. By passage of this legislation the State was assigned a new role in the battle against air pollution. In addition to its existing program of research and assistance to local governments in their control programs, the State itself was directed to establish a program to control mobile sources of air pollution, the motor vehicle. This Board was directed to effectuate a program to control this source of pollution which, if allowed to continue unabated, would adversely affect the health, safety and welfare of the people of the State of California.

The Board, composed of nine members appointed by the Governor and the directors of four State departments, became an operating agency on July 8, 1960, and held its first business meeting for purposes of organization on July 21, 1960.

This is the first report to be submitted by this Board to the Governor and the Legislature. It presents information on the extent of today's air pollution problem and the role played by the motor vehicle in its creation. It describes the role, program, and activities of this Board and its achievements during the first six months of operation. It describes the relationship of the Board program to that of other air pollution control agencies. It presents information received by the Board on exhaust control devices and their availability. It describes the program of the Board for the 1961-63 period.

THE PROBLEM AND THE MOTOR VEHICLE POLLUTION CONTROL PROGRAM

AIR POLLUTION EVIDENCE

The need for the Board's control program has been clearly established. Air pollution episodes which are occurring with increasing frequency and intensity in widening areas of the State each year are now known to be largely the result of the State's rapidly increasing motor vehicle population.

The Board at its public meetings in various sections of the State has obtained information on the air pollution problem and the significance of the motor vehicle.

It was reported to the Board that the damaging effects of photochemical air pollution have been detected in 26 of the State's 58 counties. Seven of these counties are in the South Coastal Basin: Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego; photochemical air pollution damage has been detected in Santa Clara, San Mateo, Alameda, Contra Costa, San Francisco, Solano, Napa, Sonoma, Marin, and San Benito counties in the San Francisco Bay Area; in the Delta Area air pollution effects have been detected in Yolo, Stanislaus, Sacramento, San Joaquin and Merced counties, and in the San Joaquin Valley, in Madera, Fresno, Tulare, and Kern counties. It affects a total area of 14,463 square miles. The accompanying map indicates that 12% of this smog occurs in the San Joaquin Valley, 22% in the Delta Area, 24% in the Bay Area, and 42% in the South Coastal Basin.

There are four sources of motor vehicle pollution. The greatest contributor to air pollution is the exhaust. A second source, the crankcase which emits unburned gasoline, is estimated to contribute a lesser but still significant portion of vehicular pollutants on the order of 10 to 25%. Two other sources - carburetor and gasoline tank evaporation - also add to the total pollution problem. These all emit tons of hydrocarbons and nitrogen oxides into the atmosphere which react together in the sunlight to form photochemical smog. In addition, the exhaust emits carbon monoxide, another product of combustion in today's gasoline-powered vehicles. In Los Angeles County alone, with 40 percent of the total vehicles in the state, it is estimated that each day these vehicles throw out into the atmosphere 1450 tons of hydrocarbons and 8900 tons of carbon monoxide.

Air pollution control agencies in metropolitan areas such as Los Angeles, San Diego and the San Francisco Bay Area, have emphasized the magnitude of the problem attributable to the motor vehicle. The motor vehicle is responsible for as much as 80% of Los Angeles County's smog and 77% of San Diego's smog. In the San Joaquin Valley the Board learned that air pollution episodes have been increasing in the last four years in which air quality measurements have been taken, and that the part played by the motor vehicle is believed to be significant. While the figures vary in accordance with the nature of other sources in the area and with the means that are available for controlling these other sources, evidence shows that air pollution increases with the continuing increase in our motor vehicle population. The anticipated increase in California's motor vehicle population from today's eight million to 1980's 18 million, poses a problem which this Board must meet by rapid implementation of its program. (See accompanying chart).

THE ROLE OF THE BOARD

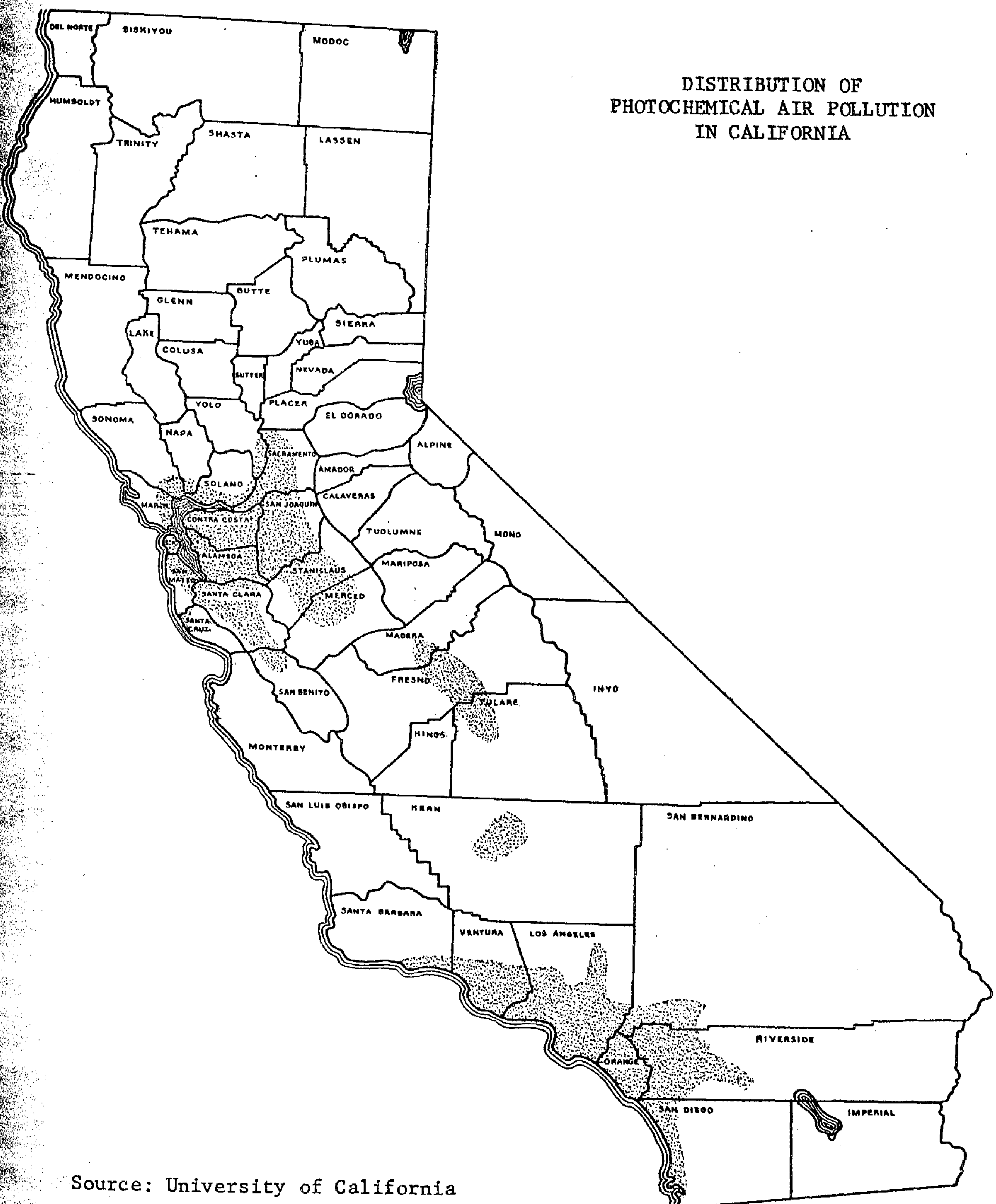
The State program for control of air pollution and the restoration of clean air to California citizens is based on the concept that control of stationary sources of pollution is properly the province of local air pollution control organizations, but that the control of contaminants from mobile sources of pollution is the responsibility of the State. Control over both stationary and mobile sources is essential if California is to successfully attack its air pollution problem.

A basic consideration in air pollution control programs is the description of specific air contaminants and the definition of acceptable air quality. This was provided with the establishment of standards for acceptable air quality. These standards and standards for motor vehicle emissions designed to permit the attainment of acceptable air quality were established by the Department of Public Health in accordance with legislation enacted in 1959. These standards serve as a necessary and invaluable basis for an effective control program by this Board.

The role of the Motor Vehicle Pollution Control Board is to implement the State standards by establishment of a program to control vehicular emissions. To this end the Board has been assigned the following specific duties:

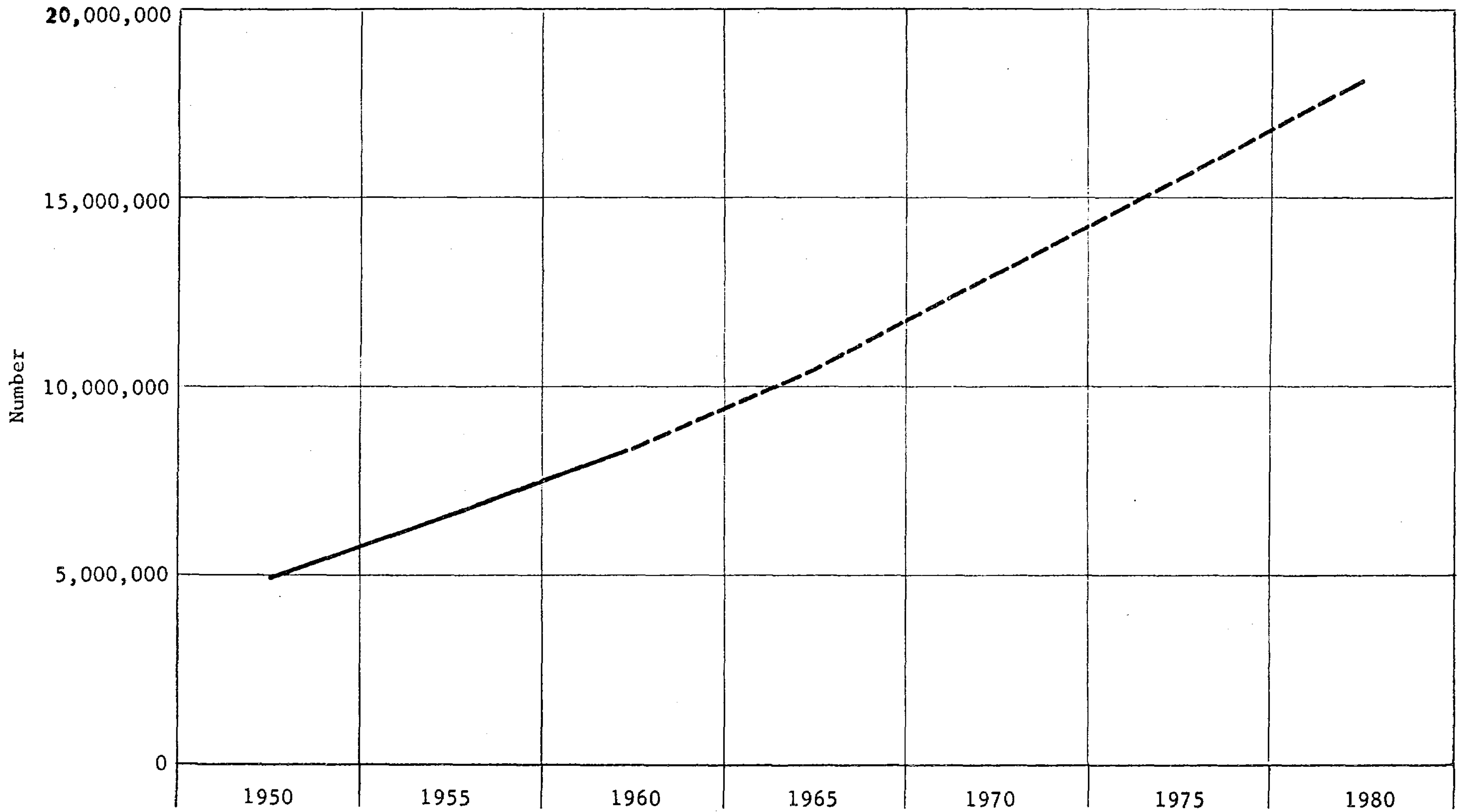
1. To determine and publish the criteria for approval of motor vehicle pollution control devices. Determination of such criteria shall be based on a number of factors including the cost of the device and its installation, its durability, the ease and facility of determining whether the device, when installed on a motor vehicle is properly functioning, and other factors which render a device suitable or unsuitable for the control of pollution or for the health, safety, and welfare of the public.

DISTRIBUTION OF
PHOTOCHEMICAL AIR POLLUTION
IN CALIFORNIA



Source: University of California

TOTAL FEE PAID VEHICLE REGISTRATIONS
1950-55 Actual, 1960-80 Estimated



Source: California Department of Motor Vehicles

2. To issue certificates of approval for devices which are found by the Board to meet the standards established by the State Department of Public Health and criteria adopted by the Board.

3. To exempt from requirements of the law those classes of vehicles for which devices are not available and also those classes of vehicles which are designed to meet and operate within the standards without the addition of other equipment.

In addition, the Board is authorized to adopt rules and regulations that are necessary to execute its powers and duties, employ necessary staff, and contract for the use of laboratories, either public or private, to perform necessary testing of devices for purposes of certification.

While the Board is responsible for establishing a program to insure the control of pollutants from motor vehicles at the earliest possible date, it has, in addition, a major responsibility to insure protection to the public by establishing sound criteria for the approval of devices based on the best technical and scientific knowledge. The Board has stated that "it will not certify a device which meets the standards for exhaust emissions unless it has complete assurance that this device will also be to the best interests of the buying public."

The steps taken by the Board in establishing its program are covered in a subsequent section.

COORDINATION WITH OTHER AGENCIES

The task of the Board by its nature requires that the Board maintain close liaison and cooperation with other state and local agencies.

The Department of Public Health, which is represented on the Board by its Director, has clearly defined activities, which are closely related to the Board responsibilities. Principal among these is the establishment of standards for motor vehicle emissions.

The Board's approval of devices is largely dependent on whether such devices meet these Department of Public Health standards. If its control program is to be effective in solving the total air pollution problem it is important that these standards, which will be refined and improved with the development of additional information, be based on the soundest possible research data. This Board has no responsibility for research in this area and is, therefore, relying on the State Department of Public Health to provide this vital information.

Secondly, the Department of Public Health has responsibilities to provide assistance to counties and local air pollution control agencies in the establishment and maintenance of an effective air monitoring system. Information on air quality developed by the State Department and by those local agencies which have their own monitoring systems is an important factor in the Board's efforts to evaluate the effectiveness of its program. This is also essential information in order that the Board may know of the part played in the creation of that problem by the motor vehicle, both prior to and after the institution of its control program.

Enforcement of the control program once the Board has certified the necessary number of devices for it to become effective, is dependent upon close coordination with both the Department of Motor Vehicles and the California Highway Patrol. As the program evolves, it will be necessary to insure that devices, when required, are installed on automobiles. The law provides that this must be done through the registration of motor vehicles which is the responsibility of the Department of Motor Vehicles and through enforcement by both that department and the California Highway Patrol. Continuing study by the Board and these Departments will be necessary to determine compliance and whether or not additional legislation will be required.

Inasmuch as solution to California's air pollution problem is dependent on control of both stationary and mobile sources, this Board is maintaining close liaison with local counties and air pollution control agencies.

APPLICABILITY OF THE LAW

The Motor Vehicle Pollution Control program will be operative throughout the entire state with regard to new motor vehicles within one year after the date that the Board has certified at least two devices as acceptable for the control of motor-vehicle-created pollution. The applicability of the law with regard to used vehicles will be dependent upon the local county or district determination as to the significance of its own air pollution problem. The legislation states that a county board of supervisors or the governing board of an air pollution control district may hold a public hearing to determine the existence and extent of its air pollution problem and the part played in that problem by the motor vehicle. It further states that the governing board may, "...on the basis of its finding as to air quality...determine and adopt a resolution declaring that the provisions...(relating to used vehicles)...are unnecessary for the preservation of air quality..." and that therefore the motor vehicle control program is not necessary within that county or district.

In those counties and districts that participate in the program the legislation stipulates that "...no used motor vehicle upon transfer of registered ownership shall be registered one year after the certification date...", "...that no used commercial vehicles shall be registered after the second December 31 next following the certification date..." Thus once this Board has certified devices, a preset schedule will go into effect which will determine when motor vehicles within those areas experiencing air pollution shall be equipped with control devices, and "...that no motor vehicle shall be registered after the third December 31 next following the certification date..."

With the establishment of valid facts and data showing that photochemical air pollution is affecting an ever-widening area of California and that there is interference with visibility, irritation to the senses, and significant economic damage to agricultural crops, it is important that there be wide-spread statewide participation in this program. One of the Board's major responsibilities is to provide assistance to the counties in reaching their decisions as to participation in the state program.

ACTIVITIES AND ACCOMPLISHMENTS

PUBLIC MEETINGS

The Board at its first meeting adopted the policy of holding public hearings in various areas of the State for a three-fold purpose: 1) to learn of the air pollution problem in these various areas of the State and the contribution of motor vehicles to that problem; 2) to enable residents throughout the State to obtain information on the Board's activities; and 3) to hear testimony on the technical aspects of motor vehicle emission control necessary to enable the Board to make its decisions leading to the eventual approval of control methods. Public meetings designed to serve these purposes were held as follows: July 21, Berkeley; August 12, Los Angeles; September 27, San Francisco; November 14, San Diego; and December 20, Fresno. A list of those persons who have appeared before the Board and the titles of their presentations may be found in Appendix I.

BOARD COMMITTEES

The urgency of the problem facing the Board demanded immediate action in taking those steps necessary to control vehicular emissions. For this reason committees were appointed to assume responsibility for certain work areas until such time as staff could be acquired. Such committees met on frequent occasions and took the steps necessary to make decisions as to headquarters location, staff organization and procurement, laboratory facilities, factors relating to the development of criteria and the establishment of testing procedures and evaluation of control devices. Such committees were appointed by the Chairman and Vice-Chairman as ad hoc committees. Functions performed by certain of these committees are now being assumed by the staff and future Board committees will be for the purpose of assisting the Board in developing policy on such matters as budget, the testing and evaluation of devices, and the socio-economic factors requiring consideration in device certification.

STAFF PROCUREMENT AND OFFICE FACILITIES

The staff activities of the Board are now being directed by an Executive Officer. The present staff also includes an assistant to the Executive Officer, a supervising engineer, and necessary clerical assistance. Additional specialists in chemical engineering and automotive engineering to work with the supervising engineer are now being acquired. Staff will be acquired as its program develops and as the need is clearly demonstrated.

The Board does not plan to create a large new agency but rather to utilize the services of existing agencies to a maximum degree. The State Department of Public Health, which is designated as the administrative service agency for the Board, has provided and will provide in the future as many essential services as feasible. To date, for example, their staff has been utilized in budgeting, travel arrangements, personnel, research and data processing, public information, and office management. As work proceeds, the Board will cooperate with the Department of Motor Vehicles, the Highway Patrol and other State agencies in effectuating its program.

Headquarters for the staff has been established in the State Building in Los Angeles, since Southern California is the area in which the need for control measures is most immediate and technical capabilities most available. A branch office with minimum staff has been located in Berkeley in order to maintain proper liaison with the Northern California counties and air pollution control agencies whose programs and interests are related to those of the Board.

LABORATORY FACILITIES

A contract with the Los Angeles County Board of Supervisors for use of the Los Angeles District Automotive Laboratory was entered into by the Board for the period January 1, 1961, to June 30, 1961. Under terms of this contract the Los Angeles facilities will be made available to the Board for Step I testing of devices, that testing designed to determine whether or not devices meet the Department of Public Health exhaust emission standards. The Board will assume full responsibility for testing by the laboratory and such testing will be done under supervision of the Board staff. The laboratory is now engaged in the development and refinement of specific procedures for the testing and evaluation of motor vehicle exhaust control devices.

As the Board program develops further it will be necessary to contract with other laboratories. Exploration and continual negotiations are underway to insure that such facilities will be available to the Board when needed.

THE TECHNICAL ADVISORY GROUP

A technical advisory group was appointed in November, 1960 to serve at the pleasure of the Board. It has since met on several occasions with Board committees and the staff to assist in the development of criteria and test procedures. Represented in this group are accessory manufacturers, air pollution control districts, analytical laboratories, the automobile industry, device manufacturers, the oil industry, research organizations, and universities.

THE PROGRAM FOR ADOPTION OF CRITERIA AND TESTING OF EXHAUST CONTROL DEVICES

In order to launch its program as soon as possible the Board has been proceeding with the establishment of its program for control of exhaust emissions. Methods to control this source have been given top priority since, first, it is by far the most significant contributor to the total problem; and, secondly, standards for its control were the first established by the Board of Health for motor vehicle emissions, thus providing the Board with the required basis for action.

A significant step was taken with the adoption of a statement that Board policy is: to establish and adopt criteria in well-defined steps; to test devices in accordance with these steps; to provide that Step I testing is for the purpose of determining whether devices meet the standards for motor vehicle exhaust emissions as established and published by the California State Department of Public Health; to require that the device manufacturer in his application to the Motor Vehicle Pollution Control Board for Step I testing submit data on the device's compliance with these standards and on other characteristics of the device as stipulated by the Board; and to accept applications and devices for Step I testing at the earliest possible date.[1]

Step I testing will determine whether a device meets the State standards; this will be merely the first step in a series of tests leading to eventual device certification. Thus, rather than delaying the Board program until the information necessary to establish additional criteria can be developed, the Board can proceed with an orderly development of its program.

Efforts are now also being directed toward the <u>establishment of additional criteria</u> for acceptable devices, devices which the Board can be assured will be in the best interests of the public. These additional criteria will relate to such characteristics of the device as cost, life, safety, noise, excessive heat, odor, effect on engine operation, and its effectiveness under abusive driving conditions.

The <u>life of the device</u> is important not only from the economic point of view but from the standpoint of any inspection and enforcement program that may be required. The Board will want to learn whether assurances can be given that a device is properly operating without requiring an inspection system that is prohibitive in cost. It is the intention of the Board not to certify devices with an effective life of less than one year based on State Department of Motor Vehicle registration periods. This certification should preferably be for more than one

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[1] See Appendices 2 and 3 for copy of Resolution 60-1 defining Board policy and Report of Committee on Criteria for Devices, Evaluation, and Test Procedures as acted on and approved by the Board on November 14, 1960.

year. In establishing this criteria, the Board will consider the driving patterns of California motorists, the cost of the device, and the cost of its installation and maintenance. In addition, the Board will take into account the rate of loss of efficiency of the device following the minimum acceptable life established by the Board.

The cost of the device to the public has perhaps been the subject of more discussion and concern than any other item. It is not yet known what the final decision on criteria for cost will be. It may well be that no single figure can now be set as a reasonable cost. It is necessary to consider, in addition to the cost of the device and its appurtenances, the installation cost, the parts replacement cost, maintenance and operating costs. Factors which also will be considered include the make of the car and its age, the average operating costs, the costs of the automobile manufacturer and the costs of the purveyor of automobile accessory equipment, the marketing costs and the extent of the market, to say nothing of the desires and needs of the automobile owner. It may be that one basis for perspective on proper costs and life of devices can be obtained from an evaluation of the cost and life for other items on motor vehicles, such as mufflers, fuel pumps, batteries, generators, carburetors, and car heaters, and the Board is now gathering data on such factors. It will also be helpful to consider the cost problems which have evolved with the installation of devices which have become mandatory in some states, such as the turn indicator, headlights, and brakes, to mention but a few.

A determination of a reasonable and just cost criterion cannot be made without consideration of the estimated effective life of a device. It could be detrimental to the public for the Board to disallow or deny certification of a device with an effective life of five years for example, even though its cost was in excess of what could be adjudged reasonable for a device lasting for one year. Because of the growing keen interest of the manufacturing industry in the United States, it is hoped and expected that competition will solve many of the questions on costs.

Considerable study will be necessary to define these additional criteria. The Board will be dependent on the information and technical advice which can be provided by those who have actually been doing the work on devices, including the automobile industry, the device manufacturers, air pollution control districts, and other research agencies and institutes in making its determination of these criteria. While the Board is responsible for establishing a program to insure the control of pollutants from motor vehicles at the earliest possible date, it has, in addition, a major responsibility to insure protection to the public by establishing sound criteria for the approval of devices based on the best technical and scientific knowledge. The Board will not, therefore, certify a device which meets the standards for exhaust emissions unless it has complete assurance that this device will also be to the best interests of the buying public.

A PROGRAM FOR CONTROL OF OTHER VEHICULAR EMISSIONS

Second in importance to exhaust emissions are emissions from the crankcase. The American automobile manufacturers, on a voluntary basis, installed control devices on the 1961 model cars being sold in California. This voluntary effort has received commendation from the Board as an important step in the control of motor vehicle pollution. With the establishment of standards for crankcase emissions by the State Department of Public Health in December of 1960, the Board immediately started to gather information which may lead to mandatory requirements for control of this source. The other two sources of emissions are carburetor and gasoline tank evaporation, and the Board is deferring action on these until more information is available.

METHODS TO CONTROL EXHAUST EMISSIONS

Organizations throughout the United States are engaged in the development of devices or control systems which they claim will meet the California requirements. The Board has received reports and information from many of these including, in addition to the automobile industry, accessory manufacturers, chemical companies, catalyst manufacturers, companies established solely for this purpose and individual inventors. The extent of effort, time and money that has been devoted by these organizations to a solution of this particular air pollution problem are incalculable. Although the Board has received information that these efforts have resulted in the development of devices which will meet California's demands, confirmation of the number and types of such devices must await thorough testing.

Two principles are utilized for the control of exhaust emissions. One is the use of a direct flame to create a temperature high enough to burn combustible substances in the exhaust (the direct flame afterburner). The other relies on a catalyst to promote the oxidation of partially burned combustibles in the exhaust (the catalytic device). Some devices make use of both of these principles. The Board is now receiving applications from developers of all three types of devices.

The ideal solution to the problem would, of course, be the control of motor vehicle exhaust emissions by engine design changes. The Board would hope that this might come to pass. Yet because of the urgency of solving the present air pollution problem, it is not feasible to delay a control program until such time as engine design has progressed to the stage where it alone can control these emissions.

THE TESTING PROGRAM

The Board's testing is for the purpose of confirming the test data developed and submitted by the manufacturers. Only those devices will be tested which can be shown by the manufacturer's test data to meet the Department of Public Health standards and those criteria established by the Board. The Board itself will not undertake and will assume no responsibility for developmental testing.

The technical problems of testing and evaluating control devices are exceedingly complex and the Board's technical advisors and the staff are exploring the problems which must be considered in evolving a sound, workable approach to testing and approval. The complications are many and agreement has not been reached on some important aspects of the problem; solutions to some of these problems will require experience and extensive laboratory operations. The decision to require vehicular control devices carries with it the responsibility to develop the information and conduct the testing necessary to sound, equitable decisions. Failure to recognize these needs can only result in delayed or hazardous decisions.

Specific and detailed test procedures to be used in evaluating devices for compliance with the state standards are now being developed by the Board staff with the assistance of the Technical Advisory Group. The laboratory facilities of the Los Angeles Air Pollution Control District are being utilized to refine testing procedures so that the Board may initiate phase one testing, the testing of control devices to determine compliance with State standards, in early 1961. Testing will include complete laboratory and road tests necessary to provide complete assurance of their suitability and acceptability.

APPLICATIONS FOR PHASE I TESTING

Applications for Phase I testing were approved by the Board in December. To date, applications have been requested by and are being distributed to more than 50 firms and individuals. These applications require the manufacturer to submit detailed information on the device including its purpose, principle of operation, the testing that has been done on its performance for specified periods of time and under specified driving conditions. It has been designed to obtain information which will permit the Board to make a preliminary evaluation of the device on the basis of the manufacturer's data. In this way the application will serve as a screening device to determine which devices will be admitted to Phase I testing.

On the basis of information presently available, it is anticipated that several devices will be submitted during the first months of 1961. If reports already received as to the effectiveness of specific devices are confirmed by the Board tests, certification of devices may be a possibility at any early date.

PROGRAM OF THE MOTOR VEHICLE POLLUTION CONTROL BOARD FOR THE PERIOD 1961-1963

The Board will continue with the development of its program for the control of motor vehicle exhaust emissions. Now that Step I testing is underway for devices to control this source, the Board will establish on the basis of information received additional and specific criteria on such factors as durability, cost, noise and safety. As these criteria are established, testing will proceed and testing can be scheduled which will lead to final certification. It is the goal of the Board to certify devices as soon as possible consistent with protection of the interests of California motorists. Although certification of two devices is required before installation on cars in California becomes mandatory, the Board is looking toward the early certification of more than this minimum. The competition resulting from the certification of additional devices will accelerate engineering improvements on control systems and will also result in additional and significant benefits to the public through price reductions.

The Board will also proceed with the establishment of a program for control of crankcase emissions. This has been made possible by the adoption in December, 1960, by the State Board of Public Health of standards for this particular source of pollution. The Board will study the many factors relating to the approval, certification and eventual installation of such devices.

To accomplish its principal objective of controlling at the earliest possible date that air pollution created by California's motor vehicles, the Board's activities will be broken down into four general areas.

<u>The technical program</u> which will be conducted by the engineering staff will be accelerated as additional devices are submitted for testing and certification. This particular aspect of the Board's work will also involve the acquiring of information necessary for the establishment of criteria and testing procedures necessary to certify devices for the control of both exhaust and crankcase emissions.

<u>An expanded public information program</u> to keep the public informed as to the Board's program and the part played in the total air pollution problem by the motor vehicle in various areas of the State. Only with a complete public information program can the Board obtain the public support necessary for the successful execution of the mandate given the Board by the Legislature and the Governor. Inasmuch as the motoring public in California will be required to pay the price for the clean air they breathe, the Board feels it has a basic responsibility to protect the public interest in this regard and keep the public informed as to the need and desirability of the program.

An on-going evaluation of the Board program is necessary to judge the effectiveness of control measures as they are instituted and the impact of this program on the air pollution problem and on the residents of California. The Board will obtain much of this information, including that on air quality and changes in air quality, from other air pollution agencies in the State.

Liaison with other agencies and organizations with responsibilities and interests in the air pollution problem will be maintained. This will, of course, include the industries involved in the development of control systems. Equally important will be continuing work and cooperation with local air pollution control agencies, county governments, and the State agencies whose activities are related to this Board's program.

As the program develops it may be necessary to request amendments or additions to the present law. However, no changes appear necessary or desirable to the Board at this time.

CONCLUSION

The preservation and restoration of California's vital air resource is dependent on the success of the program for which this Board has been assigned responsibility. While control of this source of air pollution in itself cannot be expected to solve the entire problem, its control is vital since the motor vehicle is the single largest uncontrolled contributor to our smog problem.

The Board will proceed as quickly as possible with the program it has initiated during these last six months. In view of the seriousness of the problems which must be solved, however, the Board will not move hastily; rather it will proceed in such a way as to have complete assurance that the needs and interests of the public are amply safeguarded. Answers to many of the questions and solutions to the host of problems involved in instituting this kind of program can be answered only after the Board has proceeded further with the development and organization of the program. The Board is now involved in the difficult task of determining test procedures and establishing criteria and it will initiate the first phase of its device testing program early in 1961. After receiving a number of applications from device manufacturers and after these devices have been tested a more reliable estimate can be made than is possible now of the financial implications of this program and of the time when this source of air pollution can be effectively controlled.

The ultimate success of this Board's program is dependent on sustained and widespread public interest and support and continued industry cooperation. Further, it is dependent on other agencies, both public and private, for the development of vitally needed research information, including, for example, further data on the nature and extent of various types of emissions and on the emissions from various classes of vehicles; it is also relying on the Department of Public Health for refinement and improvement of the motor vehicle emission standards as further data is developed so that the Board's program can continue to be directed towards the principal and significant problem areas, and on the Department of Public Health and local air pollution control agencies with air monitoring programs for data on air quality.

While the Board recognizes that the problems are many, it is optimistic about the ultimate success of the program which must be effectively and rapidly instituted to protect the people and the State's economy from the menace of air pollution.

APPENDICES

APPENDIX I

Presentations at Public Meetings of the Motor Vehicle Pollution Control Board

July - December 1960

August 12, 1960 Los Angeles

1. Motor Vehicle Emissions and their Significance in "Smog"
   Mr. S. Smith Griswold, Control Officer
   Los Angeles County Air Pollution Control District

2. Fuel Composition and its Effects on "Smog"
   Dr. Steven W. Nicksic, Group Supervisor
   California Research Corporation

3. Air Quality and Motor Vehicle Exhaust Standards
   Mr. John A. Maga, Chief
   Bureau of Air Sanitation
   Department of Public Health

4. Problems in the Design of Motor Vehicle Afterburners
   Dr. W. L. Faith, Managing Director
   Air Pollution Foundation

September 27, 1960 San Francisco

1. Air Pollution in the Bay Area and Importance of Motor Vehicle Emission Control
   Mr. Benjamin Linsky, Control Officer
   Bay Area Air Pollution Control District

2. Factors to be Considered in Testing Devices
   Dr. Dale H. Hutchison
   Assistant Director of Industrial Development
   Stanford Research Institute

3. Control of Motor Vehicle Exhaust Emission Without the Use of Afterburners
   Professor A. L. London
   Stanford University

4. Factors in the Operation of Catalytic Afterburners
   Mr. C. M. Sayre
   Research Division
   E. I. du Pont de Nemours & Co.

September 27, 1960 San Diego

5. Factors in the Operation of Flame Afterburners
   Dr. Stuart L. Ridgway
   Thompson Ramo Wooldridge

November 14, 1960

1. Air Pollution in San Diego County and the Importance of the Motor Vehicle Pollution Control Program
   Mr. L. M. Klauber, Chairman, Citizens
   Advisory Committee, San Diego County
   Air Pollution Control District

2. The Automobile Industry and the Motor Vehicle Pollution Control Program
   Mr. Ralph H. Isbrandt, Chairman
   Engineering Advisory Committee
   Automobile Manufacturers Association

3. A Progress Report: Meeting the Requirements of the California Law
   Mr. R. E. Sutherland, Senior Vice President
   Universal Oil Products

4. Factors Relating to the Marketing and Pricing of Control Devices
   Mr. Paul L. Magill, Consultant

December 20, 1960 Fresno

1. Air Pollution in the San Joaquin Valley
   Mr. Herman Rempel, Chairman
   Air Pollution Committee
   Fresno Chamber of Commerce

2. Air Quality Measurements in the Central Valley
   Mr. John A. Maga, Chief
   Bureau of Air Sanitation
   State Department of Public Health

3. Air Pollution and Agriculture
   Mr. E. F. Darley, Chairman
   Statewide Agricultural Air Pollution
   Advisory Committee
   University of California

4. Meeting the Requirements of the California Law
   Mr. G. P. Larson, Oxycatalyst, Inc.
   and E. J. Houdry Muffler Company

December 20, 1960 Fresno

5. Functions of the Muffler and Attendant Design Problems
   Mr. W. R. Godfrey
   AP Parts Corporation

6. Factors Determining Acceptability of Exhaust Control Systems
   Mr. T. A. Danner, Director of Engineering
   Arvin Industries, Inc.

7. Control of Crankcase Emissions
   Mr. S. Smith Griswold, Control Officer
   Los Angeles County Air Pollution
   Control District

APPENDIX II

MOTOR VEHICLE POLLUTION CONTROL BOARD

RESOLUTION NO. 60-1

METHODS OF ADOPTING CRITERIA FOR THE TESTING AND CERTIFICATION OF CONTROL DEVICES FOR MOTOR VEHICLE EXHAUST EMISSIONS

WHEREAS the State Health and Safety Code states that the emission of pollutants from motor vehicles is a major contributor to air pollution in many portions of the state and that the control and elimination of such pollutants is of prime importance for the protection and preservation of the public health and well-being and for the prevention of irritation to the senses, interference with visibility, and damage to vegetation; and

WHEREAS said Code provides that the State Motor Vehicle Pollution Control Board shall determine and publish the criteria for approval of motor vehicle pollution control devices taking into consideration the cost of the device and its installation, its durability, the ease and facility of determining whether the device is properly functioning, and any other factors which, in the opinion of the Board, render such a device suitable or unsuitable for the control of motor vehicle air pollution or for the health, safety, and welfare of the public; and

WHEREAS said Code directs the Board to issue certificates of approval for any motor vehicle pollution control device where, after being tested by the Board, the Board finds that the device operates within the standards set by the State Department of Public Health and meets the criteria adopted by the Board; and

WHEREAS it is essential that the Board act in accordance with these directives at the earliest possible date in order to establish a program for insuring the control of motor vehicle created air pollution and to do this in such a way as to protect the interests of the public which will be using the exhaust control devices; now, therefore, be it

RESOLVED, That the policy of the Motor Vehicle Pollution Control Board, with regard to the adoption of criteria for the certification of motor vehicle exhaust control devices and with regard to the testing of these devices, is:

A. To establish and adopt criteria in well-defined steps.

B. To test devices in accordance with these steps.

C. To provide that Step I testing is for the purpose of determining whether devices meet the standards for motor vehicle exhaust emissions as established and published by the California State Department of Public Health.

RESOLUTION NO. 60-1

D. To require that the device manufacturer in his application to the Motor Vehicle Pollution Control Board for Step I testing submit data on the device's compliance with these standards and on other characteristics of the device as stipulated by the Board.

E. To accept applications and devices for Step I testing at the earliest possible date.

Adopted November 14, 1960

APPENDIX III

Report of

COMMITTEE ON CRITERIA FOR DEVICES, EVALUATION, AND TEST PROCEDURES

As Acted on and Approved by the

Motor Vehicle Pollution Control Board

November 14, 1960

The following recommendations were unanimously approved by the Board at its meeting on November 14, 1960.

1. The appointment of a technical advisory committee to serve at the pleasure of the Board to work with the staff on the development of criteria and test procedures. This committee should be composed of, but not limited to, representatives of the following groups:

Accessory Manufacturers
Air Pollution Control Districts
Analytical Laboratories
Automobile Manufacturers
Device Manufacturers
Research Institutes
Public Health Departments
Society of Automotive Engineers
Universities

2. The adoption of a policy statement regarding crankcase emissions, the statement to include the following points:

a. The motor vehicle contributes to California air pollution because of its emission of pollutants from several sources including the exhaust system, the crankcase, and from carburetor and gas tank evaporation. The exhaust emissions constitute by far the most significant source of pollutants, and consequently their control is vital.

b. The Board is presently proceeding with the steps necessary for approving and certifying devices which will control the principle emissions, those emanating from the exhaust system.

c. Although crankcase emissions or blowby represents a less significant source of hydrocarbons than does the exhaust, its control, which can be easily and inexpensively achieved, cannot be ignored.

d. The Department of Public Health is currently developing standards to define the maximum permissible emissions from the crankcase. This Board cannot proceed with the certification of blowby or crankcase emission control systems until the standards are developed and adopted by the State Board of Health.

e. The Board commends the American automobile industry for its voluntary installation of crankcase ventilating systems on new 1961 model cars being offered for sale in California. This represents one step in solving the problem that is created by today's smog-producing automobiles.

f. Although crankcase emissions constitute a minor source of air pollution, the Board recognized that crankcase ventilating systems on motor vehicles in California, while not now required by law, is of value.

g. The Board hopes that the Automobile industry will proceed with the development and manufacture of exhaust control devices with the same speed as it has with the crankcase emission control systems.

3. The adoption of a policy statement regarding the responsibilities of the Board to include the following:

The legislation creating the Board states "That the emission of pollutants from motor vehicles is a major contributor to air pollution in many portions of the state; that the control and elimination of such pollutants is of prime importance for the protection and preservation of the public health and well being, and for the prevention of irritation to the senses, interference with visibility, and damage to vegetation and property."

The Board's responsibility is therefore to establish a program to insure the control of pollutants from motor vehicles at the earliest possible date.

The Board wishes to emphasize, in addition, that it has a major responsibility to insure protection to the public by establishing sound criteria for the approval of devices based on the best technical and scientific knowledge. The legislation creating this Board clearly indicated this when it stated that "... in determining the criteria, the Board shall take into consideration the cost of the device and its installation, its durability, the ease and facility of determining whether the device is properly functioning, and any other factors which, in the opinion of the Board render such a device suitable or unsuitable for the control of motor vehicle air pollution or for the health, safety and welfare of the public."

The Board wishes to emphasize that it will not certify a device which meets the standards for exhaust emissions unless it has complete assurance that this device will also be to the best interests of the buying public.

4. The endorsement of a policy statement relating to the adoption of criteria for acceptable exhaust control devices to include the following:

The policy of the Board is:

a. To establish and adopt criteria in well-defined steps.

b. To test devices in accordance with these steps.

c. Inasmuch as all devices must meet the standards which have been established and published by the State Department of Public Health for motor vehicle exhaust emissions, to stipulate that Step 1 testing is for the purpose of determining if devices do meet these standards. This testing by the Board will comprise only the first step in a series of tests leading to final device certification.

d. To accept devices at the earliest possible date for Step 1 testing.

e. To require the manufacturer in his application for Step 1 testing to submit data on other characteristics of the device as stipulated by the Board.

5. The adoption of the following policy relating to the adoption of additional criteria:

The Board will adopt precise criteria on other factors at the earliest possible date. At this time, its policy relating to certain of these criteria is stipulated as follows:

a. <u>Compliance with Department of Public Health Standards</u>. The Board will certify only those devices which perform above the minimum standards as stipulated by the Department of Public Health during the period and/or miles for which the device manufacturer seeks certification.

The committee in reaching this recommendation, determined that such a criteria was necessary, among other reasons, to facilitate enforcement and any inspection that may be required and to permit the standardization of test procedures. Further, it will minimize the problems which will be created by those motor vehicles which travel in excess of the mileage for which device certification is sought.

b. Life of Device. It is the intention of the Board not to certify devices with an effective life of less than one year based on State Department of Motor Vehicle registration periods. This certification should preferably be for more than one year. In establishing this criteria, the Board will consider the driving patterns of California motorists, the cost of the device, and the cost of its installation and maintenance. In addition, the Board will take into account the rate of loss of efficiency of the device following the minimum acceptable life established by the Board.

c. Other Criteria. The Board recognizes the importance of such other factors as warm-up time, bypass of the device, the effect of abusive driving conditions on the device, noise, excessive heat, odor, effect on engine operation, and the cost of the device, its replacement and maintenance. It will consider each of these factors in reaching its decisions as to the certification of any particular device.

6. One or more public hearings should be scheduled to provide the public with an opportunity to present information on the establishment of criteria on cost and life of motor vehicle exhaust control devices. Those invited to appear should include automobile owners and automobile clubs, device manufacturers, the automobile industry, accessory manufacturers, air pollution control districts, and other local control agencies.

7. A restatement of the Board policy with regard to testing as follows:

The Board will not undertake and will assume no responsibility for developmental testing of control devices. The Board's testing will be limited to that needed to confirm the test data developed and submitted to the Board by the manufacturers. The Board will test only those devices which can be shown by the manufacturer's test data to meet the State Department of Public Health standards and criteria established by this Board.

8. That the Board require the device manufacturer to pay an application fee and to submit the following information at the time of application for Step 1 testing: (Information on items specified on the application form will be kept confidential in the interests of the public.)

a. Instructions on how to apply.

1. Where to submit the application.
2. Number of copies of application required.
3. Official of company who should sign application.

b. Name and address of applicant.

c. Information on status of patent.

d. Description of the device.

1. Purpose (to control exhaust, blowby, evaporative losses, etc.)
2. Principle (how does device accomplish its purpose?)
3. Engineering drawings of device.
4. Materials of construction (kind, weight, etc.)

e. Period for which certification is sought (miles and/or time).

f. Classes of motor vehicles for which device is applicable (list of makes and models of vehicles for which the applicant reports his device is suitable). The manufacturer will be required to supply data adequate to indicate that the device will operate on the number and type of vehicles for which he claims the device is suitable.

g. Data on compliance with the standards as established and published by the California State Department of Public Health. Performance data for the following mileages will be required: 0, 1000, 5000, 10,000, 15,000, and 20,000.

h. Description of test methods and procedures used by applicant to determine compliance with standards:

1. Source of data and qualification of analytical laboratory.
2. Test procedures used by applicant in tests of device.
3. Fuels used in tests.
4. Makes, models, age and condition of vehicles used in tests.

i. Data on the service life of the device.

1. Time, mileage and performance data (to ascertain life of device from standpoint of its effectiveness.)
2. Construction materials' life data (to ascertain life from standpoint of corrosion, materials' failure, etc.).

j. Data on operation under conditions of abusive driving (high temperature, flooding of device, attrition of catalyst, etc.).

k. Operating conditions when bypass of device will occur and effect of bypass on overall efficiency.

l. Limits of operating conditions that device can tolerate without damage.

m. Warm-up characteristics for exhaust device. (Time required for the device to become fully effective is very important.

If this time is long the device must then operate at higher efficiency for remaining period to achieve the same overall efficiency as a device with a short warm-up time).

n. Operation of device from standpoint of:

1. Noise
2. Odors
3. Excessive Heat
4. Safety

o. Adverse effects of device on engine operation.

p. Cost of device.

1. Initial cost of device and appurtenances.
2. Estimated installation cost.
3. Parts' replacement costs.
4. Maintenance and operating costs.

9. Step 1 testing procedures to be followed by the State.

The following tests are felt to be necessary for Step 1 testing and are presented here for your consideration and comment. The committee recommends that, since the number of devices to be submitted to the Board must be adequate to permit tests on vehicles and in the laboratory and also to assure that the tests are representative, the manufacturer be required to submit 25 units of each device to the Board. These should be required from the manufacturer at such time as the Board has determined on the basis of the manufacturer's application, that the device is acceptable for testing.

a. Dynamometer.

1. Efficiency under various operating conditions.
2. Operation and efficiency under unusual conditions.
3. Warm-up time and bypass characteristics.

b. Fleet vehicles.

1. Select fleets to provide different driving patterns and consider use of vehicles such as those of Highway Patrol for severe driving conditions.
2. Efficiency vs. life tests.
3. Tests at 0, 1000, 5000, 10,000, 15,000, 20,000 as a minimum. (This does not preclude the Board of specifying a minimum life of more than 20,000 miles.)

c. Vehicles under control of laboratory.

1. Device warm-up characteristic under driving conditions.
2. Device temperature characteristic under driving conditions.
3. Bypass conditions.
4. Operations under severe driving conditions.
5. Composite samples before and after device.

d. Measurements to be made.

1. Compounds measured.

a. Carbon monoxide
b. Hydrocarbons
c. Carbon dioxide.

2. Samples collected.

a. Exhaust gases before device.
b. Exhaust gases after device.

Evaluation of exhaust device will be based on a number of factors including:

a. Car emission before device.
b. Car emission after device.
c. Absolute emission.
d. Per cent removal of carbon monoxide and hydrocarbons.
e. Higher efficiency required for device as a result of bypass, warm-up, and some device failures.
f. Life vs. efficiency. To determine compliance with standards it must be demonstrated that the device meets the standards during period for which certification is sought, and for vehicles randomly representative of the makes, models, and conditions to which the device would be applied.

10. That the Board contracts with laboratories for the performance of testing specify in detail the nature and extent of testing to be required and specify that all testing be done under direction of the Board.